

The CBCT Issue

September 2011 – Volume 4, Issue 7

orthotown™

exclusively for orthodontic specialists



Scheduling Institute

Meet the **New Patient Specialists**

page 34

Continuing Education
**Interpreting the
CBCT Data Volume**
in Orthodontic Cases, Part 2
by Dr. Dale Miles

Cone Beam
Risks and Benefits
by Dr. Ed Lin, page 52

Help



Click to display a thumbnail listing of pages.



Click to print this PDF file or pages from it.



Click to save this PDF file to your computer.



Click to go to the next or previous page of the PDF.



Click to decrease or increase the magnification of current page. May have to use horizontal scrollbar to view right hand page.

POWER2Reason

EVIDENCE BASED SYMPOSIUMS

ORLANDO

The Digital Orthodontics Symposium
October 28-29, 2011

Dr. Dale Miles
Dr. Chung H. Kau
Dr. Michel Dalstra
Susan McElvy
Cynthia Hulst Kohler



BOSTON

The Anthony A. Gianelly Symposium
November 10, 2011

Dr. John R. Bednar
Dr. B. Giuliano Maino
Dr. Roger Wise
Dr. Marcel Korn

Dr. Jonathan Sandler
Professor Kevin O'Brien
Dr. Dirk Wiechmann
Dr. James Mah

Dr. David Sarver
Dr. James McNamara
Dr. Dan Grauer
Dr. Sonny Long
Dr. John Christensen
Randall Berning
Charlene White

LONDON

The Soho Symposium
December 2, 2011

LAS VEGAS

The Gorman Symposium
January 20-21, 2012



Scan this QR code to register or learn more about these events. Visit www.POWER2Reason.org



supported by

AMERICAN
ORTHODONTICS

Empower[®]

Finally. A system that puts control back in your hands.

It's Your Choice:
Fully Interactive or
Dual Activation System

Interactive Anteriors and Passive Posteriors

- Multiple prescription options
- Hook option available on all posterior teeth and laterals
- Three bicuspid pad options
- **Empower SL molars available soon**

MADE IN THE USA



www.empowerbraces.com

Patents #5,630,715, #5,722,826, #4659, 309

1-920-457-5051 USA and Canada: 1-800-558-7687 www.americanortho.com

AO AMERICAN
ORTHODONTICS



Articles

- 42 Long Live the King**
Ali Husayni and Lorrie Delk Walker present reasons for orthodontists to consider SEO over other online advertising formats.
- 45 Placing Your Practice in the Hands of Your Patients**
Diana P. Friedman and Michelle Eggers discuss why joining the mobile movement and implementing a mobile marketing strategy is crucial.
- 48 Aligner Attachment Bonding Technique Reduces Flash and Failure**
Drs. Mark Perelmuter, Bradley Goldberg and Dee Holloman present a technique which solves the problems clinicians encounter when placing resin attachments on the teeth during Invisalign treatment.
- 50 ConebeamInfo.com**
Orthotown Magazine talks with the developers of ConebeamInfo.com, a site created to raise awareness about the benefits and risks of CBCT use.
- 52 An Overview of the Risks and Benefits of Cone Beam Computed Tomography**
Dr. Ed Lin discusses the risks and benefits associated with CBCT and reviews the guidelines set up in his practice to minimize the risk and maximize the benefits.
- 62 The Truth About CBCT Radiation**
Do the benefits truly outweigh the risks?
- 70 Unlocking Airway, TMJ and Growth with CBCT as the Key**
Explore how one scan changed the life of one of Dr. Juan-Carlos Quintero's "most special" patients.

74 TADs Showcase

Townie Clinicals

- 12 Case in Progress, Bite Opening, Any Suggestions?**
Help a fellow Townie out with this yet-to-be-finished case.
- 20 Would You Wait on This Referral?**
This orthodontist needs a 3D scan to continue, but is not sure the timing is right.
- 24 Impacted Teeth, Slow Dental Development**
This Townie recommends future extractions – definitely all Cs, but what about LR D and E? Any opinions?

Message Board

- 30 Should There Be a Fee for Starting Serial Extraction for Phase I tx?**
How do you determine whether to charge?

Product Profile

- 69 Smiles Change Lives**

In This Issue

- 4 On Orthotown.com**
- 9 Industry News**
- 10 According to "Dr. Wo": That Time of Year**
- 33 Townie Poll: Retention**
- 40 New Products**
- 80 Straight Talk: Short Order Cook or a Michelin Star Chef /Ad Index**

For the Next
BIG THING
in Orthodontics



You Need to Think Small



Spider Screw™

Temporary Anchorage Device System



Spider Screw™
Self-Ligating
TAD System

Discover the Unique Advantages of the Spider Screw™ TAD System
Designed by a Leader in Temporary Orthodontic Anchorage Treatment

- Versatile due to small dimensions and unique patented design
- Bracket-like head design features perpendicular round slots
- Generous under tie-wing area for easy placement
- Short or long collared neck sizes
- Self-drilling and self-tapping asymmetrical thread versions
- Patient compliance is practically unnecessary for successful treatment every time

Discover all of the benefits at www.orthotechnology.com/spiderscrew


Ask About Our Self-Ligating TAD
800-999-3161 | 813-991-5896



CASE OF THE MONTH

Virtual Study Club

Non-Surgical Treatment, Missing 2nd Bis

Here is an ideal surgery case but it is not an option. This case was referred by an oral surgeon after he made the decision to remove upper and lower second bicuspids and third molars. Check out the additional case photos on Orthotown.com and provide your comments. 

171994

Search



ORTHOTOWN.COM FEATURES

MESSAGEBOARDS

▶ Future of Orthodontics 2, Do You Feel Over-qualified as an Orthodontist?

A Townie wants to know your opinion of personal qualification based on the results of a USA Today job survey. Check out this interesting discussion.

Future of Orthodontics 2

Search

▶ Calling Patients at Night

When you call a patient in the evening after a more complex procedure, do you do it the same day, next day or third day?

Calling Patients

Search



Monthly Poll

Practice Management

Have you ever used the services of a dental consultant?

A. Yes B. No



Orthotown.com

Refer a Colleague to Orthotown

Orthotown now has more than 3,200 members. Help us grow our community by referring more members and you could win an iPad! Find out the details on Orthotown.com.



Online CE

Evidence-Based Orthodontics Practice Management

– Eugene Roberts, DDS, PhD

This course will explore the industrial engineering principles of W. Edwards Deming and how they are applicable to orthodontics treatment efficiency.

CONNECT WITH US

Like us on Facebook

www.facebook.com/orthotown

Subscribe to Orthotown Magazine

www.orthotown.com/subscriptions.aspx

Receive Orthotown e-Newsletters

www.orthotown.com/myprofile.aspx

continued on page 6

Just Getting Warmed Up.

The best-selling dental laser in the world

Best-in-class education and training included

Innovative, award-winning design and technology

Wireless foot control now available

Choose traditional fiber or convenient disposable tips



Use your smart phone to scan this QR code.

cda

BOOTH # 2406

September 22-24, 2011
San Francisco, CA

FREE
\$3,500
Value

Picasso
Starter Package*



Call 866.999.2635

Call now or visit amdlasers.com to order!

AMD LASERS®

A DENTSPLY International Company



AMD LASERS®, LLC
www.amdlasers.com

7405 Westfield Blvd.
Indianapolis, IN 46240, USA

866.WWW.AMDL
866.999.2635

TEL: +1.317.202.9530
FAX: +1.878.868.4108
sales@amdlasers.com

FDA CE

© 2011 AMD LASERS, LLC

09
11

Message
from the
Online
Community
Manager

▶ Back-to-school or Not, Stay at the Forefront

It's September and that means back-to-school time for students! While many of you won't be heading off to class this month, it doesn't mean you're done learning. Because you need to stay at the forefront of your profession, Orthotown.com offers online continuing education courses so you can learn the latest in dentistry. Our courses cover everything from indirect bonding to practice management, are free to view and are only \$18 per credit to claim your credits. With online learning, you can watch courses on your schedule and study at your pace, all from the comfort of your home or office. Best of all, there's no need to sharpen a No. 2 pencil!

If you have questions about the site, call me at **480-445-9696** or e-mail me at kerrie@farranmedia.com.



See you on the message boards,
Kerrie Kruse
Online Community Manager

HELPCENTER

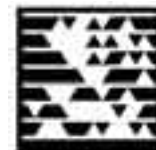
Feature of the Month

We have online members from all over the world, but some people still haven't joined our growing communities. If you know of someone who should become an official Townie, you can use the "Refer a Colleague" link to let them know. Check out the Help Center's Feature of the Month for more information!

VIDEOTUTORIAL

How to Manage your Communities

The number of Townie communities that you have access to is growing. Make sure you don't miss a thing by updating your list of communities. Go to the Media Center and click on the Tutorial section to watch a short video with step-by-step instructions.



GETTAG

Throughout *Orthotown Magazine*, you can scan tag codes to access information directly from your smartphone. To scan these codes, visit <http://gettag.mobi/> to download the free barcode reader to your mobile device. You can then scan every code you see in *Orthotown Magazine* to access additional information, enter contests, link to message boards, comment on articles and more!

3rd Annual TAD User Forum

November 4-6, 2011 · Las Vegas, Nevada

Wynn Las Vegas

www.wynnlasvegas.com

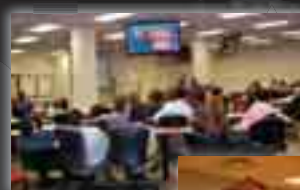
Over 250
Attendees
Last Year!

Earn Up to 18
CE Credits

Don't Gamble with Your TAD Success...
Stack the deck in your favor

Forum Overview

- ◆ Choose from Multi-Track Lecture Schedule
- ◆ Hear from 10 Market-Leading Experts
- ◆ Beginner & Advanced Level Education
- ◆ Dynamic Round-Table Workshops
- ◆ Optional Sunday Hands-On Activities:
 - Hands-On w/Demo Models
 - Place your 1st TAD on a *LIVE* Patient



Register Today!
tomasforum.com
800.523.3946

Editorial Director

Wm. Randol Womack, DDS, Board Certified Orthodontist
randy@farranmedia.com

Editor

Benjamin Lund • ben@farranmedia.com

Assistant Editor

Marie Leland • marie@farranmedia.com

Copy Editor/Staff Writer

Chelsea Patten • chelsea@farranmedia.com

Creative Director

Amanda Culver • amanda@farranmedia.com

Graphic Designer

Corey Davern • corey@farranmedia.com

Vice President of Sales & Business Development

Pete Janicki • pete@farranmedia.com

Account Manager, Orthotown

Mary Lou Botto • marylou@farranmedia.com

Regional Sales Manager

Steve Kessler • steve@farranmedia.com

Geoff Kull • geoff@farranmedia.com

Executive Sales Assistant

Leah Harris • leah@farranmedia.com

Marketing Director

Jerry Kaster • jerry@farranmedia.com

Circulation Director

Marcie Coultts • marcie@farranmedia.com

I.T. Director

Ken Scott • ken@farranmedia.com

Internet Application Developers

Angie Fletchall • angie@farranmedia.com

Nick Avaneas • niko@farranmedia.com

Electronic Media Production Artist

Amy Leal • amy@farranmedia.com

Multimedia Specialist

Devon Kraemer • devon@farranmedia.com

Online Community Manager

Kerrie Kruse • kerrie@farranmedia.com

Publisher

Howard Farran, DDS, MBA, MAGD • howard@farranmedia.com

President

Lorie Xelowski • lorie@farranmedia.com

Controller

Stacie Holub • stacie@farranmedia.com

Receivables Specialist

Kristy Corely • kristy@farranmedia.com

Editorial Advisory Board



Dr. Sebastian Baumgaertel
Cleveland, OH



Dr. John Graham
Litchfield Park, AZ



Dr. Robert Boyd
San Francisco, CA



Dr. David Hatcher
Sacramento, CA



Dr. Doug Chenin
San Jose, CA



Dr. Andrew Hayes
O'Fallon, MO



Dr. Clark Colville
Seguin, TX



Dr. Ed Lin
Green Bay, WI



Dr. Ken Fischer
Villa Park, IL



Dr. David Paquette
Charlotte, NC



Dr. Robert W. Fry
Overland Park, KS



Dr. Orhan Tuncay
Philadelphia, PA

Editorial published in *Orthotown* is reviewed by relevant members of the magazine's Editorial Advisory Board and/or qualified outside experts and specialists.

Copyrights of individual articles appearing in *Orthotown* reside with the individual authors. No article appearing in *Orthotown* may be reproduced in any manner or format without the express written permission of its author (whose contact information is either footnoted in the article itself or available through Orthotown) and *Orthotown Magazine*. Orthotown.com message board content is owned solely by Farran Media, LLC. Orthotown.com message boards may not be reproduced in any manner or format without the expressed written consent of Farran Media, LLC.

Orthotown makes every effort to report clinical information and manufacturer's product news accurately, but cannot assume responsibility for the validity of product claims or typographical errors. Neither do the publishers assume responsibility for product names, claims, or statements made by contributors, in message board posts, or by advertisers. Opinions or interpretations expressed by authors are their own and do not necessarily reflect those of Orthotown or Farran Media, LLC.

The Orthotown.com "Townie Poll" is a voluntary survey and is not scientifically projectable to any other population. Surveys are presented to give Orthotown.com participants an opportunity to share their opinions on particular topics of interest.

LETTERS: Whether you want to contradict, compliment, confirm or complain about what you have read in our pages, we want to hear from you. Please visit us online at www.orthotown.com.

Orthotown (ISSN 1943-1570) is published ten times a year on a controlled/complimentary basis by Orthotown.com, Inc., 9633 S. 48th St., Suite 200, Phoenix, AZ 85044.
Tel. 480-598-0001.
POSTMASTER: send address changes to: Orthotown.com, Inc., 9633 S. 48th St., Suite 200, Phoenix, AZ 85044

©2011 Orthotown.com, Inc. All rights reserved. Printed in the USA.

Publications Mail Agreement #40902037
Return undeliverable Canadian addresses to
Station A
P.O. Box 54
Windsor ON N9A 6J
e-mail: cpcreturns@wdsmail.com

Ortho News in Brief

The Industry News section helps keep you informed and up-to-date about what's happening around the dental profession. If there is information you would like to share in this section, please e-mail your news releases to ben@farranmedia.com. All material is subject to editing and space availability.

John T. Jankowiak, Former Great Lakes President/CEO Remembered

John T. Jankowiak, retired president and CEO of Great Lakes Orthodontics, Ltd., died on August 3, 2011. Jankowiak, who served as the company's chairman of the board, was a dynamic leader and highly respected in the dental profession for his knowledge and integrity. He joined Great Lakes in 1975. His charismatic personality and work ethic earned him the presidency in 1989. He served on the company's board of directors for more than 30 years and was elected chairman in 2001.

i-CAT Puts Clinicians In Control With Quick Scan

Imaging Sciences International now offers Quick Scan, the lowest available dose 3D scan of the full dentition. Quick Scan is one of many proprietary tools that allow general dentists, orthodontists, oral surgeons and other specialists to maximize the clinical information they need while maintaining the ability to control radiation exposure to the patient. With Quick Scan, the entire patient dentition can be imaged in 3D for only 27uSv. This dose compares favorably to a typical digital panoramic scan of 24uSv yet offers full three-dimensional radiography of both arches that provides accurate and distortion-free views not available with 2D panoramics. For more information on the low-dose Quick Scan, visit www.imagingsciences.com.

OHSU School of Dentistry Team Compares Bacteria on Two Types of Braces

Researchers at the Oregon Health & Science University School of Dentistry have determined that patients with elastomeric orthodontic brackets have similar levels of bacteria as patients wearing self-ligating orthodontic brackets when examined after one year. This is in contrast to an OHSU pilot study one year ago that determined elastomeric bracket patients had significantly higher plaque retention than self-ligating bracket wearers after examination at one week and five weeks. The researchers also found in the new study that patients wearing self-ligating brackets and elastomeric brackets had similar numbers of white-spot lesions. Their findings are published online in the Summer 2011 issue of *Orthodontics: The Art and Practice of Dentofacial Enhancement*.

Pride Institute Establishes New Orthodontic Consulting Division

The Pride Institute has announced the formation and launch of its newly created Orthodontic Consulting Division. Pride's new Orthodontic Division will focus exclusively on the orthodontic specialty providing customized tools and skill development to support the improvement and growth of practices. In addition to specialized programs, Pride has created customized modules for orthodontists and their teams to grow productivity. Visit www.prideinstitute.com for additional details.



That Time of Year

by Wm. Randol Womack, DDS, Board Certified Orthodontist
 Editorial Director, *Orthotown Magazine*

Every year around this time, kids start moping around while mom and dad start dancing in the aisles of Office Max and Staples – it's back-to-school time, aka, Mom's Independence Day! It's also around this time of year that my orthodontic practice sees record appointments of students whose parents want them to get in one last time before school begins.

I'm also happy to say around this time of year is when *Orthotown Magazine* presents its annual focus on cone beam computed tomography (CBCT) 3D digital imaging. In the last few years, CBCT has been everything from a buzzword to a game changer in the orthodontic specialty, and it has been a major focus for this publication as we've looked at the possibilities and liabilities of this technology. Personally, in 2009, having returned from the Third International Congress on 3D Dental Imaging, my eyes were opened wide to the potential of CBCT and I'd written my September 2009 column about what I found and how I believed the technology would revolutionize the orthodontic profession. Ever since, we've looked at as many aspects of CBCT as possible, and will continue to do so in this and future issues of *Orthotown Magazine*.

"If you are still considering CBCT, if you are beginning to utilize cone beam images or if you are regularly using cone beam technology in your practice, you will greatly benefit by attending the International Congress in Dallas."

I'm sure you noticed the special continuing education supplement in our July/August issue titled "Interpreting the CBCT Data Volume in Orthodontic Cases, Part 1" written by CBCT guru, Dr. Dale Miles. We are very excited to present this two-part series that Dr. Miles put together for you, and we are pleased to present Part 2 in this month's issue. Dr. Miles' previous contribution to *Orthotown Magazine* was in September 2009, and he closed his contribution by saying, "Do not wait! Get trained, get ready and get started!" That was two years ago, already!

If you haven't, I implore you to go back to your July/August issue and tear out the first part of Dr. Miles' CBCT CE series. When you're finished with it, check out the second and final part in this issue. Even if CBCT is something you've only casually thought about, you owe it to yourself to read Dr. Miles' articles.

In this issue, we focus on the truth about CBCT radiation. The currently featured speakers on CBCT are being polled to compile a resource article to expose and refute some misquoted and alarming references to the "abuse" of using CBCT in orthodontics. In my practice, as well as yours, we require an accurate representation of this issue, to feel reassured that we are not only using the ALARA principle in our practice but also so we can confidently discuss the truth about this technology with our patients and their parents.

In addition to the time I spend working on *Orthotown Magazine*, I am already registered for the Fifth International Congress on 3D Dental Imaging, which will be November 4-5, 2011, in Dallas, Texas. If you are still considering CBCT, if you are beginning to utilize cone beam images or if you are regularly using cone beam technology in your practice, you will greatly benefit by attending the International Congress in Dallas.

As Dr. Miles declared two years ago, it's time to get trained, get ready and get started! See you in Dallas! ■



**Low Profile
Mini Design
With an Advanced
Nickel Titanium Clip**

Lotus[®] Plus

Passive Self-Ligating Bracket System



Just Some of the Many Unique Features, Specifically Designed
by an Orthodontist That Will Change the Way You Treat Patients

- Open design allows for maximum patient hygiene
- Bracket design provides passive engagement to reduce friction and improve sliding mechanics
- Low profile mini-twin design with rhomboid shape for easy placement and more patient comfort
- No special instruments required. Opens easily with an explorer, closes with utility plier or tweezers
- Mandibular arch clips open gingivally to minimize occlusal interference, maxillary arch open occlusally
- Convertible bracket allows for the engagement of ligature ties during the finishing phase if desired



View our online video and
discover all of the benefits at
www.orthotechnology.com/lotus

Call About Our 2 Free Trial Cases Today*
800-999-3161 | 813-991-5896



 **ORTHO TECHNOLOGY[®]**

*Get 2 free patient cases (40 brackets) when you purchase 5 cases (100 brackets). Try Lotus Plus Brackets for the first time and if you are not completely satisfied then return the remaining cases and keep the two trial cases at no cost. Offer expires 12-31-2011
© 2011 Ortho Technology, Inc. Lotus is a registered trademark of Ortho Technology, Inc. Domestic and international patents pending.

Case in Progress, Bite Opening, Any Suggestions?

Help a fellow Townie out with this yet-to-be-finished case.

dhmjdds

Posted: 7/1/2011

Post: 1 of 28

Patient had Phase I treatment for anterior malalignment and diastema in 2006-2007. Very straight forward treatment. Had a little chin deviation to right but only if you look for it on the old photos. In retention/obs with lingual arch and Hawley until 2010.

Records in 2010 show unilateral right posterior crossbite, noticeable facial asymmetry and occlusal plane cant. Started comprehensive treatment with RPE and full fixed.

Now we are 15 months into treatment. The arches are well-coordinated (fit together nearly perfectly with hand-articulation of the models). Photos show obvious bite opening, somewhat Class II, proclination of incisors, opening of mandibular plane angle.

None of this is shocking, but I need some thoughts about how to proceed. Use TADs to intrude posterior teeth? Extract 5s? Anterior elastics? Maxillary impaction? ■ Diane



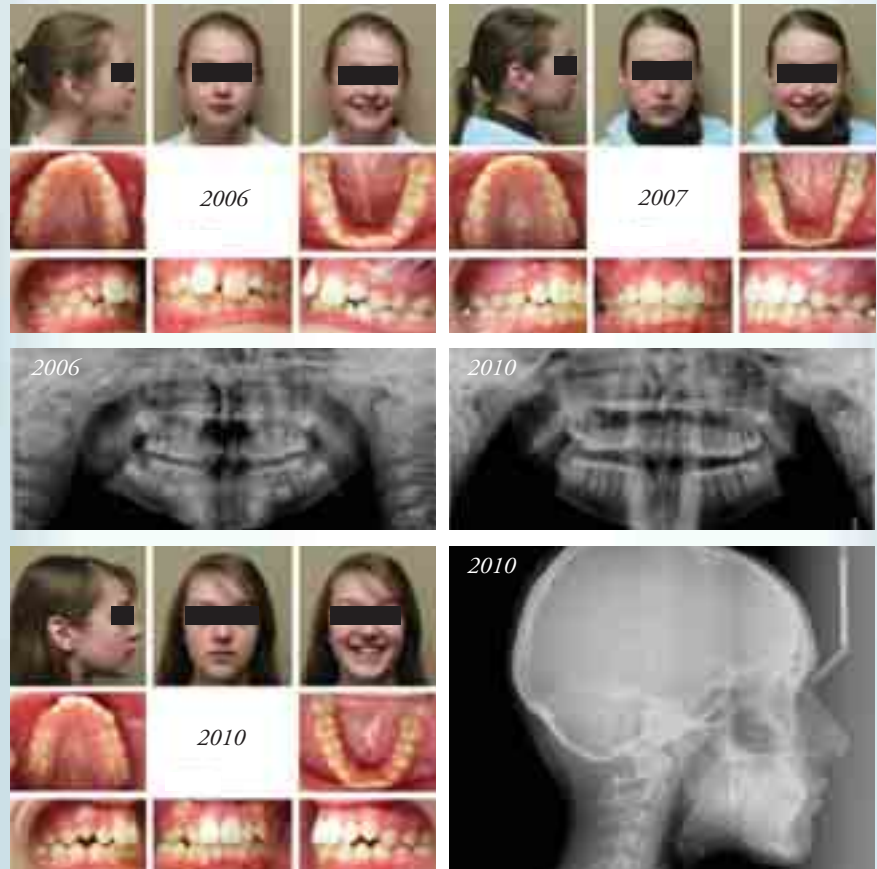
Visit the Orthotown.com message boards to view these similar threads regarding bites opening.

Progress Records... Open Bite, Lip Incompetent

Search: [Progress Records](#)

What Kind of Non-visible tx Option Do We Have?

Search: [Non-visible tx Option](#)



continued on page 14

Introducing **3D CEPHALOMETRIC ANALYSIS** because your patients are not 2D

Comprehensive 3D analysis

Trace directly on the 3D volume.
Customizable options for all types
of measurements and analyses.



Automatic landmark identification

Simply trace the outlines of structures and landmarks are automatically identified for you. Easy to learn and use by the entire staff.



Easily create your own 3D

Create custom planes, lines, landmarks, and measurements.
Easily establish 3D norms with
automatic norm building functions.



Compatible to traditional analysis

The 3D tracing can be converted
into a traditional 2D analysis,
including Steiner, McNamara, and
more.



Introducing the first full feature 3D cephalometric analysis software. A full 3D analysis clears up any ambiguity in misleading 2D images. It provides a very objective and accurate quantitative assessment using your patients full 3D anatomy. Whether you are in a private practice or an academic institute, the 3D cephalometric analysis will provide useful applicable information. A friendly and fluid user interface makes it very easy to use, customize and train staff members. With automatic landmark identification features, you and your staff can be tracing in 3D immediately!

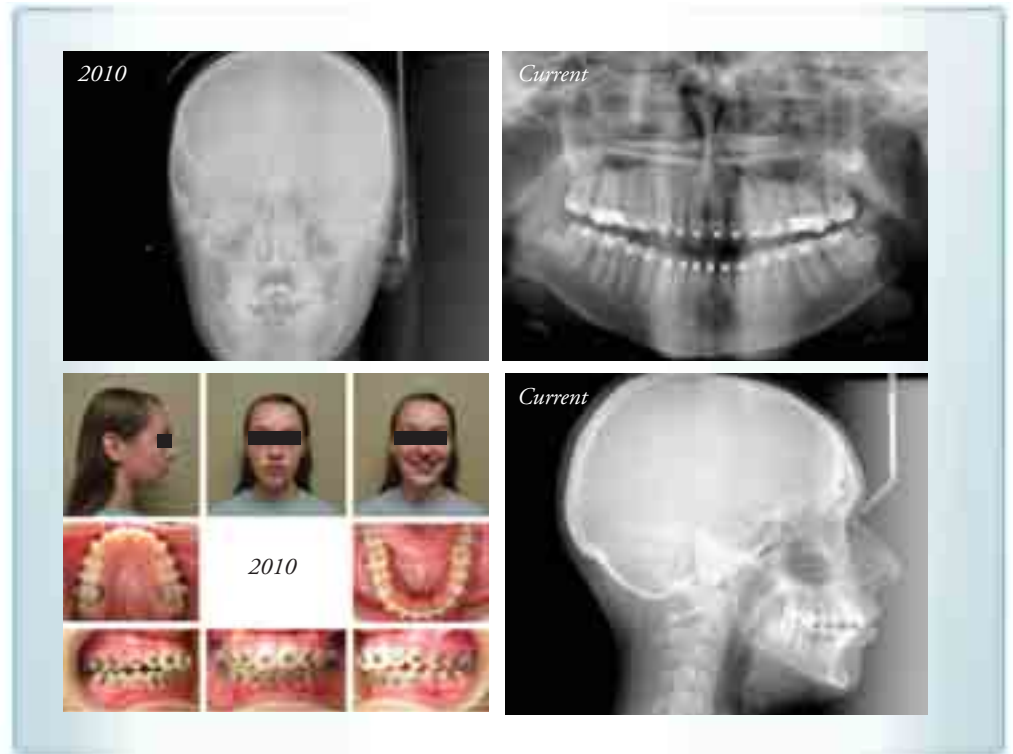
CALL TODAY FOR A DEMONSTRATION!

A Plugin for
Invivo5



Anatomage

www.anatomage.com
Tel) 408-885-1474 Fax) 408-295-9786
111 N. Market St. #800 San Jose, CA 95113



sharperdds
 Posted: 7/1/2011
 Post: 3 of 28

How old is the patient currently? Still growing? We know “poor growers” will usually continue to grow poorly. You might be fighting against growth the whole way, until she is done growing. If growth is done (or not), have a progress consult with the parents, give them the options of 1) surgery once growth is complete (for perhaps the most ideal result), 2) Extract 5s (or other extraction pattern) and try to close the bite and get the best result you can, and/or 3) try TADs to correct asymmetry. I have found TADs can be unpredictable in the result and the amount of relapse once the case is complete, but still can be an improvement.

Give them these options, plus the option of debonding with less than an ideal result (no extractions, TADs or surgery) and inform them that a third phase of orthodontics could be undertaken when the patient is an adult, if she so desires. ■

ZXZXZX
 Posted: 7/3/2011
 Post: 4 of 28

About 25 years ago, I first heard Rick McLaughlin of MBT fame in Boston. I was looking for a way to leave closing loop mechanics and my “A” Company rep recommended I hear Rick who did sliding mechanics. Since then I’ve heard him speak many times, read his book and I’ve been to his office for two one-week programs.

I mention all this because as I got to know Rick, I also saw that sometimes he extracted second molars. Sometimes in the lower arch but a little more in the upper arch. Here was a very capable clinician who was also a big player in the West Coast Component of the Angle Society and he was extracting second molars in some cases. Since then, I’ve extracted second molars a fair amount.

I was in Dallas about five years ago at the iBraces users meeting and got to talking to an older orthodontist from Columbia, South Carolina. He really seemed to know his stuff so I asked him one of my “test” questions. So, “Do you ever extract second molars?” He replied that “second molar extractions were the best kept secret in orthodontics.”



ENGINEERED TO DELIVER
EVEN BETTER
**CLINICAL
RESULTS**

Invisalign's NEW SmartForce™ features are engineered to deliver the force systems to achieve **predictable tooth movements**.



POWER RIDGE™ FEATURES
Now for upper and lower incisors



OPTIMIZED ROTATION ATTACHMENTS
Now for cuspids and bicuspids

To learn more about Invisalign's latest innovations—Invisalign^{G3}—go to:

AligntechInstitute.com/new

When you extract maxillary second molars, you get some horizontal correction but also vertical control. I think this would be a nice thing to do in your case. You also have a case that looks “non-extraction” when the patient smiles.

Treatment plan:

1. Extract maxillary second molars.
2. Place a TPA from the first molars.
3. Use a mid-palatal TAD for vertical control. Pull chain elastics or NiTi springs from buttons on the sides of the TPA to the TAD.
4. If the auto rotation is not enough to correct the overjet, use a Forsus (which might have a helpful vertical aspect to the upper first molars) or buccal TADs with Class I elastics or coils. If you place TADs within the attached gingiva between the upper 56 and run NiTi coils from normal height hooks on the archwire between the 23 you will get a rotation to the maxilla which is up in back and down in front. This is because the line of force is lower than the center of rotation of the maxilla producing a clockwise rotation. This can also be helpful.

There is no progress ceph with braces, but the latest ceph (assuming it was done 15 months ago) shows the patient was CVM 4 or a little older. By now her growth should be starting to slow down. I looked really carefully at your strap up. It seems fine, the best I can tell. I frequently see molars overseated relative to the incisors, which as you know causes bite opening and it is something to guard against but I don't think that is an issue here.

Also, it seems as if the left condyle is different than the right condyle. This might be a factor in the asymmetry.

Good luck. ■ Charles J. Ruff, DMD

dhmjdds

Posted: 7/5/2011

Post: 5 of 28

I replaced the old ceph with the current one.

So, only extract maxillary second molars, not upper and lower?

I'm not quite picturing the midline TAD with a TPA with buttons. Buttons where, exactly? How does the chain/NiTi spring stay attached to the TAD – seems like the design of most TAD heads wouldn't hold it in this configuration. ■ Diane

ZXZXZX

Posted: 7/9/2011

Post: 6 of 28

Just upper second molars. Lower are only done for Class III open bites (I think).

In my opinion, the best TAD book is Paik's “Orthodontic Miniscrew Implants.”

I think this for four reasons:

- 1) All of the cases he shows are done with 1.6mm diameter 8mm long screws.
- 2) The mechanics are straight forward.
- 3) Most of the cases are by the primary author so there is consistency in thought pattern throughout.
- 4) The chapter on vertical control is superb.

In the chapter on vertical control Paik shows exactly how he places the mid-palatal miniscrews and how he connects the TPA to them. He also has three case presentations at the end of the chapter.

Dan George, who is in Holland, Michigan, does some teaching for Mondeal (now known as PSM) and places a load of mid-palatal screws. I'm pretty sure he would be happy to show you the ropes if you need to see some done before doing them yourself. Just head north to Chicago and turn right for Grand Rapids.

In my opinion, the profession is moving away from inter-radicular buccal placement of TADs in the maxilla and moving toward either mid-palatal (better bone) or inter-radicular palatal placement. ■ Charles J. Ruff, DMD

I am a bit worried that this patient is having some sort of condylar resorption. I don't know why, but I am a worrywart. I would see if the patient and parents are up for a break. I would want to see if the open bite continues to worsen in retainers. If it did then we might have a way bigger problem. ■

Wired

Posted: 7/9/2011

Post: 11 of 28

Wired, I think the patient has only been in it 15 months or so. Kind of soon to ask for a time out. ■ [Charles J. Ruff, DMD](#)

ZXZXZX

Posted: 7/9/2011 ■ Post: 12 of 28

The 7s look higher than the 6s and occlusal plane. Try going to a base arch first and auxillary box loop to level the 7s for a few months first. ■ [Rich Standerwick, DDS,MSD](#)



catch-22

Posted: 7/9/2011 ■ Post: 13 of 28

Charlie, I'm glad you're not down the street from me because you would own me. Your plan seems awesome. As an aside, Diane, I have been burned on 15-ish girls and ICR. This one creeps me out a little with resorption too. ■

BracesDude

Posted: 7/9/2011

Post: 14 of 28

Catch-22, I don't understand where you are coming from with that comment. Please expand on your thinking if you would.

ZXZXZX

Posted: 7/10/2011

Post: 15 of 28

Thanks. ■ [Charles J. Ruff, DMD](#)



Full size wire base arch 6 to 6 and then level 7s to the occlusal plane with auxillary box loops. LL6 might or might not be a bit of a problem. Might need to get it down and out of the way a bit.



I have one of these "opening bites" going on as well. Pain in the butt. ■ [Rich Standerwick, DDS,MSD](#)

catch-22

Posted: 7/10/2011

Post: 16 of 28

Have you considered rebracketing? ■



str8wire

Posted: 7/11/2011

Post: 17 of 28

Catch-22, Any chance you could post a picture of how you use the box loop in this kind of situation?

ZXZXZX

Posted: 7/11/2011

Post: 18 of 28

I think you are saying that you stabilize 6-6 and then intrude the 7s. Am I right on that? What about the upper? ■ [Charles J. Ruff, DMD](#)



With the upper I just piggy back a NiTi over the base arch (14x25 NiTi in this picture). Figure the maxillary 7s are a bit buccal when they erupt anyway. ■ [Rich Standerwick, DDS,MSD](#)



catch-22

Posted: 7/11/2011

Post: 19 of 28

continued on page 18

dhmjdds

Posted: 7/12/2011

Post: 22 of 28

I really don't think rebracketing will help us at all. I also have to disagree with Rich about the 7s.

Here are photos of the models in hand-articulated position.



The second molars are actually out of occlusion slightly, so intruding them alone likely would not make any difference in the problem. I think the bracket positioning is almost ideal; the LR6 bracket is too far gingival on the mesial and the UR3 could stand to be a little more mesial.

If we were doing surgery, we could almost go to surgery today. Need some lower incisor uprighting so we could get the right side Class I.

So I am going to have a sit down consult with the patient and her parents. I think I will recommend Charlie's plan with TADs and posterior intrusion. I've done some of this before, but never with maxillary second molar extractions and a midline palatal TAD. That should be interesting. But this is why I love ortho after 25 years! Always a new challenge. ■ Diane

ZXZXZX

Posted: 7/12/2011

Post: 23 of 28

Extracting the 7s helps control vertical and (I think this is true) prevents extrusion of the 6 as it distalizes. I have never heard anyone talk about that but it is a hunch on my part.

If you consider that someday you will extract 8s, and upper 8s come in 95 percent of the time if you extract 7s, it then becomes a no brainer to me in cases like this. ■ Charles J. Ruff, DMD

like2drill

Posted: 7/12/2011

Post: 24 of 28

I am mildly curious as to the sequence of things that got you here. Was the cross-bite still unilateral after you completed your turns on the PE? Did you engage the upper 3s before complete turns? I was trying to superimpose the cephs in my head to see what had changed.

My bailout position would be extracting 5s or 7s, or rebracketing and IPR with short Class IIs. I find extracting 7s good to control vertical before the proverbial horse has left the barn. If you look at a lot of Kim's stuff on open bite closure, it happens by extrusion and uprighting of incisors mainly.

In a non-cooperative patient, I would just take the 5s and in a cooperative patient, either 7s or selective bracket repositioning to close bite with IPR and Class IIs. I understand what you are saying about the brackets being ideal. However, now that you have an open bite, it probably wouldn't hurt to rebracket to help close it. Maybe invert your upper 2-2 as it looks like they flared on you when you brought down the canines (just speculation from the cephs). Are those Sohdi's brackets, or a different version of Creekmore's I am not familiar with? ■

Find it online at
www.orthotown.com

Bite Opening

SEARCH



ORTHODONTIC APPLIANCE

DESIGN MANUAL



- Created and written by Certified Dental Technicians

- More than 200 full color photos
- Multiple views of over 60 orthodontic appliances
- Diagram of each appliance indicating wire, acrylic and component specifications
- Use as a communication tool with:
 - Patients
 - Colleagues
 - Laboratories
 - Staff members
 - Lab technicians
- Already one of the most talked about and sought after reference manuals in the U.S. today

EXCLUSIVELY FROM



Purchase one for \$40.00 plus S&H or buy three, one for your library, one for the clinic and one for your lab source for \$100.00 plus S&H 1-800-734-7855



Visit our web site to see large page samples www.accutechortho.com

Would You Wait on This Referral?

This orthodontist needs a 3D scan to continue, but is not sure the timing is right.

like2drill

Posted: 4/18/2011

Post: 1 of 9

A mom brought this girl in after we finished up with her brother's Phase I. She is going to need a 3D scan because these PAs are the best that the referring doc said he could get (doc also agrees on referral). Seeing as how there apparently is little root development on the premolars and I can't foresee being able to do anything until we have a decent amount of root anyway. Would you wait on sending her out for a 3D scan? Or would you do it now, and inform that we might need to do it again? My concern is over radiation. This, and also cost, is mom's concern as well.



My only other concern is the U3s in this maelstrom. Anyone squint hard enough and see an extra premolar UR? ■

istr8nthem

Posted: 6/20/2011

Post: 2 of 9

Take CBCT now. I would want to make sure U3s are not going to be impeded from erupting and I would say with 90 percent certainty (previous experience) these U5s will never form correctly. LL5 congenitally missing – when I see this, there is very often malformation of other 5s or U2s. Might require early intervention/removal of U5s/supernumerary on right. ■

markgood72

Posted: 6/20/2011

Post: 3 of 9

I would take the 3D now. I would explain that it is better to have all the best info now (3D) to make the best decision going forward as far as treatment, extraction of primary tooth/teeth with space maintainer, etc.

continued on page 22



Imaging



Management

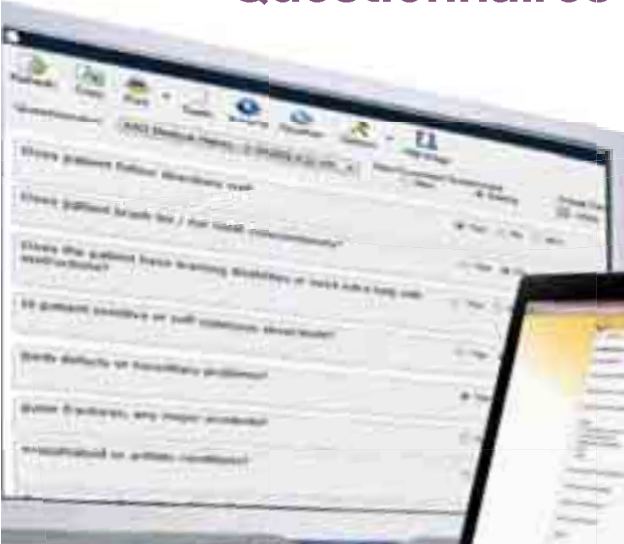


AnywhereDolphin.com



Mobile

Questionnaires everywhere.



Dolphin Imaging or
Dolphin Management

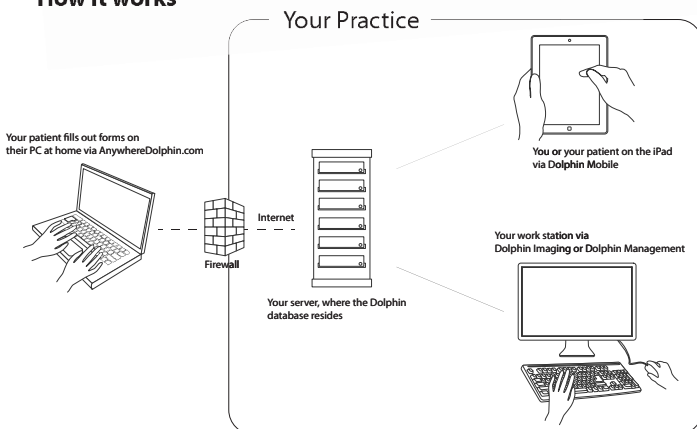


AnywhereDolphin.com



Dolphin Mobile

How it works



Super Questionnaire is a new multi-platform feature that allows you to securely share questionnaires, medical history, informed consent, and other standard forms across the Internet using an iPad or workstation. Featuring a distinct interface for staff and patient, Super Questionnaire works across Dolphin Imaging, Dolphin Management, AnywhereDolphin.com and Dolphin Mobile. This means, for example, that a patient can fill out an online medical history form prior to an appointment, then at the appointment it can be reviewed and finalized using electronic signature. Your Treatment Coordinator can use Super Questionnaire on an iPad during the exam! All data is accessible via Dolphin Letters, Patient Information, Treatment Card, and other relevant screens within Dolphin. Super Questionnaire is part of the Dolphin Letter System and is a free upgrade to customers on a current support contract. For more information, visit www.dolphinimaging.com/superq.



I have the Kodak 9000 3D that I just got in March and have seen a couple panos that looked like this patient, turned out to have nothing wrong with any of those teeth even though it looked like a mess on the pano. ■

Doctor_P

Posted: 6/26/2011

Post: 4 of 9

I agree with doing a CBCT now. I would want to have all the information early for a patient like this. You could order a smaller field of view (FOV) and less resolution if you and the parent are concerned about the radiation. The field of view I would use would consist of the maxilla/mandible only. Using those parameters, I wouldn't be concerned with over-radiation. ■

VBTX

Posted: 6/27/2011

Post: 5 of 9

I think there way too much hype about radiation exposure and the people who say this have not really looked at how much it is. Even a full head scan on an iCat done at the 4.8 seconds setting is about the exposure of two panos or almost equal to what you have already done (if there were no retakes). Now look at this data using a good software like InVivo and you will get a phenomenal image and an exact idea of what to do and when. In our area, if I need a scan of a quadrant, the cost is \$100.

I would not hesitate to take a 3D scan. ■

valpoken

Posted: 6/27/2011

Post: 7 of 9

My guess is that a 3D scan will give you a clearer picture of this jumbled up bicuspid cluster, but you probably won't be doing anything about it at this time. I would wait six to 12 months and then reconsider. ■

elenablack75

Posted: 6/27/2011

Post: 8 of 9

I agree a 3D image would give a lot better info. However, since you would probably do nothing for almost another year anyway, why not wait? Of course you will definitely need one before you start treatment. I showed the pictures to one of our faculty in the radiology department and her opinion is that it is better to wait a while before taking another image. Maybe the radiation of the 3D scan is equal to two panos, but this patient already had a pano, probably also a ceph, at least two PAs (but these are "the best" ones, so maybe there were more taken). Bone marrow is highly susceptible to radiation at this age. In a case like this I just know that I would not take a 3D image at this time if it were my daughter. ■

Lester Kuperman

Posted: 7/16/2011

Post: 9 of 9

Radiation? I use the lowest settings possible on our i-CAT with a thyroid collar. Exposure values are almost half under these circumstances. Smaller field of view if you like... but this is still a minimal concern. I would be concerned with other machines as the radiation dosages were considerably higher when I shopped around.

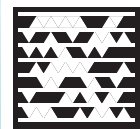
Wait for more development? Cleary, there is a problem. Could there be an odontoma in the area contributing to the ectopic pattern? Maybe too early is too late.

How can you diagnose what you cannot see? If this were my child... or better yet, if this were me personally, I would take the CBCT and also check the region of the LLE for possible cystic development as well. ■

Find it online at
www.orthotown.com

Would You Wait

Search



digitally
Beautiful



starting

\$12.99 a set

16 years of satisfied customers · First 3 cases are free
ABO certification · No contracts · No set up fees
Free shipping* · Free software · 5 pricing options



866.695.3319 · info@myorthoselect.com · myorthoselect.com

* Free shipping on most orders

Impacted Teeth, Slow Dental Development

Ortho recommends future extractions – definitely all Cs, but what about LR D and E? Any opinions?

njtxortho

Posted: 4/4/2011

Post: 1 of 15



Patient is a 13-year and three-month-old female with a Class III growth pattern and slow dental development.

She has a horizontally impacted LR3, of which I recommend future extraction.



I am going to refer her for extraction of all Cs.

Does anyone think the LR D and E should be extracted also?

I plan to begin comprehensive ortho in the next six to 12 months.

Thanks in advance for your feedback. ■



Want to see more cases with impacted teeth? Then check out these message boards.

Impacted Canine – Anyone Ext?
Search: Impacted Canine

Impacted Lower Canine
Search: Impacted Lower

ellisjb

Posted: 4/4/2011

Post: 2 of 15

Unless she is Class III molar on the right, I'd extract the LR3 and LRD, and E – leave the LRC for now as it looks to have a decent root and might work for a while until a dental implant can be placed. At least it would preserve the bone. You can always go back and have it taken out in the future if the premolars struggle to come in. I'd go ahead and take out the LLC and E also, and place a holding arch. It looks to me like the upper is doing OK, so I would probably leave these alone for now. ■

ZXZXZX

Posted: 4/4/2011

Post: 3 of 15

She does not have slow dental development but slow dental eruption. Most all the teeth from second molar to second molar have closed apices. These teeth should be in the mouth.

I don't know why they are not but you might want to look into it, maybe with an endocrinologist.

Why not leave the LRC? If the root persists during ortho, have it bonded until she is ready for an implant. Other than the LRC, I might take all the remaining deciduous teeth. ■ [Charles J. Ruff, DMD](#)

markgood72

Posted: 4/4/2011 ■ Post: 4 of 15

Definitely take out the LRD as well. Not sure LRE needs to come out, but it couldn't hurt to expedite the case. I agree with the others to try to save LRC. Just let

continued on page 26

The Best in Digital Dentistry

Your CBCT is only as good as your software.



**“You Should See What
You May be Missing!”**

-Dale A. Miles BA, DDS, MS, FRCD(C)

Experience the best diagnostic
and planning tool for digital dentistry

- Multiplanar Reconstruction with Pano, TMJ, Orthodontic tools
- 3D Cephalometric tracing and 2D photo mapping functions
- Pre/post treatment comparison with superimposition
- Small volumes stitching function for larger Field of View
- Prefilled report templates with customization options
- Implant planning and surgical guide ordering with In2Guide™



Cybermed

OnDemand3D Technology Inc.
310 Goddard Way, Suite 250, Irvine, CA 92618
info@ondemand3d.com Tel. 949 341 0623 Fax. 949 334 1317

FREE DOWNLOAD

<http://www.ondemand3d.com/orthotown>



mother know that as the LR4 erupts, you might have to eventually take out the LRC because the LR4 might resorb its root or the LRC might impede the LR4 eruption. ■

ucla98

Posted: 4/4/2011

Post: 5 of 15

I would do ortho treatment for this kid now by extracting all the baby teeth (except the LRC and keep it as long as possible). I think it is better for a 13-year-old to walk around with missing permanent teeth now than when she becomes 14 to 15 years old. I think the permanent teeth will erupt very fast since all of their roots are fully formed. And I would also warn the parents that the LR4 and LL3 might need surgical exposure if they don't erupt in six to 12 months. While waiting for the permanent teeth to erupt, I'd start closing the spaces between upper 2-2 to make space for upper 3s to erupt. ■

davidharnick

Posted: 4/4/2011

Post: 6 of 15

Ucla98, I have taken the same approach. I have been burnt waiting and watching. When a girl is 13 or boy is 14, I have the primary teeth extracted, all things being equal. I have never had to have teeth re-exposed. ■ **David**

AmazingSmiles

Posted: 4/17/2011

Post: 7 of 15

I agree to have all of the remaining deciduous teeth and the LR3 extracted ASAP except for the LRC. Also place a lower lingual holding arch (LLHA) to hold the lower 6s back, especially since your patient is Class III. I wouldn't place braces until the permanent teeth are erupted. I saw a 14-year-old who still had all of her Cs, Ds, and Es remaining so I recommended extractions of remaining deciduous teeth ASAP. The advice was not taken, and the patient returned two years later. She had not lost a single tooth. The patient/parent finally took my advice, and the permanent teeth started erupting shortly after removal of the primary teeth. ■

kaziii

Posted: 4/18/2011

Post: 8 of 15



I saved the LR3 several years ago on this patient. It was a lot of work, especially when you consider that it was almost exclusively done off of an LLA with occlusal rests. Your patient is much worse, so I understand the LR3 extraction decision. Extraction also reduces the risk of damage to the LR21.

My argument would be that the primary teeth need to come out. I give until 13 years old also, but not all at once. Leave the kid with something to chew on. I would

continued on page 28

ONE COMPANY. ONE PHONE CALL...
WE PUT ALL THE PIECES OF YOUR PRACTICE TOGETHER!



Call 877-OSI-1111 or Visit www.orthosynetics.com
For more information Email Sales@OrthoSynetics.com

take out upper Cs, LRD and LLC now. In six months maybe the upper and lower Es, then six months later the upper Ds if they haven't come out already. Much easier to sell four primary teeth out at a time than to tell a parent that their child needs 11 baby teeth out all at once.

I agree, keep the LRC to help in proper eruption of the LR4 and possibly longer, to maintain bone for an eventual implant. Also, if the patient is that slow of an erupter, I might consider an LLA to maintain space in case the mandibular premolars don't erupt as quickly as you like. ■

pipesjohnson

Posted: 4/18/2011

Post: 9 of 15

I think I would be inclined to extract UCs, LLC and E, and LRD and E and place LLHA and wait for teeth to come in. Keep LRC as long as possible. Oh and extract LR3. ■

braceyourself

Posted: 4/21/2011 ■ Post: 12 of 15

I agree with Dr. Ruff on everything, including referral to endocrinologist or pediatric geneticist. Keep the lower right C. ■

Charleston Faces

Posted: 4/22/2011 ■ Post: 13 of 15

Zxzxzx, I agree... and I would include a LLHA just to be safe. ■

royalalbatross

Posted: 4/22/2011

Post: 14 of 15

I also have a 14.5-year-old female who has been on a "watch" list with the previous orthodontist. She will be 15 this December and she still has solid primary teeth (Cs, Ds and Es) and on the radiograph all of the permanent teeth are fully developed with the apex closed. The roots of the primary teeth have not resorbed at all. I recommended referral to her physician for an evaluation of her growth (she's pretty tall for her age, Caucasian) and wanted her to be evaluated and managed by a pediatric dentist as well. I will also recommend her to seek an endocrinologist's opinion as well! ■



lakeortho

Posted: 4/24/2011

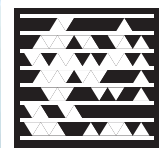
Post: 15 of 15

I recommend that you keep the lower right C, and add the upper Ds to the extraction plan, along with your lower primary extraction plan. Recent article in AJODO showed 15 percent improvement in upper 3s eruption with C, D extraction instead of just upper Cs. Good luck! ■

Find it online at
www.orthotown.com

Impacted Teeth

Search



Financing as advanced as the care you provide.

There were no
surprises, so we can
keep on smiling.

Your patients won't be left guessing with clear and simple monthly payment plans from ChaseHealthAdvance.

Patients choose a monthly plan and know exactly what to expect from the first payment to the last. No surprises.

- 12, 18 and 24 month no interest plans
- Convenient online application
- Generous credit lines for comprehensive care
- No Surprise financing

LOOK FOR OUR NEW, EASIER-TO-USE WEBSITE AND TRANSACTION PROCESS COMING SOON.

Give your patients a trusted payment option to start their care:
AdvanceWithChase.com/OT
1-888-388-7633

CHASE 

Should There Be a Fee for Starting Serial Extraction for Phase I tx?

How do you determine whether to charge or not?

ndee

Posted: 12/1/2010

Post: 1 of 9

Hi, I have a question regarding the fee for serial extraction. Should there be a fee or should we start charging a patient when we start serial extraction and monitoring the patient before putting on braces? And how much should it be? Would that be considered Phase I treatment? I don't think I would feel comfortable referring patients for extraction of Ds and then 4s without the patients officially being my patients.

Thank you for your input. ■ dn

flybywire

Posted: 12/1/2010

Post: 2 of 9

Interesting question.

I often spend a lot of time explaining the need for extractions (serial or others) to parents and patients and don't get paid for my efforts. Also, I don't charge when I order extractions of primary teeth for things like crowding or ectopic permanent canines. Though I probably should charge an office visit fee.

Before ordering extractions of permanent teeth I usually have full diagnostic records (pan, ceph, photos, models) and informed consent stating that the parent understands that comprehensive ortho treatment will be required after the extractions are done.

I think one pushes the creativity envelope by calling serial extractions a Phase I (i.e. D8060 treatment code).

I'm curious to hear what others do. ■

ucla98

Posted: 12/1/2010

Post: 3 of 9

I don't feel comfortable either. This is why I don't do serial extractions. I just tell the parents that there is no benefit of starting the treatment early. I just wait for all permanent teeth to erupt and then start comprehensive treatment. At that time, I will decide which teeth to extract... 4s or 5s. I only write the prescription for extraction when the patients are my patients and have brackets on their teeth. ■

njtxortho

Posted: 12/2/2010

Post: 4 of 9



Good question. For one case of serial extraction I had recently, I placed a TPA and LHA first (so parents signed an informed consent) and then I ordered the extractions.

There is definitely an issue of liability, especially if the patient goes elsewhere for Phase II or moves out of the area.

For extraction of primary canines, I just send the pano and referral and do not require an informed consent because I haven't started any treatment. ■

drbecky

Posted: 12/2/2010

Post: 5 of 9

You should absolutely charge for records and an observation fee that would include the cost of any progress records and office visits prior to the start of comprehensive treatment. ■

continued on page 32

JOIN THE REVOLUTION!



EDGE

The future of successful practice management is here.

Get the revolutionary Edge™ to maximize your practice efficiency and profitability. Ortho2 brings you the latest in state-of-the-art management, imaging, and communications software that's supported by an industry-leading customer service team.

Leading Edge Technology

- Web-enabled application with offsite data hosting option
- Convenient drag-and-drop design
- Customizable widget library
- Next-generation imaging
- PC, Mac, and multi-monitor support

Cutting Edge Efficiency

- Staff "roles" customize available features and views
- Workflows auto-sequence tasks
- Online patient forms and images
- Flexible patient reminders
- HR Manager tools

The Edge in Profitability

- Motivational Goal Tracker
- Effective Collections Assistant
- Powerful Smart Scheduler
- Animations for case presentation
- Multi-year graphs and trends

Join the revolution. Take your practice to the Edge today.

www.TheEdgeRevolution.com



800. 678. 4644 • www.ortho2.com

continued from page 30

s0m0w

Posted: 12/4/2010

Post: 6 of 9

Good thread.

I was just thinking about this the other day because I have a patient who will be referred for primary extractions and parents are worried about fees right now... I was thinking of charging a records fee and having a good informed consent in place. ■

etaynor

Posted: 12/7/2010


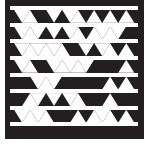
Post: 7 of 9

I think that this is a good question. I do not charge for the initial exam, the pan or the recommendation for deciduous teeth extractions. I think that it is a wonderful way to establish a rapport with the child and a comfort level with the parent. The old adage "penny wise and pound foolish" is my basis for my decision. I would rather forego the penny for the sake of the pound. I make it perfectly clear that the parent knows that we're going to treat the problem when ready, but watch the child and perhaps take advantage of some guided eruption. I believe this conveys a caring feeling. You can't buy that rapport with a fee. However, anything more such as holding appliances, etc. then full diagnostic records and informed consent along with a consultation visit is in order. ■

Find it online at www.orthotown.com

Starting Serial Extraction

Search

ORTHOpix™
3D DIGITAL STUDY MODELS



3D DIGITAL MODELS
SHOULD BE A SERVICE... NOT A LIFE SENTENCE

No false promises. No startup fees or extra charges. No once-you're-in-you-can't-get-out formatting. ORTHOpix accommodates your needs and gives you the freedom to choose...and breathe.

SIMPLE. INTUITIVE. AFFORDABLE.

- User-friendly, interactive 3D PDF
- Easy email to colleagues and patients
- Model access from any internet location
- Import into any Practice Management software
- Flexible Model-or-Impression Option

PLUS,

- FREE** Software
- FREE** 15-Year Storage
- FREE** Starter Kit

YOUR 1ST CASE IS FREE

- after that, just \$24.95 per case.

1-888-777-1945
www.ORTHOpix.com

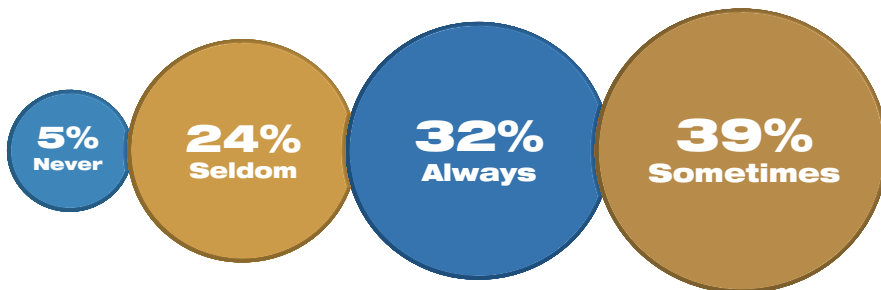
Orthodontists' Opinions About Retention

Find out what your colleagues do when it comes to their patients' retention in this poll conducted from May 26, 2011 to July 22, 2011. Don't forget to participate in the current online poll on Orthotown.com.



How often do you use fixed retainers on a case?

200 total votes



What kind of retainer do you find most successful for upper retention?

- 5% Bonded
- 53% Essix**
- 37% Hawley
- 1% Invisalign Vivera
- 4% Other

182 total votes

What kind of retainer do you find most successful for lower retention?

- 54% Bonded**
- 21% Essix
- 20% Hawley
- 1% Invisalign Vivera
- 4% Other

184 total votes

How long do you prescribe part-time retainer wear?

- 2% Three months
- 6% Six months
- 4% Nine months
- 1% Less than three months
- 87% More than nine months**

183 total votes

How long do you prescribe full-time retainer wear?

- 20% Three months
- 26% Six months
- 4% Nine months
- 38% Less than three months**
- 12% More than nine months

181 total votes

What do you charge for a single replacement retainer?

- 37% 100 to 150 dollars
- 37% 150 to 200 dollars
- 19% 200 to 250 dollars
- 7% More than 250 dollars

180 total votes

When do you tell patients to stop wearing their retainers?

- 2% After 12 months
- 1% After 24 months
- 3% Longer than 24 months
- 94% I tell my patients to wear their retainers indefinitely**

181 total votes

When do you charge for retention visits?

- 3% After three months
- 3% After six months
- 21% After 12 months
- 8% After 18 months
- 18% After 24 months
- 47% I don't charge for retention visits**

180 total votes

Log on today to participate on orthotown.com

A SPECIALIST

for Specialists

by Chelsea Patten
staff writer, *Orthotown Magazine*

“It takes a lot of skill to change things that have been done the same way for years,” says Jay Geier, founder and president of the Atlanta, Georgia-based Scheduling Institute (SI). With more than 25 years of experience, Geier and his team of trainers work with doctors and staff on the fine points of taking a practice to the next level. The first goal for each of these practices is to get more new patients in the door. The solution starts with the most basic necessity: answering the telephone.

Geier says, “Ninety-eight percent of new patients call before coming into your office. This means your front-desk staff is their first impression and the ‘gatekeeper’ to your schedule.” Research conducted by SI suggests most orthodontists lose 10 to 50 percent of potential new patients due to staff’s poor conversation skills and a lack of understanding of the value a new patient brings to the practice. This means if an orthodontist averages 30 new patients per month, valued at roughly \$2,500 each, he or she could be losing between three and 15 of those, or \$7,500-37,500 per month. Geier says, “If your staff is not trained properly on how to handle these calls and ‘close’ new patients on your practice, they could be costing you more than just their compensation. On the other hand, if they were, they could help you increase new patients and be revenue producers in your practice.”

To prevent losing valuable new patients, SI helps practices establish the Baseline (approximately 10-15 percent above the average number of new patients per month an orthodontist currently has) and the Goal (usually 25-40 percent more than the Baseline). By using incentives to motivate, the staff is trained with Geier’s proven concepts and strategies for effectively handling new patient calls. SI holds each staff member accountable to these standards with Mystery Calls – when a person from SI calls the prac-

tice posing as a new patient – that are evaluated and “rated” on their 0-5 scale. “Mystery Calls are like a test in school,” says Geier. “It’s what determines if the individual staff member is applying the strategies they learned and it’s a gauge of how many new patients you may be losing.” Geier goes on to explain that if the person who answers your phone receives below a 4 rating, that person is losing new patients. “But if you never test your staff you won’t actually know what you’re losing. New patients will call, but never come in. You’ll spend to get them to call, but you turn over complete control of what happens once they call to your staff,” says Geier.

There are many facets to SI’s program – telephone training, incentivizing, systematizing, creating constant accountability and receiving coaching and consulting from someone outside of your practice. And although the program seems to have popularity in the general dentist circuit, it is just as effective for orthodontists. Dr. Jacqueline Moroco, one of the three case studies later in the article, says the principles Geier teaches are “applic-

able across the board. We’re all running businesses that need more patients.”

SI has the statistics to prove what they teach works, but they don’t want you to just take their word for it. *Orthotown Magazine* asked three orthodontists with three very different practices about challenges, changes, hard-to-learn lessons and new optimistic views of the future. They all started with the telephone training program and each credit that as being the catalyst for their subsequent success. Now, these orthodontists have progressed to higher membership levels within the organization and have continued to grow their practices with Geier’s targeted advice and accountability. They have not only increased their new patient numbers, but have improved their bottom line and all have happier, motivated and more valuable staff. Dr. Kerry White Brown, an orthodontist who has four locations in South Carolina, started working with Geier in January of this year and says, “I wish I had met Jay Geier when I started my practice. I would be in a totally different place right now. Where I wanted to be in 10 years...I think I would be there now.”

1

Case Study #1: Dr. Dustin Burleson Burleson Orthodontics • Kansas City, Missouri

Initial Results:

“Hiring the Scheduling Institute has been the single best decision I’ve ever made for our practice. Our revenue and my take-home pay tripled in less than a year.”

“We were growing really quickly,” says Burleson, “and we were looking for a system to manage that growth.” Right off the bat, Burleson acknowledged a big increase in new patients upon completing the telephone-training course. Within just a few months the practice went from averaging 60 new patients a month to 85-100. Their record new patient month was in March of this year (131 new patients).

The team went through additional training courses with SI that helped in other areas of the practice. Burleson says, “We went from 300 starts per year to more than 630. Our patient referrals have doubled because our patients are receiving better customer service.”

Changes After Implementation:

“It’s one thing to rack up new patients. It’s another thing to deal with them once you have them. Jay has always said, ‘We solve a problem which creates another problem.’ We had all these new patients but really had to overhaul our scheduling system because we wanted to accommodate those new patients,” says Burleson.

continued on page 36



Burleson and his team got involved with Geier's coaching program, an option subsequent to completing the telephone-training program. "He teaches doctors how to manage human capital, space and equipment and marketing," says Burleson. Geier also helped Burleson implement an internal marketing system.

Burleson recently had to double the new patient consultation space and reception area in his office to accommodate the number of new patients. "We want patients to be comfortable, which means offering more hours and a larger space, so patients don't feel like a number." The doctor is planning to move the practice into a larger building soon. They've also hired associates including a pediatric dentist to broaden their services and they expanded their hours to better accommodate their patient's schedules.

Dr. Burleson's staff



"Our staff is more motivated and satisfied in their goals," Burleson says. He attended a coaching workshop at SI's Training Center in Atlanta at which Geier laid out an incentive plan for his clients to implement with their staff. Burleson implemented it the next day and it produced their best day of production ever.

The tone SI sets in offices is designed to change attitudes and perspective about helping patients. A refreshed Burleson confirms, "What employees do in the office is a mission. It's all about serving patients and focusing on them, versus focusing on us." He repeats one of Geier's words of wisdom, "If a patient gives you a dollar bill, you should give him a lot more in return (for years). We're in the business to serve patients, which means we need to give them what they need."

Biggest Lessons:

"I have all the same problems other orthodontists have. The difference is, with the Scheduling Institute's guidance I solve them and get onto the next problem in life." Frustrations lead to breakthroughs; Burleson has adopted Geier's philosophy as his practice mantra. "Each obstacle is presented as an opportunity; a chance to get better as a team. My office manager says a problem means something good is right around the corner."

A New Image of the Future:

Burleson says, "SI is like my golden goose that just keeps laying golden eggs." He says he'll continue to follow their advice.

2

**Case Study #2: Dr. Jacqueline Moroco Maloney
Moroco Orthodontics • Del Rey Beach, Florida**

Initial Results:

"I don't think I was completely aware of my challenges initially," says Dr. Jacqueline Moroco Maloney. At a seminar where Geier was the guest speaker, Moroco heard a recording of a phone conversation between one of her staff members and a potential new patient. She says, "It was blatantly obvious as to the lack of training. Because I'm not up there, it's easy to put my head in the sand. I didn't realize the problem until I heard it." Before Moroco Orthodontics began working with the Scheduling Institute in 2009, they averaged 28 new patients a month. They now average 37.

Changes After Implementation:

"The staff was uncertain and resistant about the training program," says Moroco. "But once they knew I was committed to the process, I started to notice the staff feeling more confident about new patient phone calls and saw more excitement from them." Moroco says setting goals and incentivizing those goals, which are two of the steps in Geier's program,

greatly helped production and office morale.

Moroco had also maximized her production ability in her old office, and needed a more efficient space. "Jay helped me realize there was no way I was going to do what I wanted in my old facility. We moved in October 2010." The practice went from 1,575 to 2,800 square feet. Production for the first half of 2011 is up 22 percent over the same period last year. Based on production in the first six months of this year, Moroco and her team are on pace for a 27 percent increase in production over 2010.

With Geier's advice on improving her case presentation, Moroco has also been able to add an additional \$100 to her average revenue per patient.



A close-up, shallow depth-of-field photograph of a computer keyboard. The keys are light-colored and slightly blurred. In the top-left corner, there is a semi-transparent orange and white graphic overlay that contains a close-up image of human teeth and gums. A dark blue banner is positioned across the top of the image, containing the main title and a URL.

From Bites to Bytes

Find it all on Orthotown.com

- Get feedback and clinical advice on the message boards
- Learn from your colleagues' cases in the Virtual Study Club
- Insights on supplies, equipment and even topics of leisure

orthotownSM

a Farran Media interactive healthcare community | www.orthotown.com



Dr. Morocco Maloney and her staff

Biggest Lessons:

“You can’t take your eye off the ball in any aspect of your practice,” Morocco states. If she had to start her practice all over again, she would spend a lot more time at the beginning setting up systems and training her team. Morocco has also learned to get excited about challenges, taking them as opportunities to change and improve.

A New Image of the Future:

Geier has taught her many valuable things and she says, “I have learned to focus on the practice as a business, as an investment. Even though I have no intention of retiring anytime soon, my best investment right now is my practice. If I continue to follow Jay’s advice, when I do want to retire, the practice is there to support me.”

3

**Case Study #3: Dr. Michael Weathersby
Aspire Orthodontics • Cleveland & Ooltewah, Tennessee**

Initial Results:

Everyone thinks their office is the exception. Dr. Michael Weathersby says, “Clinicians will describe their ‘unique’ practice and staff and create reasons why Geier’s technique will not work in their office. I had the same misconceptions, but I needed to do something about the decline we had experienced for the past few years.”

Weathersby’s long-time friend and colleague Dr. Bob Gallien, a dentist in a neighboring city, worked with SI for almost three years. Weathersby often asked Gallien for ideas he thought would work in his orthodontic practice. Weathersby says, “I tried to implement a few of the things Jay teaches that I got from Bob, but with little success.” In April 2011 Weathersby joined SI and in June saw 99 new patients up from an average of 51 in 2010.

One of the greatest challenges for Weathersby, and many clinicians, was overcoming the idea that no branch of dentistry is different when you are talking about increasing patients. Weathersby says, “Increasing new patients means increased production. Period.”

Changes After Implementation:

In addition to a steady flow of new patients, Weathersby noticed changes with his staff. “At first there was fear of the unknown, animosity concerning how they used to speak on the phone and then eventually excitement and engagement. The staff noticed what they were doing was working when we had an increase of 39 percent this June (99) as compared to last June (71)!” Their average revenue per patient went up \$200 and based on production January through June of this year, they are on pace for a 21 percent increase in production over 2010.



Dr. Weathersby and his staff

Biggest Lessons:

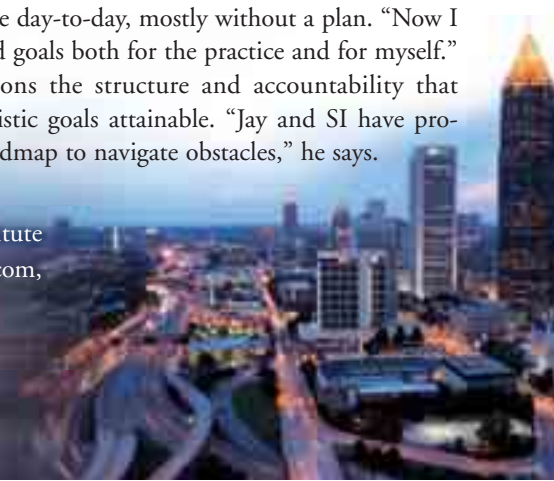
Weathersby says new patient generation is something clinicians have to work at every day. He adds, “Every day you ignore it, you will see a decline in your practice. Work every day on new patients and your practice will grow!”

The doctor mentions, “Fortunately I was exposed to SI in only my third year of practice, but if I could, I would have started with Jay when I was in my residency.”

A New Image of the Future:

Before implementing SI’s program, Weathersby admits to running his practice day-to-day, mostly without a plan. “Now I have clearly defined goals both for the practice and for myself.” Weathersby mentions the structure and accountability that makes once-unrealistic goals attainable. “Jay and SI have provided us with a roadmap to navigate obstacles,” he says.

If you would like to learn more about Jay Geier and his team at the Scheduling Institute and the services they offer orthodontic practices, visit www.newpatientspecialists.com, e-mail info@schedulinginstitute.com or call 877-588-4990. n



THE ORIGINAL NEW PATIENT SPECIALISTS...

WE WILL INCREASE YOUR NEW PATIENTS 10-50% IN 90 DAYS OR LESS...GUARANTEED!

GET STARTED NOW!

One Day On Site Training in YOUR Office - Limited to first 19 Orthodontists!

SAVE \$2000 AND DON'T PAY TRAVEL EXPENSES!*



CALL **877-588-4990**
FOR EXPRESS ENROLLMENT
Guaranteed 5 Minutes or Less - Mention this ad!



OR GO TO **WWW.NEWPATIENT
SPECIALISTS.COM**

- Or -

GET FREE INFORMATION VIA FEDEX

Need more information? Take the '5 Star Challenge' Today

We'll send you a FREE custom analysis of how your staff is handling New Patient calls and provide you with a 0-5 rating. To receive this information...



GO TO **WWW.NEWPATIENT
SPECIALISTS.COM**



OR **FILL OUT THE FORM BELOW
AND FAX TO 866-808-0118**

Doctor's Full Name _____

Office Address _____

City, State, Zip _____

Office Phone _____

Doctor's Email _____

*Travel expenses included within the contiguous United States & Canada.
Travel outside these areas will be included up to a maximum of \$1,500

JAY GEIER'S
**SCHEDULING
INSTITUTE** 



New Products

You are invited to visit Orthotown.com to ask questions or post comments about the following New Product Profiles.

Esthetic CrossRef

The Esthetic CrossRef Centered Bite Record enhances communication between the clinician and the lab as it accurately records the patient's midline and horizontal plane. The Cross Ref allows the vertical and horizontal bars to be aligned after the bite registration material sets. This bite record can then be used to mount the casts on any articulator. For more information on the Esthetic CrossRef or for a free sample, call 800-626-5651 or visit www.whipmix.com.

Esthetic CrossRef



Referral-Tracker.com

Referral-Tracker provides a safe, secure, HIPAA-compliant platform that connects specialists to their new patient referrals in real-time. Referral Tracker's proprietary patent pending e-referrals service provides you a copy of every new referral including complete patient contact information the instant one of your referring doctors recommends you to one of their patients. Follow up with patients you would otherwise miss, monitor referral trends of your referring GPs, improve specialist-GP relationships and communication and ultimately grow your practice! Visit www.referral-tracker.com for more information or to preview a subscription.

Referral-Tracker.com



Triumph Orthodontic Instruments

The Triumph Orthodontic Instrument line from Ortho Organizers includes cutting instruments, utility pliers, wire forming pliers and ligating pliers. Each instrument features a stainless steel insert for enhanced cutting performance, high quality, corrosion-resistant stainless steel forgings, laser-engraved part number and applicable archwire sizes for easy identification in an ergonomic design with diamond-honed cutting edges. For more information, call 888-851-0533 or visit www.orthoorganizers.com.

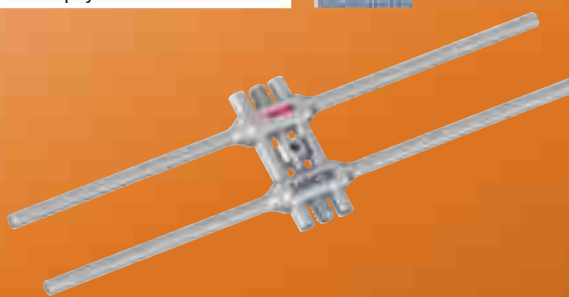
Triumph Orthodontic Instruments



Philosophy 1

The Philosophy 1 rapid palatal expander (RPE) is designed and manufactured by Lancer Orthodontics and has been developed with extremely small dimensions (micro-dimensions) to allow the Philosophy 1 to fit very close to the palate thus improving patient comfort. Philosophy 1 provides expansion from 4mm to 13mm. For additional information, view the Philosophy 1 video at www.lancerortho.com/video.php?file=litsection/philosophy1.mp4, contact your Lancer Orthodontics sales representative or call 800-854-2896.

Philosophy 1



If you would like to submit a new product for consideration to appear in this section, please send your press releases to Assistant Editor Marie Leland at marie@farranmedia.com.

eBiteplus Intraoral Suction and Lighting System

The eBiteplus Intraoral Suction and Lighting System is a multi-functioning device that combines full illumination of the workspace as well as suction, tongue retraction and bite block tools in a single unit. eBiteplus features three levels of light intensity, a fully autoclavable handpiece, fits into any standard delivery unit and provides continuous aspiration without interruption of treatment. For more information, visit www.greatlakesortho.com.

eBiteplus



CS 9300

The CS 9300 system offers practitioners 2D digital panoramic imaging with variable focal trough technology and 3D imaging with up to seven fields of view, ranging from 5cmx5cm to 17cmx13.5cm. The system's open design makes exams comfortable for patients, and with both standing and seated options available, it accommodates patients of all sizes. In addition, its extra-oral systems are designed to be upgradeable with an optional cephalometric modality. For more information, visit www.carestreamdental.com/9300.

CS 9300



Andrews² Straight-Wire Appliance

Ortho Organizers has worked closely with Drs. Lawrence and Will Andrews, directors of the Andrews Foundation, to develop the Andrews² Straight-Wire Appliance. The Andrews² Straight-Wire Appliance concept involves building tooth guidance into brackets rather than into the archwires. The Andrews² Appliance is comprised of both standard and translation brackets. Teeth that need to be translated mesially or distally are assigned translation brackets, which help to deliver forces to the tooth's center of resistance. Teeth that do not require translation are assigned standard brackets. Brackets can be prescribed individually or by pre-arranged set. There are 12 sets for the maxillary arch and 11 for the mandibular arch. For more information, visit www.orthoorganizers.com or www.andrewsfoundation.org.

Andrews2 Straight-Wire Appliance



There are a myriad of ways for orthodontists to promote their practices online, and most Internet marketing experts would agree that taking a multi-faceted approach is a good idea.

However, if budget constraints drive the need to take a more conservative approach and marketing dollars can be spent in just one area, that area should be search engine optimization (SEO).

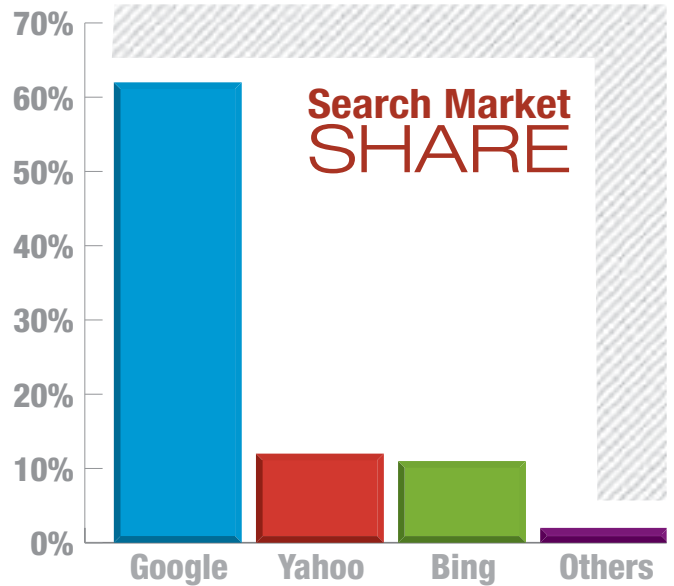
SEO is the term used to describe how companies maximize the number of visitors to a Web site by getting that site to rank high on organic search results.

The heaviest focus ought to be on organic SEO. This refers to the search results Google shows beneath and to the left of the Google "Ads" listings on its search results pages. Orthodontists must have a strong presence on Google when potential patients search for providers in their area.

Robert Donovan, administrator of Las Vegas, Nevada orthodontist Dr. David Alpan's practice, views SEO as a much-needed function of Internet marketing. "If you're not on the first page of Google, you're nowhere," Donovan says. "It's like having a billboard in the desert; you might have a Web site, it might be attractive, but what good will it do you if no one sees it?"

Given the difficult economic climate in Las Vegas, not embarking on an SEO campaign simply wasn't an option for Alpan, Donovan says. "Had we chosen to not do that, it wouldn't have been good for anybody," he says. "In tough economic times, you have to gear up your marketing."

In July, Alpan's site received 1,385 visitors coming from Google organic search alone.



Another reason for orthodontists to consider SEO over other online advertising formats when money is tight is although economical opportunities to advertise via Facebook advertisements and Google pay-per-click ads abound, people still want to feel like they are driving their decisions. That means while an advertisement might appear under the sponsored link headings when a person performs a Google search for an orthodontist in their area, many potential patients are prone to click on the organic search results instead. People are quite savvy about advertisements these days, so there is a segment of the population who will never click on an advertisement.



by Ali Husayni and Lorrie Delk Walker



The key to getting that population segment to click through to an orthodontist's Web site is making sure Google looks upon those sites favorably and ranks them high on search results.

It's as simple as this: if Google thinks a site is good, that site is going to be number one on search results. Potential patients perceive an orthodontist to be the best if Google ranks their site number one on its search engine and the site has many positive reviews, both of which can easily be accomplished with the help of a professional SEO company.

Following is some helpful information on how Internet marketing firms can help orthodontists achieve SEO results that will generate traffic to their site and result in getting new patients.

Develop Keywords

Most clients have some idea regarding the keywords they want associated with their business. For example, an orthodontist in Biloxi, Mississippi knows she wants her site to appear prominently in Google's organic search results when someone searches for "Biloxi, MS orthodontist."

An Internet marketer understands people also sometimes search for similar variations of those keywords, such as "orthodontist Biloxi, MS" and "Biloxi, MS orthodontists" or just simply, "Invisalign."

Professional Internet marketers work with clients to brainstorm keyword phrases, and they conduct research to get a comprehensive list of commonly searched for words. They also look at their clients' competitors to determine the types of keywords the competition is using.

From there begins the process of reviewing, categorizing and comparing search volume and competitiveness of the main keywords. Finally, a client's keyword phrases are prioritized based on relevance and propensity to drive traffic and sales.

Orthodontics keywords are commonly known to the SEO companies that specialize in helping these practices. So, working with an orthodontics marketing company from the beginning will be an advantage for the practice.

Optimize

A variety of work is done to an orthodontist's site when it is optimized. A sitemap.xml file is created and submitted to Google Webmaster Tools, and the orthodontist's HTML sitemap page is created and/or updated.

A quality Internet marketer will also make sure that search engines are not blocked through no-index meta-tags, robots.txt files, or anything else that prevents search engines from accessing and indexing a Web site.

Google frowns upon duplicate content, so any content on an orthodontist's site that isn't original should be removed and replaced with fresh, original content. Duplicate content can be a common problem for orthodontists who use some Internet marketing firms that offer standardized content or template Web sites for clients.

Using Invisalign as an example, if the information about Invisalign that is on an Erie, Pennsylvania, orthodontist's Web site is an exact duplication of information that appears on 50 other orthodontists' Web sites throughout the country, that content will do the Erie orthodontist absolutely no good in terms of SEO effort, and could even cause Google to remove his site from its index.

Eagan, Minnesota orthodontist Dr. Jennifer Eisenhuth tried two large dental Internet marketing firms for optimization prior to switching to a boutique SEO provider. "We found that the canned content basically keeps you in pace with your competitors," said Peter Eisenhuth, the practice's business administrator. "Most orthodontists are using the same large companies, and when we switched to a smaller boutique SEO provider, they customized our site's content."

He quickly saw improvements in organic search outcomes as a result because the content was customized to include the practice's specific keywords. "Without our customized content being replicated on other orthodontists' Web sites, it allowed us to separate ourselves from the pack," Eisenhuth said.

It has been Eisenhuth's observation that the bulk of orthodontic practices in his market who participate in SEO use the same companies. "Doing so is a conflict of interest on the SEO providers' part, because they really can't differentiate between clients in the same market if they're all paying the fees for services," he said. "How can a company charge you a fee for enhancing your search engine ranking above your competitors when they're currently working for your competitors?"

There are many orthodontists in search of a turnkey provider that offers everything from Web site design and SEO to patient reminder software.

"Orthodontist"

"Orthodontics"

"Invisalign"

"Braces"

continued on page 44

Eisenhuth said the practice gained better results by finding a firm that concentrated its efforts strictly on SEO. Firms that don't focus specifically on SEO, but offer a wide variety of marketing services to orthodontists instead are similar. You don't get the customer service, Donovan says. "They don't focus on what they promise."

Donovan recommends marketing a practice's

Web site through SEO because the price

per lead is significantly less than it is with news-

paper or Yellow Pages advertisements.

Build Quality Links

Link building is imperative to the overall SEO process, because generating quality links back to the orthodontist's Web site is what Google uses to identify a Web site as "more important" than the rest and consequently rank it at the top.

Jolina Pettice, a senior account manager with TopRank Online Marketing, has been quoted as saying that "inbound links are like electricity for search visibility." Quality links to an orthodontist's site can be achieved by developing original content, partnering with other marketing experts, professional publication of articles and press releases and often through promotion via social networks.

Think Socially

Social media outlets such as LinkedIn, Twitter, Facebook, YouTube, Vimeo and now Google Plus offer more outlets for orthodontists to share their information with potential patients. The benefits of posting items such as videos, articles and press releases to these sites are that doing so generates quality links back to an orthodontist's site.

Because millions of people are active in social media circles, posting items through these outlets creates a number of opportunities for the information to be promoted by others when they choose to share it with their friends.

Google Places

Orthodontists need to be found by potential patients locally. This means Google Places is another must-have in an orthodontist's marketing toolbox.

An Invisalign provider in Boston, Massachusetts needs to be optimized on Google Places for that city because it will help him appear prominently in search results when people in Boston Google "Invisalign provider."

Google Places is connected to SEO, but there are some deliberate steps that are required to achieve the desired rankings.

A Word About Google

Optimizing Web sites for Google searches is the most important goal for SEO, and the proof is in the user statistics.

March data from comScore revealed that almost two-thirds of all domestic searches are performed using Google's search engine, according to an April article on Wired.com.¹ Yahoo! claims less than 16 percent of the search market, while Bing claims less than 14 percent.

In terms of SEO, Google has the strictest guidelines for organic search rankings. But the effort an orthodontist puts into achieving good organic search results on Google automatically helps improve ranking results on all of the other search engines.

With a seemingly bottomless well of Internet marketing tools at orthodontists' disposal these days, it's best to choose wisely. Keenly spending marketing dollars on a quality SEO provider today will generate positive results now and in the future.

Donovan recommends marketing a practice's Web site through SEO because the price per lead is significantly less than it is with newspaper or Yellow Pages advertisements. "And I don't know anyone who looks in the Yellow Pages anymore," he says.

Eisenhuth offered this advice to orthodontists considering whether to begin an SEO campaign: "Work with someone dedicated to boosting your business within your market above your competitors." Ethically, a company can't do that if it doesn't limit its clients to one or two per market. "Consumers need to be cautious," he said. "If the goal is to outrank competitors who use SEO firms, it is in your best interest not to seek those services from the same company that your competitors are using." ■

References:

1. <http://www.wired.com/epicenter/2011/04/google-still-pulling-ahead-in-search-according-to-new-comscore-numbers/>

Author Bios

Ali Husayni has worked in the SEO field since 2003. He founded Master Google in 2004 with the focus of helping clients rank at the top of Google's organic search results. His company has helped hundreds of clients increase site traffic and revenues through better exposure on Google.

Lorrie Walker is the chief copy writer for Master Google. For more information, visit the company's Web site at www.mastergoogle.com.

Placing Your Practice in the Hands of Your Patients

by Diana P. Friedman, MA, MBA
and Michelle Eggers

With the touch of a finger, information that used to be accessible only through peer-to-peer conversation, printed material or by sitting for hours at a computer is now available anywhere, anytime, *and* fits in the palm of your hand. In fact, based on a recent Nielsen report, mobile browsing is slated to surpass desktop browsing in 2014. Health-care consumers are at the forefront of adopting this wireless behavior, using their smartphones to access records, communicate with providers and post comments about their experiences. Combine this current behavior with proliferation in smartphone usage, and it's easy to see why orthodontic practices must implement a mobile marketing strategy.

Eighty-seven percent of smartphone owners access the Internet or e-mail on their handheld, including two-thirds (68 percent) who do so on a typical day. When asked what device they normally use to access the Internet, 25 percent of smartphone owners say that they mostly go online using their phone, rather than with a computer.¹

Click, Tap, Scroll

According to a recent Gartner report, 428 million mobile devices were sold in the first quarter of 2011, and 100.7 million of those were smartphones, representing an 85 percent year-over-year increase.²



Why is the smartphone so popular? It not only acts as a phone, but it's a texting device, e-mail checker, portable organizer, Web browser, social media connector, camera and video player. The overwhelming theme is online accessibility and being connected.

Miniature vs. Mobile

Mobile-optimized Web sites are specifically designed for mobile Web consumption to provide user-friendly, legible content and a quick efficient upload. Miniaturized Web sites are not.

On the left is how a regular Web site appears on a smartphone. On the right is the same Web site that is optimized for viewing on a mobile device.



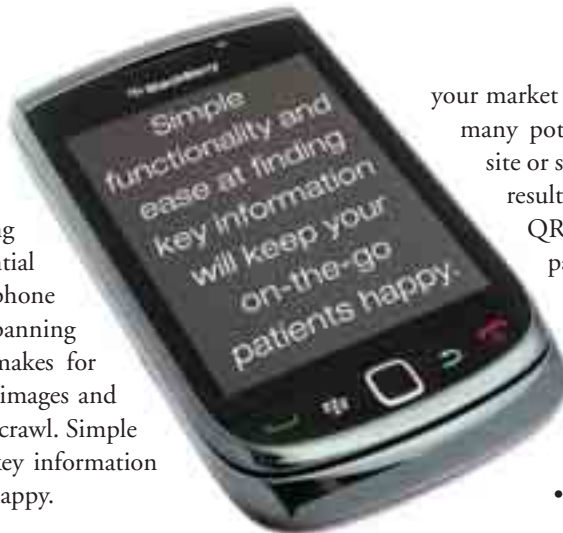
Smartphone ownership and internet use summary

	% of smartphone owners who...	% of all cell owners who...	% of all adults who...
Own a smartphone	100%	42%	35%
Use the internet or e-mail on smartphone	87	36	30
Use smartphone to go online on a typical day	68	28	23
Go online mostly using smartphone	25	10	8

Source: The Pew Research Center's Internet & American Life Project, April 26-May 22, 2011 Spring Tracking Survey. n=2,277 adult internet users ages 18 and older, including 755 cell phone interviews. Interviews were conducted in English and Spanish.

continued on page 46

Have you looked at your practice Web site on your smartphone? Viewing a shrunken version of a site on the screen of a mobile phone can create a frustrating experience for existing and potential patients simply looking for a telephone number or address. Pinching and panning the image to zoom in and out makes for clunky interaction; and too many images and graphics slows page load times to a crawl. Simple functionality and ease at finding key information will keep your on-the-go patients happy.



your market communications, so as to optimize how many potential patients you drive to your Web site or social media channels. The most effective results will come from developing different QR codes with the appropriate landing pages on your Web site, mobile site or social media channels.

Examples of tactics to leverage QR codes include placing them on:

- Documents you hand out at your office (receipts, follow-up instructions, etc.)
- Bags of recare goodies you give out to patients
- A reception room sign or sign chart
- Business cards, brochures, letters, postcards, newsletters
- Your front door
- Giveaways

Integrate Your Online Strategies

The average time spent by patients on a dental mobile Web site is two minutes and 51 seconds, 143 percent longer than the average time spent on non mobile-optimized sites.³

A mobile-optimized site should serve as an extension of your practice's main Web site. It should not replace it. Your mobile Web site should match the look and feel of your practice Web site with reduced image sizes and focus on the most relevant content that existing and prospective on-the-go patients want to find on their smartphone – important news about the practice, contact information, links to locations and directions.

Drive Mobile Traffic with QR Codes

Now that you've set up a mobile-optimized site, how do you encourage new patients to find you? One of the fastest growing trends in online marketing has been Quick Response, or QR codes. You've probably seen these square barcodes starting to pop-up on billboards, brochures and business cards. The codes, when scanned with a special app on a smartphone, can take the user to a Web site, social network or even a video. QR codes have become a more common sight these days. The apps that are required to scan and read the QR codes are free and have been developed to work with iPhone, Android and Blackberry phones.



The beauty of the QR code versus a written URL is its ability to hold programmed content, including a Web site address, business contact information, or even a coupon or promotion such as discounts or downloads.

QR codes are increasing in popularity. Research shows they are extremely effective in driving interested potential patients to your practice. Remember, when patients scan your QR code, they will be using a smartphone to view your Web site, making a mobile-optimized site even more important for your practice.

The Next Step: Linking Patients from the Physical World to the Virtual One

QR codes turn your physical collateral into dynamic content. It is important to make them visible and prominent on all

Being in Touch Means Being Mobile

In the same way that a Web site presence increases your online reach to existing and potential new patients, a mobile-optimized strategy lets you effectively communicate with those patients while they're on-the-go. This means there are even more opportunities to promote digital dialogue between provider and patient. As the usage of smartphones and tablets continues to grow, so will the need to create and maintain a strategy for your practice to thrive in these mobile environments. n

References:

1. *The Pew Research Center*, July 2011
2. *Mobile Marketing Watch*, May 19, 2011
3. *Sesame Communications*, July 2011

Author Bios

Diana P. Friedman, MA, MBA, is the CEO of Sesame Communications. Diana has had an extensive career launching dental innovations for leading manufacturers such as Philips Sonicare, as well as experience as a recognized speaker and practice management consultant. To contact her, e-mail diana@sesamecommunications.com



Michelle Eggers combines her love of design and enthusiasm for research with understanding the dental industry. She keeps abreast of the latest design trends and how patients use the web to deliver websites to hundreds of dental and orthodontic practices since 2007. Michelle's background in interactive media lends itself well to her role of Director of Web Operations at Sesame Communications



New!

ORTHOeasy®

The Complete System for Cortical Anchorage



OrthoEasy Pins



The intelligent system of the new generation, developed for orthodontists by orthodontists.



Forestadent USA
2315 Weldon Parkway · St. Louis, MO 63146 · TOLL FREE 1-800-721-4940
Fax 314-878-7604 · info@forestadentusa.com · www.forestadentusa.com

FORESTADENT® USA
GERMAN PRECISION IN ORTHODONTICS

ALIGNER ATTACHMENT

Bonding Technique Reduces Flash and Failure

by Mark Perelmuter, DMD, MS,
Bradley Goldberg, DMD and Dee Holloman

Since its introduction in 1999, a component of the Invisalign system (Align Technology, Inc., San Jose, California) of removable, transparent aligners has been the use of resin attachments bonded to the teeth to aid in retention of the aligners and facilitation of individual tooth movements. As the Invisalign system advanced from treating simple to more advanced orthodontic cases, the shapes of the attachments, as well as the quality of resin material, have taken on added significance.

In 2005, the newly formed Invisalign Clinical Advisory Board (including one of the authors) was credited with improving the attachment protocols based on clinical experience. In 2007, John Morton's arrival at Align Technology introduced a new era of research and development with the adoption of power ridges for torquing incisors and optimized attachments for improved rotation and extrusive movements of teeth. Developed from computer models and bench testing, the shapes and positions of these new attachments on the teeth are determined by the software based on the specific shape of each crown, long axis of each tooth and required movement. In addition, certain restorative resins which are high in bond strength, surface hardness and wear resistance have been recommended for use based on in-vitro research at Align Technology.

Given the importance of the resin attachments to treatment success, the system of bonding the attachments to the teeth takes on added significance. The technique should be efficient and dependable with minimal failure and be comfortable and aesthetic to the patient. Align Technology provides attachment templates, which are trays with greater flexibility than aligners and

include the attachment bubbles for the indirect bonding of the attachments. Each optimized attachment has an active working surface, therefore, the shapes of the bubbles in the templates are slightly different than those in the aligners.

The primary pitfalls clinicians encounter when placing the attachments are voids in the attachments which can lead to retained plaque or failure of the attachment, and excessive flash/residual resin material on the tooth which requires added time to remove and, when using fluted burs to reduce flash between the gingival margin of the attachment and the gingiva, can create patient sensitivity.

Our long-time clinical assistant and one of the authors developed a dependable technique which solves these problems. This technique has been closely monitored by the doctors and successfully used in our office for more than a year by all of the assistants in our practice. The advantages of this technique are as follows:

- Minimal flash
- Where flash is present, it can be easily and comfortably removed with a scaler, reducing the use of high-speed fluted burs
- Eliminates voids, so there are few attachment failures
- Increased efficiency with little flash to remove and rarely requires an attachment be replaced

The Holloman Attachment Bonding Technique

Step 1: Trim and remove excess template areas which do not include attachments, or section the template if there are multiple attachments in different quadrants. For example, if one of



the arches has four attachments only on the upper incisors, remove the bicuspids and molars from the template with scissors. If attachments are on the bicuspids, canines and incisors, the molars may be removed from the template and the template may be sectioned at the midline and each quadrant bonded separately (Fig. 1).

Step 2: Place Tetric Ceram shade T (for translucent) (Ivoclar Vivident, Amherst, New York) resin into template bubbles, pressing firmly so as to compress material and prevent voids within the attachment which could lead to breakage (Fig. 2). Compact the resin into the attachment bubbles so the exposed surface is level with the edges of the template. Use a brush with primer to smooth attachments. View template from facial to be sure there are no voids

Step 3: Place attachment template (with resin in bubbles) in drawer or light-tight box. The resin will remain stable for several hours to several days for use later.

Step 4: After drying and etching teeth, spread bonding agent/primer on tooth (Fig. 3). The authors suggest to etch only attachment area and slightly beyond, not the entire tooth surface.

Step 5: Place template – which includes the uncured resin – onto the teeth without curing and remove uncured immediately

(Fig. 4). This creates a custom base as the tooth side of the resin fill is pressed onto the tooth and takes on the contour of the tooth surface. There should be some flash around the entire perimeter of each attachment. If there are any areas where there is no flash after removing the template, add some resin as this is an area where there will likely be a void after bonding.

Step 6: Use a scaler or other instrument to remove all flash from within the template where the excess resin has spread after placing the template on the teeth. Then, smooth edges with a dry micro-brush at attachment edges (Fig. 5).

Step 7: Place template onto teeth and cure through the template material (Fig. 6). Cure again after removing the template, as the template material can reduce the effectiveness of the curing light by 40 percent.

Step 8: Remove flash, if present, with scaler and check with floss for residual flash interproximally (Fig. 7). Just as bracket bonding procedures can influence the results of fixed appliance treatment, effective attachment placement will have significant consequences for treatment with transparent aligners. This new system for placing attachments should provide more predictability, efficiency and comfort in the treatment of patients with the Invisalign appliance. ■

Author Bios

Dr. Mark Perelmutter is adjunct faculty at the University of Louisville School of Dentistry and serves on the Align Clinical Advisory Board. He and **Dr. Bradley Goldberg** are in the private practice of orthodontics in Louisville, Kentucky. **Ms. Dee Holloman** is a clinical orthodontic assistant at Perelmutter & Goldberg Orthodontics. To contact them, e-mail info@greatersmiles.com.



Dr. Lawrence Chan and Mr. Brendon Bengtson are the two men behind ConebeamInfo.com, a site created to raise awareness about the benefits and risks of CBCT use. Herein, Dr. Randol Womack asks about the business and the idea behind creating the forum for discussion.

ConebeamInfo.com is a social discussion entity dedicated to CBCT. It's a place where those involved or interested in the paradigm shift can gather thoughts, ideas, intentions, treatments, processes, etc. and decide on how to implement these into everyday practice and diagnoses. The CBCT machines are reaching into an abundance of different fields including anywhere from orthodontics to paleontology.

Tell us about ConebeamInfo.com.

Bengtson: As this specialty evolves, we are incredibly excited to help develop the communities along the way. Our mission statement at ConebeamInfo.com is to provide a non-partisan arena for dentists, industry professionals, staff and patients to discuss CBCT technology, applications, cases and standard of care all for the greater good of patients and doctors.

What was the drive behind starting a Web site like this?

Bengtson: There has been a lack of universal information in this incredibly vibrant and expanding field of cone beam. There needs to be a location like Orthotown.com where people can go to ask questions and discuss topics that are vital to the health of this industry.

Chan: When I bought my first CBCT three years ago, there was very little information about it. We had to develop our own protocols, obtain information by talking with people and sometimes invent on the fly. I love that we can gather new and presently established opinions about cone beam in one place and discuss how to apply them to everyday practices. With

ConebeamInfo.com, we have the insight of current industry leaders and interesting and thought provoking questions of upcoming doctors, in a central location. I wish I had this resource when I first started.

Can you please explain some of the topics that are included for discussion?

Chan: We cover a gamut of different categories and topics. This site is for everybody – dentists, industry professionals and even patients. Currently we have a handful of industry-leading orthodontists available to ask questions and spur new topics. We are also discussing oral surgery, implants and pathology. At this point, there isn't much we are not open to discussing. We have

great topics on things like cephalometrics, gear and equipment, scan settings, radiation/exposure and risk factors, just to name a few. I am especially proud of our Interesting Case section. This is a great place to share successes and disasters with complete anonymity, so that we can expand our knowledge base.

Bengtson: Not only are we discussing hot topics for the dentist and specialists but we also address issues staff and patients might have too. There are plenty of questions even for staff, like: what is DICOM? How do I find it? What is a DICOM header? What are some of the

things that I should be aware of for myself? For patients there are countless questions as well: My orthodontist has a 3D machine called a cone beam scanner. What kind of questions should I be asking? Is it worth an extra fee (if any)? What are the benefits?

Brendon, what separates you from other similar resources?

Bengtson: One of the main things that puts us aside from similar entities is we are not affiliated with any cone beam com-



panies. However, a highlight of ConebeamInfo.com is that we have industry professionals from CBCT machine companies and even software companies available to answer your questions directly. This is a valuable tool for anyone interested in more information from a direct source.

It's our mission to provide real information with as little bias as possible. When I worked for Anatomage I was asked numerous times about what machine to buy, or what software to use for treatment planning, etc. It quickly became apparent that the cone beam industry needed this hub. It is our core interest to offer a central location for doctors, staff and patients to ask questions, discuss hot topics and gather true and unfiltered information.

What are some of the milestones you have fulfilled so far?

Chan: For the launch of ConebeamInfo.com, we have recruited some of the industry's top innovative and influential doctors like Dr. Sean Carlson of Mill Valley, California, Dr. Juan-Carlos Quintero of Miami, Florida, Dr. Andrew Trosien of Tracey, California and many others, to be a part of our core crew. They are on board to answer important questions in hot topics and provide guidance via their own experiences in the cone beam field. We have a proactive approach to technology and its current or predicted benefits or even shortcomings. We welcome all opinions on these topics. This site is about the community and helping it move forward through open and fair communication.

Can you tell me about some of the highlights of ConebeamInfo.com?

Bengtson: We have many features to share with the community: track events on the calendar, reply and follow ongoing con-



versations, create new topics for discussion, review cases, take and review polls, read blogs (staff and/or doctors and companies), access cone beam CT machine and software reps directly, see featured "Cone Beam User of the Month," view member maps, personal message between members and use social media features like status updates, friends, etc. With such a wide range of users, we have a lot for everyone.

Is there anything else you would like to add about ConebeamInfo.com?

Bengtson: 3D has become such an important part of orthodontics, and all shades of the dental field, for treatment and diagnoses. Questions and misconceptions need to be addressed as soon as possible. We need to hear all the success stories and even disastrous stories around CBCT to further overall awareness and appreciation for what this tool can provide, not only to doctors but patients too.

Chan: CBCT is an ongoing hot topic right now. It has so much to offer dental practices and patients alike. I believe the time has come to discuss this as a large community. Please enjoy. We are bringing the CBCT world to your finger tips. n

Interviewee Bios

Dr. Lawrence Chan is a board certified medical radiologist, who specializes in head and neck imaging. Dr. Chan is the founder and CEO of Bay Area Advanced Imaging. Soon after starting the company three years ago, he realized that the information about cone beam CT was not being communicated easily between dentists, industry professionals and patients. Dr. Chan brings more than 16 years of expertise in the medical field to an emerging technology.

After medical school, Dr. Chan was a general surgery resident at the University of California at San Francisco for two years before completing a diagnostic radiology residency in Southern California. Dr. Chan also completed a musculoskeletal radiology fellowship from UCSF. Dr. Chan holds a MD from Albert Einstein College of Medicine and a BA in biochemistry from the University of California at Berkeley.

Mr. Brendon Bengtson was lead modeling technician, production manager for AnatoModels and head software trainer for Anatomage, a leader in 3D treatment planning software for cone beam CT. At Anatomage, he developed production pipelines, and created the training and support department responsible for client integration, business development and company collaborations. He also specialized in 3D treatment planning, training, imaging and 3D cephalometrics.

Mr. Bengtson holds a bachelor's degree in computer and video imaging from Cogswell Polytechnical College in Sunnyvale, California.





An Overview of the Risks & Benefits of Cone Beam Computed Tomography

by Dr. Ed Lin

As an orthodontist and health-care provider, I want to clearly state that my first and foremost priority for my patients is with my patients' welfare and to provide them the highest quality of care and service while utilizing the most clinically accepted and advanced technologies available. There have been several different technologies that have made major impacts in my private practice over the past 12 years. However, I consider the integration of a cone beam computed tomography machine (CBCT), more specifically the i-CAT, to have made one of the biggest positive impacts in my practice.

Whenever a new technology is introduced to our profession, there is a process that must take place prior to consideration of the technology becoming a "standard of care." Four key stages that make up this process: First, clinical research must substantiate the efficacy and safety of the technology for our patients and clinicians. Second, the technology must be taught properly to the qualified providers who will be utilizing the technology to ensure safety. Third, systems must be created to allow for effective implementation of the technology in the clinical private practice environment. And fourth, the costs associated with investment of this technology must demonstrate a positive return on investment both financially for the practice and clinically for the doctor and the patient. CBCT is the middle of this process of consideration for being the "standard of care" for our profession.

In this article, I would like to first discuss the risks and benefits associated with CBCT. I would then like to review the guidelines we have set up in our practice to minimize the risk and maximize the incredible benefits. Finally, I will share some clinical examples to demonstrate the benefits of CBCT.

As we all know, whenever we utilize any X-ray imaging for our patients, there is an increased lifetime risk of cancer for our patients. This is the one increased risk associated with CBCT when compared to conventional 2D imaging. However, the incredible benefits associated with CBCT have been clearly substantiated with independent clinical research over the past decade.^{1,2}

The invention of CT was a Nobel-prize winning discovery and today is still considered to be the greatest innovation in radiology since the discovery of X-rays. The reason they were awarded with one of the most prestigious honors in society is because CT is considered to be one of the most important methods of radiological diagnosis with far superior imaging in comparison to 2D radiography with clearer, non-superimposed images and more accurate images.

So how does a medical CT scanner work? I have attached a diagram (Fig. 1) from the Food and Drug Administration (FDA) to explain the mechanism with a medical CT scan.

There are two major differences between CBCT and medical CT. First, CBCT uses a low-energy fixed-anode tube, similar to that used in dental panoramic machines. Second and most important, the mechanism capturing the data with CBCT is different than the mechanism with medical CT. These differences are illustrated in the diagram (Fig. 1). With the medical CT, the head anatomy is exposed in small fan-shaped or flat slices as the X-ray source and detector make multiple revolutions around the patient's head while moving up or down the head anatomy. While collecting this information with a medical CT, there is overlapping of radiation.

With CBCT, the head anatomy is captured during the scan with only one revolution around the head with a cone-shaped beam. In contrast to the medical CT, the X-ray source and detector of the CBCT rotate only one time around the head anatomy and remain in the same vertical plane during the entire scan. With CBCT, the X-ray source and detector never move up or down during the single rotation.³

As a result, the same volumes of data with the head anatomy can be captured with both CBCT and medical CT. However, there is significantly decreased radiation exposure to the patient with CBCT in comparison to medical CT, due to the single cone-beam revolution around the patient's head. In fact in the *New York Times* an article published the statistics of CT medical scans versus those taken by an i-CAT. The article stated a standard medical CT scan of the head exposes a patient to approximately 2,000 microsieverts of radiation and a standard i-CAT scan exposes a patient to approximately 74 microsieverts of radiation.

Radiation dosages to a patient from any CT scan are dependent on two factors: 1) the type of CT scanner used and 2) the patient. Each CT scanner has its own unique settings and mechanism. As a result, the radiation dosages for each CT scanner will be different. The age and size of the patient and tissue type to be scanned are also important factors that determine the amount of radiation exposure to the patient. Young patients are more sensitive to radiation than a mature adult. Patients who are smaller in size are also more sensitive to radiation than larger patients. Finally, tissues such as the lung, breast and colon are much more sensitive to radiation than the brain, skin and thyroid.^{4,5}

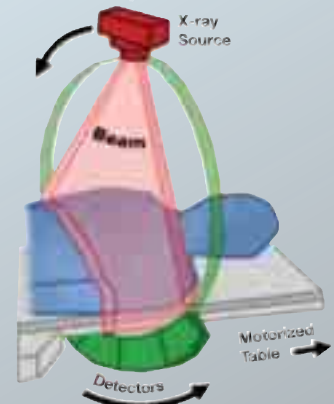
Traditionally in orthodontics in the United States, prior to initiating treatment for a patient, diagnostic records must be taken. This typically requires obtaining photographs of the patient, models of their bite and radiographs (typically a panoramic X-ray and lateral cephalogram X-ray). However, sometimes there might be other types of radiographs that will be requested such as a posterior-anterior cephalometric X-ray, submental vertex X-ray, occlusal X-ray and TMJ tomograms. Some of the various types of radiographs utilized in orthodon-

continued on page 54

Fig. 1: How a CT system works

Description: Computed tomography (CT) scanning, also called computerized axial tomography (CAT) scanning, is a medical imaging procedure that uses X-rays to show cross-sectional images of the body.

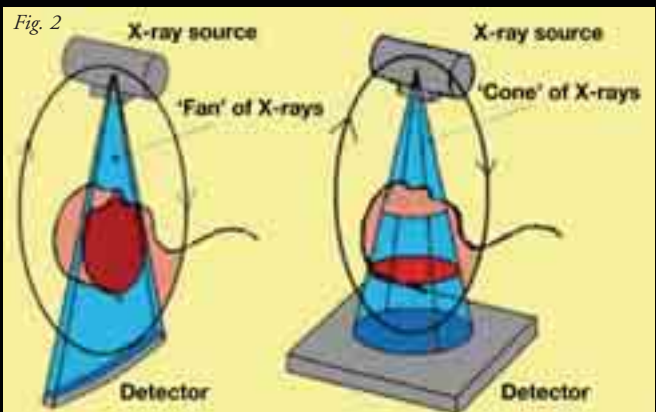
A CT imaging system produces cross-sectional images or "slices" of areas of the body, like the slices in a loaf of bread. These cross-sectional images are used for a variety of diagnostic and therapeutic purposes.



How a CT system works:

1. A motorized table moves the patient through a circular opening in the CT imaging system.
2. While the patient is inside the opening of the CT imaging system, an X-ray source and detector within the housing rotate around the patient. A single rotation takes about one second. The X-ray source produces a narrow, fan-shaped beam of X-rays that passes through a section of the patient's body.
3. A detector opposite from the X-ray source records the X-rays passing through the patient's body as a "snapshot" image. Many different "snapshots" (at many angles through the patient) are collected during one complete rotation.
4. For each rotation of the X-ray source and detector, the image data are sent to a computer to reconstruct all of the individual "snapshots" into one or multiple cross-sectional images (slices) of the internal organs and tissues.

Source: U.S. Food and Drug Administration



tics are listed with the amount of radiation exposure in microsieverts in the graph (Fig. 3) from a study by Dr. John Ludlow in September 2008, published in *Journal of the American Dental Association*.

A standard set of radiographs in orthodontics consists of a 2D digital panoramic X-ray (24.3 microsieverts) and a 2D digital lateral cephalometric X-ray (5.6 microsieverts). The total radiation exposure to the patient is approximately 30 microsieverts with these two X-rays. With a “single i-CAT scan,” all of this diagnostic information can be captured at a very low radiation exposure range of 30 to 160 microsieverts, which is the equivalent of or only slightly higher radiation exposure to the patient with far superior imaging and detail when compared to 2D radiographs.

The reason there is such a range for a single i-CAT scan is due to three factors which determine the amount of radiation exposure to the patient: 1) field of view (FOV), 2) resolution or voxel size and 3) scan time.

FOV in radiology is defined as the maximum diameter of the area of the scanned object from the detector that is represented in the reconstructed image. With the i-CAT, the FOV of the rectangular detector has a maximum scanned area of 23cm x 17cm. However, the FOV can be adjusted with i-CAT’s software application to be reduced to a FOV of 4cm x 16cm. In our practice, we typically use a FOV between 8cm x 16cm to 13cm x 16cm. We keep a CBCT log of every scan taken. Our i-CAT logbook indicates that we typically use this range for approximately 95 percent of our i-CAT scans. We

only use the maximum FOV of 23cm x 17cm less than five percent of the time and this is only utilized for very large individuals. As a result, the smaller the FOV, the less radiation exposure there is to a patient.

A “voxel” can be defined as the smallest distinguishable box-shaped part of a 3D image. Think of a voxel as a 3D pixel from 2D digital photography. With the i-CAT, the voxel setting can be adjusted using the i-CAT’s software application from a range of 0.125 voxel to 0.4 voxel. The smaller the voxel, the higher the resolution. As a result, 0.125 voxel offers the highest resolution and 0.4 voxel offers the lowest resolution. As can be evidenced by our i-CAT scanning protocol, approximately two-thirds of our i-CAT scans are taken at 0.4 voxel or 0.3 voxel. We only utilize the 0.2 voxel setting approximately one-third of the time for SureSmile scans and for larger individuals. We never utilize the highest resolution setting of 0.125 in our practice. As a result, the lower the resolution, the less radiation exposure there is to the patient. Conversely, the higher the resolution, the higher the radiation exposure to the patient. Simply stated, there is a direct correlation between the quality of the image and the amount of radiation exposure to the patient.

“Scan time” is the setting for the amount of time it takes for the X-ray source and detector to make a “single” 360-degree rotation around the patient’s head. The scan time setting range varies from: 4.8 seconds to 26.9 seconds. We typically utilize a scan time setting of 4.8 seconds, 8.9 seconds and 14.7 seconds. In our orthodontic practices, rarely do we

Fig. 3: Effective dose for commonly used dental radiographic examinations

Comparison of International Commission on Radiological Protection (ICRP) methods from 1990* and 2007. †

Type of Examination	Effective Dose (Microsieverts)		Change in Effective Dose 1990-2007 (%)
	ICRP 1990 Tissue Weights	ICRP 2007 Tissue Weights	
FMX [‡] with PSP [§] or F-Speed Film and Rectangular Collimation	12.2	34.9	186
BW [¶] with PSP or F-Speed Film and Rectangular Collimation	1.0	5.0	422
FMX with PSP or F-Speed Film and Round Cone	58.4	170.7	192
FMX with D-Speed Film and Round Cone [#]	133	388	192
Panoramic Orthophos XG ^{**} (CCD ^{††})	4.3	14.2	231
Panoramic ProMax ^{‡‡} (CCD)	7.1	24.3	241
Posteroanterior Cephalometric (PSP)	3.9	5.1	32
Lateral Cephalometric (PSP)	3.7	5.6	51

* Source: International Commission on Radiological Protection.¹

† Source: Valentin.²

‡ FMX: Full-mouth radiographs.

§ PSP: Photo-stimulable phosphor.

¶ BW: Bitewing

Calculated as F-speed film value x 2.3 (See Ludlow and colleagues³).

** Orthophos XG is manufactured by Sirona Group, Bensheim, Germany.

†† CCD: Charge-coupled device

‡‡ ProMax is manufactured by Planmeca, Helsinki, Finland.

utilize the highest scan time setting of 26.9 seconds. This scan time setting is really only utilized for very large individuals. As a result, the shorter the scan time, the less radiation exposure there is to the patient.

i-CAT Settings for Next Generation Machine (Dr. Lin)

Panorex only (ck 8s or eruption):

Diameter - 16cm, Height - 8cm, .4 voxel, 4.8 or 8.9 seconds.

Panorex/lateral ceph (all records):

Diameter - 16cm, Height - 13cm, .3 voxel, 4.8 or 8.9 seconds.

or for a larger FOV:

Diameter - 23cm, Height - 17, .3 voxel, 4.8 or 8.9 seconds.

For patients age 10 or under, use 4.8 seconds unless the patient is a larger individual.

SureSmile scan that needs a panorex only:

Diameter - 16cm, Height - 8cm, .2 voxel, 14.7 seconds.

SureSmile scan that needs both panorex and lateral ceph X-rays:

Diameter - 16cm, Height - 13cm, .25 voxel, 14.7 seconds.

The bottom line is that we always try to keep the amount of radiation exposure to our patients as low as possible, typically in the range of 30 to 75 microsieverts. We do follow the International Commission on Radiological Protection's (ICRP) ALARA principle to keep radiation exposure "as low as reasonably achievable." With our i-CAT, we now have a technology in our orthodontic practice that allows us to significantly reduce the radiation exposure to our patients in comparison to a medical CT, and still allows us the incredible benefits of 3D imaging so that we can make the best decisions for treating our patients! I would also like to point out that in our practice, we do not charge a fee for the i-CAT scans for our patients. As a result, there is no financial incentive for us to take extra scans of our patients. A scan is only recommended if the doctor feels that it is clinically necessary for the patient.

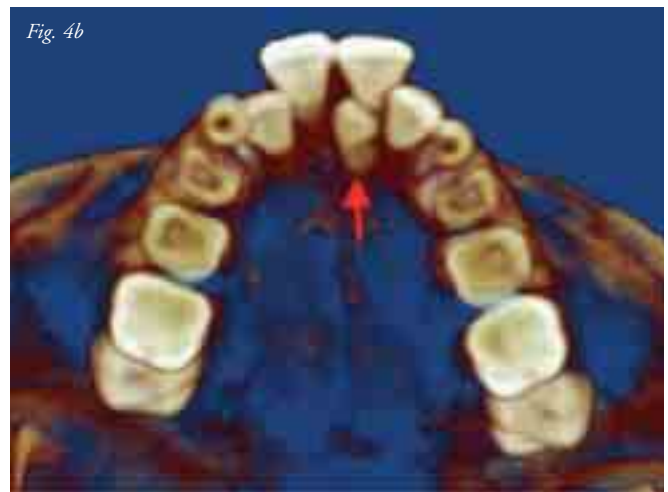
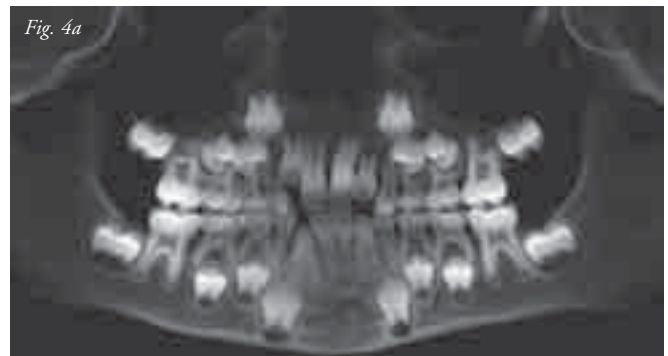
I will now illustrate how 3D CBCT imaging is superior to conventional 2D radiography leading to improved diagnosis and treatment planning for our patients.^{6,7,8} For example, let us look at the 2D panoramic X-ray (Fig. 4a) that was created from a single, low-radiation i-CAT CBCT scan.

With a single i-CAT scan, we can view 2D cross sections as in the panorex above, but can also view things in 3D. Let us take a look at the same patient in the 3D mode (Fig. 4b).

The red arrow above points to a supernumerary tooth positioned behind the patient's permanent upper left central incisor. Any orthodontist will understand the significance of not knowing that an extra tooth is present under the bone and tissue can put the patient at risk for damaging the roots of the adjacent permanent teeth, especially if we begin moving teeth with orthodontic appliances. The reason that you cannot see the extra tooth in the 2D panoramic X-ray is because the extra tooth is

superimposed behind the root of the patient's upper left central incisor. Because of the i-CAT, I was able to diagnose the extra tooth, which has since been extracted, and the patient is currently in orthodontic treatment with me without any risk to the roots of the adjacent permanent teeth while in treatment. This patient entered into my practice for a second opinion. The original orthodontist never diagnosed the extra tooth because the orthodontist did not see the extra tooth on the 2D panoramic X-ray and lateral cephalometric X-ray, and a CBCT scan was never taken.

Another example of the incredible benefits of CBCT for our patients is illustrated with figure 5. Let us first take a look at the



continued on page 56

2D digital panoramic X-ray that was provided to us by the pediatric dentist of our patient.

Compare this 2D digital panoramic X-ray (Fig. 5a) to a 3D view that was created from an i-CAT scan of the same patient 12 months later (Fig. 5b).

The red arrow points to a “blue circular area” in the patient’s right lower jaw that is clearly abnormal and looks very suspicious for pathology. In comparison, in the original 2D digital panoramic X-ray taken before the start of treatment, the lesion is not apparent and looks very similar in appearance to the same area on the patient’s left side as is illustrated by the red arrows in Fig 5c.

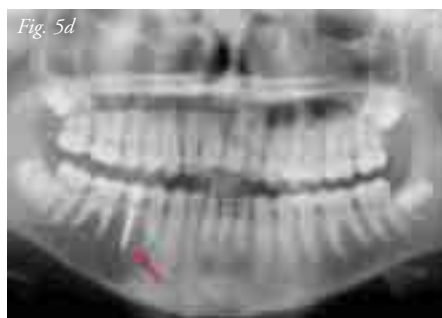
As a result of the diagnosis of this lesion from the iCAT-SureSmile scan, the patient was given a referral to both an oral surgeon and endodontist. The lesion was removed and biopsied and was diagnosed as a traumatic bone cyst. Unfortunately, the pathology had extended to the lower right second premolar and root canal treatment was necessary for that tooth as well. This is illustrated by the red arrow in the 2D digital panoramic X-ray (Fig. 5d) that was provided to us by the patient’s pediatric dentist.

Now the question needs to be asked, What if this lesion would have continued to go undiagnosed because it was not evident in the 2D digital panoramic X-ray or other types of 2D dental X-rays. The answer to that question is that 1) the lesion could have continued to grow larger over time, 2) the lesion could have affected other teeth requiring additional root canals or even the loss of teeth and 3) if the lesion continued to grow and destroy the bone in the patient’s lower jaw, this would put the patient at greater risk for fracture of his lower jaw.

A 15-year-old male patient transferred into my practice for a second opinion as the patient had been in orthodontic treatment for approximately 14 months with the previous dentist. As you can tell in the photographs and illustrated by the red arrows, there is a significant problem with the eruption of this young man’s teeth in the right quadrant of his lower jaw (Fig. 6a). The previous dentist had recommended extraction of his permanent lower right first and second premolars because the dentist felt that these two teeth were “ankylosed or stuck” under the bone and tissue.

This young man had suffered trauma to the head and jaw in an ATV accident as an 11-year-old. As a result, he had suffered a fracture in his lower right jaw, which had required surgery to repair the fracture with plates and screws. This is illustrated by red arrows in the 2D panoramic X-ray (Fig. 6b) that was created from a single, low-radiation iCAT scan. In looking at a cross section of that same area in the 3D mode (Fig. 6c), it is clearly evident with the red arrows that the screws on the sides of the permanent lower right second premolar are embedded into the roots of that tooth. This young man also was suffering from chronic facial and jaw pain, frequent headaches, difficulty in chewing, and his grades in school had suffered since the accident.

As a result, I recommended removal of the plates and screws with an oral surgeon and have since taken over his case. Final photographs were taken on 4/21/2011, the day his braces were removed (Fig. 6d). As is clearly evident, the teeth on his right side have come together. More importantly, the patient no longer suffers any side effects from his accident, his grades have improved and he will be graduating from high school and going to college in 2011.



Evaluation of the eruption patterns of the permanent teeth is another example of the incredible benefits of CBCT.

Let's look at a patient who entered into my practice in December of 2010. This patient's 2D panoramic X-ray (Fig. 7a) was created from a single, low-radiation i-CAT scan.

Clearly evident and indicated by the red arrow in Fig. 7a, this patient's permanent upper right canine is impacted underneath the gum tissue and bone. However, is the permanent canine in front of or behind the permanent upper right lateral incisor? Also, are there any other areas of concern on this panoramic X-ray?

The upper left red arrow in Fig. 7b clearly illustrates that the permanent upper right canine is positioned behind the permanent upper right lateral incisor and is impacted in the roof of the mouth. The second red arrow illustrates that there is also a second impaction that was not evident on the 2D panoramic X-ray with the permanent upper left second premolar lying almost horizontally in the roof of the mouth.

The surgeon will know exactly where to go to surgically uncover these two teeth to allow me to bring them down into their correct positions. This will minimize the amount of trauma to the patient during the surgical procedure. I would also like to point out that if a CBCT scan would have been taken on this patient a couple of years earlier, perhaps both of these impactions could have been avoided with an earlier diagnosis and the recommendation of the extraction of the two primary teeth. The negative consequences of impacted teeth are: 1) surgery and recovery time, 2) additional expense for the surgical procedure, 3) additional time for orthodontic treatment and 4) additional expense for orthodontic treatment due to extra work involved.

One final example of the incredible benefits that CBCT has to offer for our patients with diagnosis and treatment planning is with a comparison of the images of the next two patients. The first patient entered into my practice in September of 2009. When taking a single, low-radiation i-CAT scan for our initial diagnostic records, I discovered the root of his maxillary lateral incisor had been destroyed, which is illustrated in the 2D panoramic X-ray created from the i-CAT scan with the red arrow (Fig. 8).

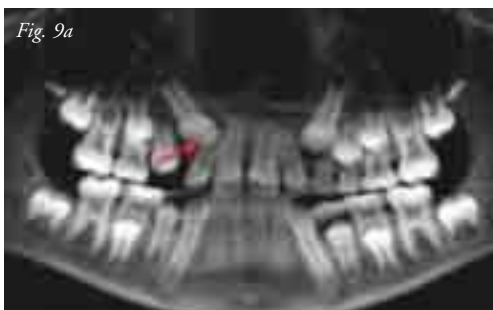
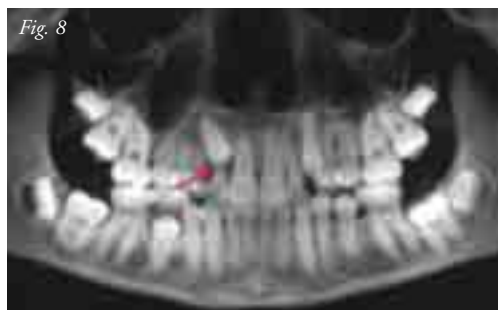
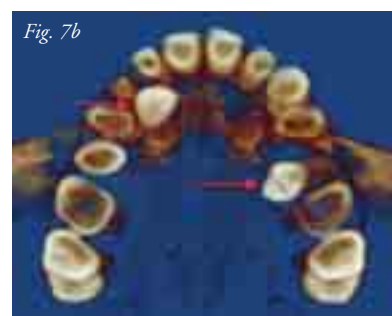
The mother told me that they have always gone to see their general dentist for their routine dental checkups every six months. Unfortunately, the eruption path of the permanent upper right canine had gone undiagnosed, and as a result, this young man will eventually lose his permanent upper right lateral incisor in the near future.

In comparison to this case above, the second patient's images (Fig. 9) were created from a single, low-radiation i-CAT scan.

The area of concern again is illustrated by the red arrow. However, on this 2D panoramic X-ray created from the i-CAT scan, it does not appear as if the root of the permanent upper right lateral incisor has been damaged or is in danger of being damaged. We also cannot tell if the permanent upper right canine is in front of or behind the permanent upper right lateral incisor (Fig. 9b).

As can be evidenced by the red arrow, the eruption path of the permanent upper right canine of this patient is coming directly over the top of the root of the permanent upper right lateral incisor and this patient has a significant risk of damage to the root of the permanent upper right lateral incisor if treatment were not rendered.

The reason I have brought these two patients' cases up for comparison is because they are very similar cases. However,



continued on page 58

these two cases are also at two very different stages of dental development, with the first patient being more mature and approximately two years older.

With this image (Fig. 9b), I was able to diagnose a significant risk for damage of the root of this patient's permanent upper right lateral incisor due to the eruption path of the permanent upper right canine that was not evident on the 2D panoramic X-ray. As a result, I began treatment immediately and was able to protect the root of this patient's permanent upper right lateral incisor from any damage. In my personal professional opinion, if a CBCT scan would have been taken on the first patient a couple of years earlier, I believe the first patient's permanent upper right lateral incisor could have been saved.

A Change in Application

Until 2007, CBCT has been viewed in orthodontics as a diagnosis and treatment planning tool. However, in 2007, the merging of the technologies of CBCT with a technology called SureSmile gave the orthodontist the capability to utilize CBCT not only as a diagnosis and treatment planning tool but also gave us the capabilities for CBCT to become "actively" involved in the treatment of our patients!

SureSmile is a technology first introduced to the orthodontic profession approximately seven years ago. SureSmile's technology incorporates computer hardware, a scanner (intra-oral scanner or CBCT scanner) and their proprietary 3D CAD/CAM software applications in combination with fixed orthodontic appliances or braces. The way SureSmile works is after we bond the brackets on a patient, we then need to scan the patient's teeth and brackets. Using SureSmile's proprietary software, the orthodontist is able to reset the patient's incorrect bite to an ideal bite and then *will bend a customized* SureSmile wire with memory that will move all the teeth into the correct positions at once. As a result, SureSmile allows us to correct our patient's alignment and bite issues with a high degree of precision and also allows us to reduce treatment time by an average of 40 percent.^{9,10} My average treatment time prior to SureSmile for all of my full orthodontic and Phase II cases used to be 24 months. My average treatment time with SureSmile for these same cases is now 14 months.

When SureSmile was first introduced, the only option at that time was to utilize an intra-oral scanner to scan the patient. As a result, SureSmile's technology was limited to only capturing the clinical crowns of the teeth in combination with the brackets as illustrated in figure 10. We are not able to see the roots of the teeth because we cannot scan them with the intra-oral scanner.

As orthodontists, our specialty is responsible for creating beautiful smiles and correcting bite problems for our patients. However, in the process of moving teeth, we are also moving the roots of the teeth as well. Until recently, there was no technology available to orthodontists that would allow us to be able to accurately evaluate root positions prior to the start of treatment or determine if we were moving the roots of our patient's teeth into the most ideal positions at the completion of their orthodontic treatment.

That is until 2007, when SureSmile gave orthodontists the capability to CBCT scan our patients so that we could evaluate and correct not only the positions of the crowns of their teeth but also the roots of their teeth to a very high degree of precision and accuracy. Several studies have shown that evaluation of root positions utilizing a 2D panoramic radiograph is an inaccurate procedure.¹¹

Let us look at what the benefits are with understanding what is happening with both crown and root movement of the teeth while a patient is in orthodontic treatment. With the SureSmile setup of the patient in figure 11 without the roots present, it appears as if this patient has a very nice fitting bite on the patient's right side.

However, let us look at this same patient a bit more closely when displaying the roots of the patient's teeth with all of the teeth in the exact same positions. It is clearly evident in the second image (Fig. 12), as is indicated by the red arrow, that the roots of the permanent upper right first and second premolars are colliding. The concern here is that with the collision of the two roots, this can 1) prevent tooth movement that might go undiagnosed or 2) in the worst case scenario, it might cause damage to the roots of the teeth themselves.

By truly understanding the anatomy of the roots of the teeth, with SureSmile's software applications, this allows the



orthodontist to better position both the crowns and the roots of the teeth into the most ideal positions. This is illustrated in Figure 13a with the red arrow. There is now clearly space between the roots of these two teeth. I have also included before and after photos of the patient's completed case (Figs. 13b-c), which I completed in only 12 months with SureSmile. Without SureSmile, I estimate that it would have taken me approximately 18 months to complete her case.

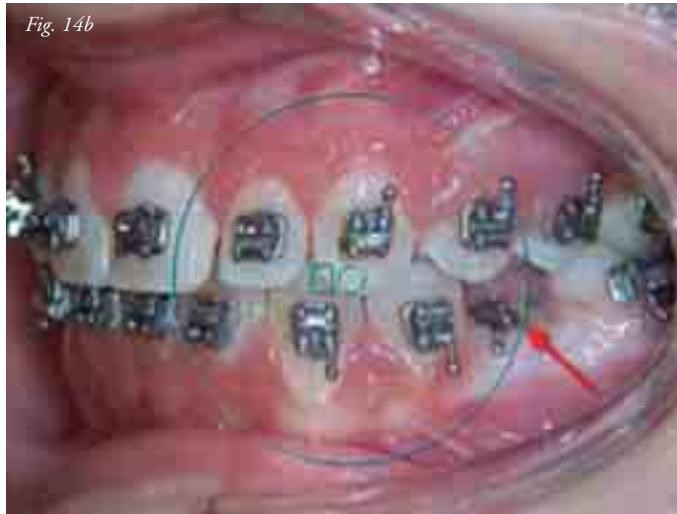
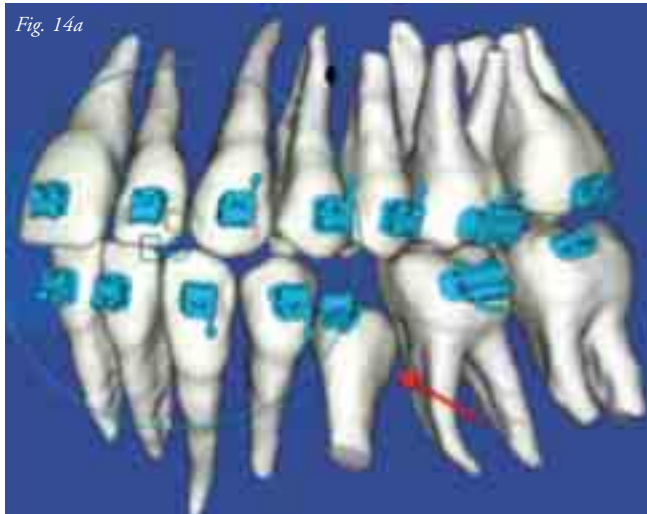
Another example of the importance of understanding both the crown and root positions for orthodontic treatment with the following patient's images (Figs. 14a-b). As indicated by the red arrows, this patient's permanent lower left second premolar is partially impacted on the day of her SureSmile scan. Obviously there is significant movement of both the

crown and the root of the tooth that needs to take place.

With SureSmile's software applications, I am able to reposition both the crowns and the roots of the teeth into the most ideal positions. This is illustrated in this patient's SureSmile setup (Figs. 15a-c) with her before and after photos of the completed case.

Her total treatment time took only 14 months from start to finish with SureSmile, even with the impacted tooth. If I would have treated her case without SureSmile, I would estimate that it would have taken me approximately 20-24 months to complete her case.

With ideal positioning of the crowns of the teeth in combination with the ideal positioning of the roots of the teeth in the bone, this leads to increased stability with the bite and a



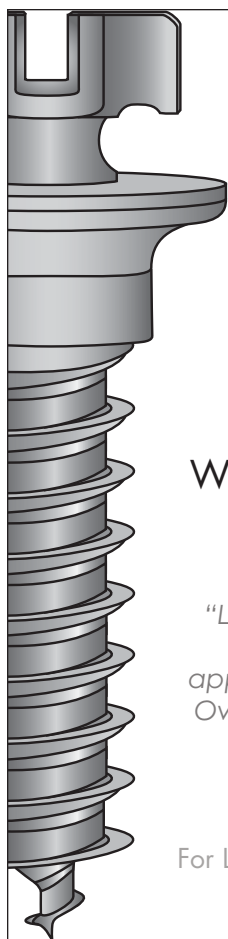
continued on page 60

decreased potential for orthodontic relapse in the future. This also leads to greater periodontal stability for the long-term, resulting in a decreased potential for gum recession and bone loss as we age.¹² I personally feel that it is phenomenal that we now have these capabilities for the orthodontist to be able to predictably determine both crown and root movement because of the integration of the technologies of CBCT and SureSmile.

In conclusion, I would like to review one final case to illustrate the tremendous benefits which CBCT has to offer both to us, the clinicians, and our patients.

This young lady presented to me for a new patient examination in July of 2011 (Fig. 16). She was 13 years and 11 months. Her father is a general dentist and has been monitoring her dental needs on an annual basis. She has a Class I malocclusion with mild spacing present in both maxillary and mandibular arches. An i-CAT scan was recommended by me after my initial clinical evaluation. Upon further evaluation of her lateral cephalogram (Fig. 17a) and panorex (Fig. 17b), it appears that this is a very straightforward orthodontic case and could be considered a "routine" orthodontic case by some.

However, after sending her i-CAT scan to an oral radiologist, it was discovered that a radiopacity was present in her



THE aarhus SYSTEM™

THE Mini-Screw System for Your Practice

UPCOMING LECTURES

with Professor Birte Melsen



Professor Birte Melsen

WSO Meeting • New Conn Meeting • NESO Meeting
AAO 2012

"Lack of equilibrium is most likely the cause of the majority of adverse effects seen in orthodontics. Forces delivered by any orthodontic appliance are equal and opposite to the active and the reactive unit... Overcoming this obstacle is clearly the most valuable contribution that skeletal anchorage offers orthodontics."

- Prof. Birte Melsen, Keynote Address
The Thirty-Fourth Moyers Symposium, 2007

For Lecture Details Visit www.americanortho.com/mini-screws_aarhus.htm

See Article in Current Issue for Aarhus System Details.





right maxillary sinus with distortion and bowing present of the posteriolateral wall of her right maxillary sinus as is evidenced by the red arrow in the axial cross section (Fig. 18).

As a result, an ENT referral was immediately given to the family for further evaluation and treatment. The reason that I would like to conclude with this case is because this case truly demonstrates the importance of CBCT in diagnosis and treatment planning, especially as our profession of orthodontics continues to advance with the technological changes that are making us better clinicians and allowing us to provide a higher quality of care. The question needs to be asked, What if an i-CAT scan had never been taken on this patient and her pathology had gone undiagnosed for several years because the pathology was not evident in the 2D radiographs? Without a doubt, I think we all know that this young lady would have a much greater risk with health issues directly related to this.

In my practice, I never consider any case to be a “routine” orthodontic case until that case has been completed and I have had an opportunity to re-evaluate. I treat each and every case that comes through my practice with “universal precaution” while completing my diagnosis and treatment planning. Radiographic imaging is only recommended when I see the need for it. As clinicians, we must understand that there are risks that we are exposing our patients to when we are making these recommendations and we must minimize these risks by controlling the amount of radiation exposure to the patient and making certain that the benefits will outweigh the risks. With CBCT, we now have the capabilities to do so.

In summary, I personally believe that our esteemed profession of dentistry should be given significant credit and recogni-

tion for the development of the technology of CBCT to provide our patients with a low-radiation 3D imaging alternative to medical CT. However, CBCT still affords us all the benefits of medical CT with 3D imaging. This has led to an improved quality of care with diagnosis and treatment planning for our patients. With the integration of the technologies of CBCT and SureSmile, CBCT now has an additional benefit as it is being utilized with the active therapeutic care of our patients. Diagnosis and treatment planning with actual treatment of our patients are all transitioning from the 2D into the 3D world. It is my belief that CBCT will be considered the standard of care in orthodontics in the very near future, especially since the technology has now advanced to bring the radiation exposure levels to our patients down to levels that are very comparable to a digital panorex and lateral cephalogram. **n**

References:

1. Mah, J and Hatcher, D.C.: *Current Status and Future Needs in Craniofacial Imaging, Orthod. Craniofac. Res.* 6(suppl. 1):10-16, 2003
2. Mah, J; Yi, L; Huang, R; Choo, H: *Advanced Applications of Cone Beam Computed Tomography in Orthodontics, Sem in Orthod.* 2011;17(1):57-71
3. Scarfe, W; Farman, A; Sukovic, P: *Clinical Applications of Cone-Beam Computed Tomography in Dental Practice, J Canadian Dent Assoc.* 2006;72(10):75-80
4. Brenner, D; Hall, E: *Computed Tomography – An Increasing Source of Radiation Exposure, New Engl J Med.* 2007;357(22):2277-2284
5. Ludlow, J; Davies-Ludlow, L; White, S: *Patient Risk Related to Common Dental Radiograph Examinations: The Impact of 2007 International Commission On Radiological Protection Recommendations Regarding Dose Calculation, J Am Dent Assoc.* 2008;139,1237-1243
6. Cha, J-Y; Mah, J and Sinclair, P: *Incidental findings in the maxillofacial area with 3-dimensional cone-beam imaging, Am. J. Orthod.* 2007;132:7-14
7. Haney, E; Gansky, S; Lee, J; Johnson, E; Maki, K; Miller, A and Huang, J: *Comparative analysis of traditional radiographs and cone-beam computed tomography volumetric images in the diagnosis and treatment planning of maxillary impacted canines, Am. J. Orthod.* 2010;137:590-597
8. Granlund, C; Lith, A; Molander, B; Grondahl, K; Hansen, K and Ekestubbe, A: *Frequency of errors and pathology in panoramic images of young orthodontic patients, Eur. J. Orthod.* 2011; First published online April 21, 2011 doi:1093/ejor/cjr013
9. Saxe, A; Louie, L; Mah, J: *Efficiency and Effectiveness of SureSmile, W. J. Orthod.* 2009;11:16-22
10. Alford, T; Roberts, E; Hartsfield, J; Eckert, G; Snyder, R: *Clinical outcomes for patients finished with SureSmile method compared with conventional fixed orthodontic therapy, Angle Orthod.* 2011;81:383-388
11. Leuzinger, M; Dudic, A; Giannopolou, C; Kiliaridis, S: *Root-contact evaluation by panoramic radiography and cone-beam computed tomography of super-high resolution, Am. J. Orthod.* 2010;137:389-392
12. Poling, R: *A Method of Finishing the Occlusion, Am. J. Orthod.* 1999;115:476-87

Author's Bio

Dr. Ed Lin is an internationally recognized speaker and full-time practicing orthodontist and partner at both Orthodontic Specialists of Green Bay (OSGB), in Green Bay, Wisconsin, and also Apple Creek Orthodontics (ACO) in Appleton, Wisconsin. Dr. Lin received both his dental and orthodontic degrees from Northwestern University Dental School ('95, DDS; '99, MS).





by Sean Carlson, DMD, MS; John Graham, DDS, MD;
William E. Harrell Jr., DMD; Edward Y. Lin, DDS, MS;
Aaron Molen, DDS, MS and Wm. Randol Womack, DDS

A general consensus in dentistry exists, at the present time (2011), that the revolutionary technology known as cone beam computed tomography (CBCT), aka, cone beam volumetric tomography (CVCT), has the potential to significantly improve diagnosis, treatment planning, treatment monitoring and treatment outcomes in many dental procedures. The clarity and detail provided by the volumetric images enables a doctor to maximize the effectiveness and efficiency of the treatment they can provide to a patient.

Orthotown Magazine has published multiple articles by leading practitioners about the advantages CBCT has provided in their practices. The proliferation of CBCT imaging devices during the past five to 10 years is evident of the interest in and adoption of the undisputed, tangible benefits of the information gained through a few seconds of scan time.

There currently exists significant confusion with respect to the ionizing radiation produced during a scan. Many articles and consumer publications have reported widely varied and often incorrect and/or distorted data about the radiation values and risks from modern digital imaging devices being sold to and utilized in dental practices and dental specialties. This has led to apprehension from patients and has left the doctor with indecision as to how to effectively evaluate this technology and how to

answer questions that are posed when CBCT scans are recommended and/or utilized in their practice.

Before beginning any discussion on dosimetry, we must first become familiar with the International Committee of Radiological Protection (ICRP). The ICRP is a group that is designed to protect and inform the public regarding the harmful effects of ionizing radiation. They set guidelines for the medical and dental communities to help minimize the risks to the public. In 2007, the ICRP released a set of updated guidelines on the limits of X-ray exposure. The two most important take-home messages from this set of guidelines are: 1. Non-occupational exposure to ionizing radiation should be limited to 1,000 μ Sv per year and 2. A revised set of tissue weightings (released as part of the 2007 guidelines) should be used when calculating effective dose of ionizing radiation.

Using these guidelines from the ICRP, as clinicians, we can simply gauge our diagnostic X-rays to make sure we stay at or below the guidelines. Therefore, if we minimize our patients' total exposures to less than 1,000 μ Sv per year, we are well within the "safety zone" as judged by the ICRP.

The following graphs are a good start in defining what is accurate and true about ionizing radiation from CBCT scans understanding that the ALARA principle (As Low As Reasonably Achievable) is always the goal whether it be 2D or 3D imaging.

Recent publications by Ludlow and colleagues comprehensively describe the X-ray exposure of the most common dental X-rays. These exposure values can be seen in Tables 1 and 2. Notice that for an FMX using round cone collimation, the effective dose is 170.7µSv versus FMX using rectan-

gular collimation is 34.9µSv. The exposure for a ProMax panoramic X-ray is 24.3µSv. The exposure for a lateral cephalometric X-ray is 5.6µSv.

Table 2 shows the exposure values for CBCT X-rays. In orthodontics, it can be argued that one of the more common

Table 1: Effective dose for commonly used dental radiographic examinations
Comparison of International Commission on Radiological Protection (ICRP) methods from 1990* and 2007.†

Type of Examination	Effective Dose (Microsieverts)		Change in Effective Dose 1990-2007 (%)
	ICRP 1990 Tissue Weights	ICRP 2007 Tissue Weights	
FMX‡ with PSP§ or F-Speed Film and Rectangular Collimation	12.2	34.9	186
BW¶ with PSP or F-Speed Film and Rectangular Collimation	1.0	5.0	422
FMX with PSP or F-Speed Film and Round Cone	58.4	170.7	192
FMX with D-Speed Film and Round Cone¶	133	388	192
Panoramic Orthophos XG** (CCD††)	4.3	14.2	231
Panoramic ProMax‡‡ (CCD)	7.1	24.3	241
Posteroanterior Cephalometric (PSP)	3.9	5.1	32
Lateral Cephalometric (PSP)	3.7	5.6	51

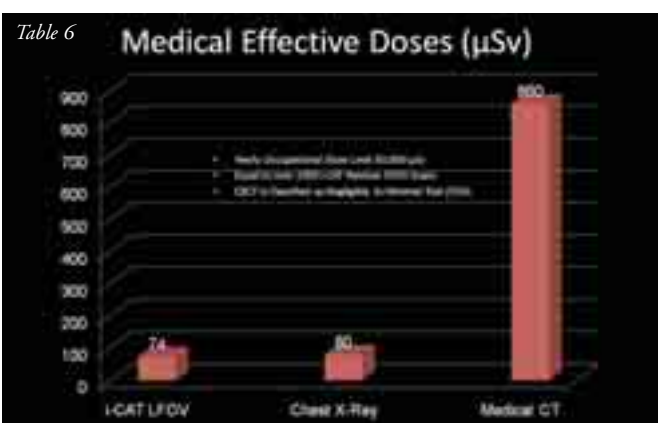
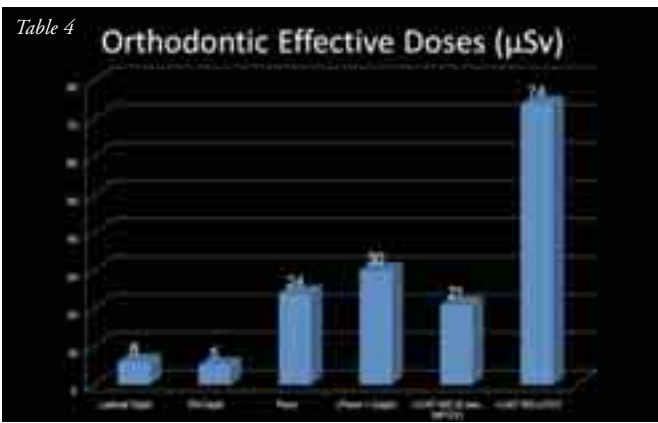
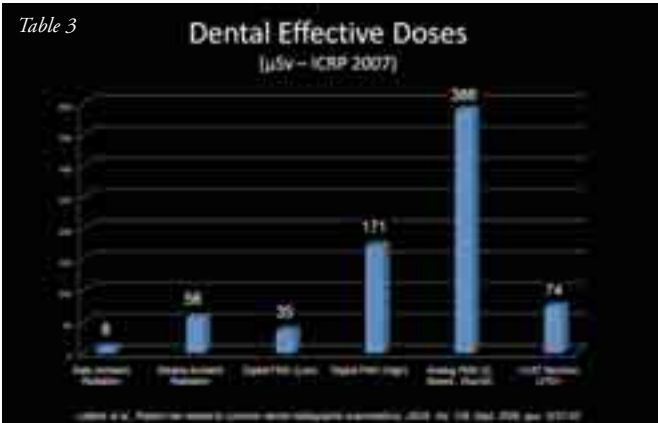
• Source: International Commission on Radiological Protection.¹
 † Source: Valentin.³
 ‡ FMX: Full-mouth radiographs.
 § PSP: Photo-stimulable phosphor.
 ¶ BW: Bitewing
 †† OCD: Charge-coupled device
 # Calculated as F-speed film value x 2.3 (See Ludlow and colleagues⁵).
 ** Orthophos XG is manufactured by Sirona Group, Bensheim, Germany.
 ‡‡ ProMax is manufactured by Planmeca, Helsinki, Finland.

Table 2: Effective dose from dento-alveolar and maxillofacial radiographic examination for CBCT and MDCT devices. Comparison of ICRP 1990 and 2007 calculations

Technique	Effective Dose, µSv, ICRP 1990 Tissue Weights	Effective Dose, µSv, ICRP 2007 Tissue Weights	Change in Effective Dose 1990-2007
Large FOV			
New Tom3G large FOV ⁴	42	68	62%
CB Mercuray facial FOV maximum quality ⁴	806	1073	33%
CB Mercuray facial FOV standard quality ⁴	464	569	23%
Next Generation i-CAT portrait mode	37	74	100%
Iluma standard	50	98	97%
Iluma ultra	252	498	97%
Average			61%
Medium FOV			
CB Mercuray panoramic FOV ⁴	264	560	112%
Classic i-CAT standard scan	29	69	137%
Next Generation i-CAT landscape mode	36	87	139%
Galileos default exposure	28	70	148%
Galileos maximum exposure	52	128	148%
Somatom 64 MDCT	453	860	90%
Somatom 64 MDCT w/ CARE Dose 4D	285	534	87%
Average			123%
Small FOV			
CB Mercurayl FOV maxillary ⁴	156	407	161%
ProMax 3D small adult	151	488	224%
ProMax 3D large adult	203	652	222%
PreXion 3D standard exposure	66	189	187%
PreXion 3D high exposure	154	388	151%
Average			189%

ICRP, International Commission on Radiological Protection.
 4. Previously published data.

continued on page 64



CBCT X-rays is a large FOV (LFOV) scan (17-23cm at .3 voxel resolution) using the Next-Generation i-CAT machine. Notice that the effective dose for this type of scan is 74 μSv . Medium FOV (MFOV) is usually around 13cm height and smaller FOV, i.e. 4, 6, 8cm height (SFOV) or “focused field of views” (FFOV) can be done to reduce the exposure time and the size of the region of interest.

All of the X-rays mentioned above fall well below the guideline limits of X-ray exposure as set by the ICRP. Recall that the limit of 1,000 μSv indicates that we are well within the “safe zone” for X-ray exposure if we stay below this. However, the “safe zone” is really the issue we must debate.

Discussing the “safe zone” in dental X-rays is where emotions run high. We must somehow be able to put this in perspective based on ionizing radiation exposure from other sources. The best way to put this in perspective is by using background radiation exposure data. This data has been well researched. Background radiation exposure in the United States is approximately 8 μSv per day. Therefore, when we discuss the “safety zone,” or the risk of X-ray exposure, it helps to compare it with our daily exposure of 8 μSv per day or 2,920 μSv per year, which is the base line for human daily exposure on the earth.

When we compare the dosimetry used in dentistry today with the daily background exposure value of 8 μSv or 56 μSv weekly, it becomes evident that some of the dental X-rays being used today – with no real concern about exposure by the public or the dentist – are much higher than a LFOV CBCT scan (see Table 3).

Within the specialty of orthodontics, the options for X-rays show a variety of combinations that will provide the orthodontist with the diagnostic information needed to plan treatment for his patient are shown in Table 4. What is not indicated on the graph is the “quantity of information” provided by the different options for X-ray choices... but that is a different article.

Today’s CBCT machines offer a wide variety of settings and fields of view, which enable the orthodontist to decide the best and most conservative X-ray option for each individual patient. Table 5 shows not only the comparative options for CBCT scans, but it also includes the routine pan/ceph and FMX exposure in μSv .

Another comparison – often confused by the public because of the terms “CAT scan” or “CT scan” – is the fact that a dental CBCT scan is not the same as a medical CT scan in terms of the ionizing radiation given to the patient. Table 6 shows the difference in exposure of two common medical X-rays compared to the dental CBCT scan.

There is an active effort being made by machine manufacturers to provide settings that will offer the clinician the best options for choosing the appropriate CBCT scan for each diagnostic evaluation. Table 7 presents the latest information com-

paring the newest scan time and newest FOV selections for a CBCT scan compared to the commonly used pan/ceph diagnostic radiographs.**

Figure 1 is an image that demonstrates the type of quality that can be achieved using only the five seconds, low-dose scan taken at 0.3mm voxels and with a FOV of 10x16cm.

Again, it is important to understand that patients are not only exposed to clinical radiation but also they, and everyone on the planet, are exposed to “background” radiation each day. To reiterate, the United States background radiation dose is 8.0µSv per day. We understand that radiation accumulates over time and elective clinical radiation adds to the patient total. However, when the ICRP’s non-occupational exposure limit is 1,000µSv per year, which is far less than what a person would naturally get in a year, it is clear that the ICRP has set its limit very low. Yet this limit does give patients and parents a defined margin, yearly, to measure the accumulative exposure to all types of non-occupational radiation in order to stay in the “safe zone.” It also gives clinicians a parameter in determining the “safe zone” of accumulating radiation for a patient during orthodontic treatment or observation.

In an effort to put X-ray exposure in perspective with background exposure, Table 8 shows the relative exposure in days of the most common dental X-rays. A full volume CBCT X-ray is equal to approximately nine days of background exposure. When one considers the amount of background exposure each person receives in a year, a single CBCT X-ray is comparable to around two percent of that. The entire full mouth series of den-



tal X-rays, using digital film and round collimation, is equal to only approximately 21 days, or just under six percent of that.

It is of value to state that everyday activities also produce background radiation. For example, airline travel adds to one’s radiation exposure and can easily be compared to ones CBCT exposure (see Tables 9 and 10). Generally the public is unaware or unconcerned about background exposures of this nature.

However, the aviation industry has always been very concerned about the exposure of their pilots to radiation while flying the many hours each year. A study was done to evaluate the incidence of cancer among Nordic airline pilots over five decades involving 10,032 pilots in a 17-year follow-up period. The conclusion: “This study does not indicate a marked increase in cancer risk attributable to cosmic radiation.”

Of course, when it comes to X-ray exposure, most people simply want to know the risk they have of contracting cancer

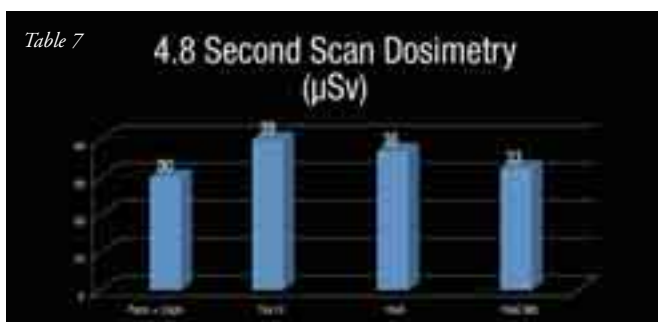
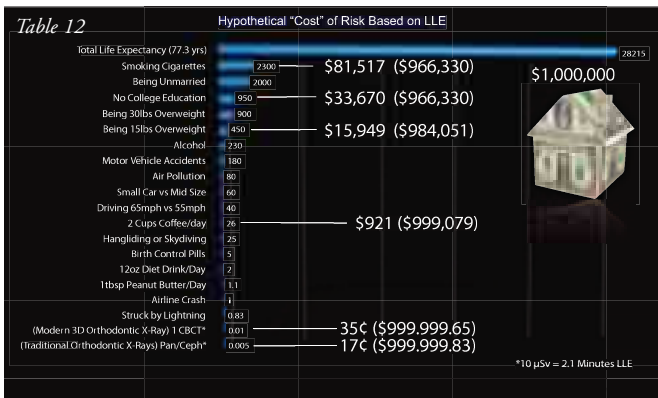
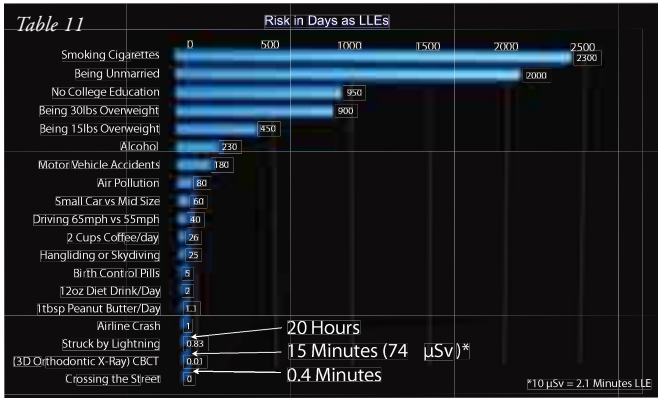


Table 7: Internal testing by Imaging Sciences International performed in 2011 using protocol as described in Ludlow and Ivanovic. Data provided by Ed Marandola

Digital BW or Digital Lateral Cephalometric device = 5.6 µSv	Days of per capita background, ICRP 2007 = <1
Planmeca ProMax Digital panoramic device = 24.3 µSv	Days of per capita background, ICRP 2007 = 3
Next Generation i-CAT Full Volume CBCT (8.9s) = 74.0 µSv	Days of per capita background, ICRP 2007 = 9
Digital FMX or F-speed film with round collimation = 170.7 µSv	Days of per capita background, ICRP 2007 = 21



continued on page 66



from the procedure. This is where nuclear scientists have contributed a significant amount of information. Using their statistics, and a calculation known as Loss of Life Expectancy (LLE), we can put in perspective where ionizing radiation falls in comparison with other life risks.

Table 11 shows the relative risks of some common everyday experiences. For example, we know that there are risks associated with drinking alcohol and being overweight, but many of us choose to accept these risks based on perceived benefits from these practices. By contrast, it is well known that the benefits of dental X-rays, in particular CBCT, far outweigh the extremely small risk of the procedure.

To put this in even more perspective, Table 12 shows these risks relative to our overall lifespan. If we consider our total life to be valued at approximately \$1,000,000, the risk of a CBCT scan is the equivalent of approximately 35 cents. Notice that a more common risk, such as drinking coffee, is equal to \$921. What is interesting to note in this figure, is that the difference between a CBCT X-ray and a traditional pan/ceph combination is only 18 cents. This is a minuscule increase when compared to other more common risks. When the risk increase is minuscule, and the diagnostic benefit very large, it seems that it would be easy to explain why a movement to CBCT should not be an argument about increased X-ray exposure risk.

From a Member to a Colleague

Let's grow the Orthotown community together



Why: Because of Orthotown's role in your Specialty

- Continued learning via CE and Virtual Study Clubs
- Insights on case presentations (typical and special patient types)
- Peer reviews of equipment and supplies
- Watch emerging equipment and supplies

Refer a friend and receive a chance to win an iPad2. Find more information on Orthotown.com under "refer a colleague".



orthotownSM

a Farran Media interactive healthcare community | www.orthotown.com

To bring the point home, we should consider the risks and benefits of air travel. Most of us would not hesitate to get on an airplane with our entire family. This would include our young children and our infants. However, the risks of ionizing radiation with flying are well known facts. These risks have been studied in detail to protect airline workers such as pilots and flight attendants. Table 9 shows the ionizing radiation exposure for round-trip flight from San Francisco to New York. The exposure for this trip is approximately 72µSv, equal to one CBCT scan. When put in perspective with the benefits of flying, most of us neglect the associated risk. Why we don't disregard the risks of dental X-rays, it simply comes down to how these issues are presented to the public.



Again, when we discuss the move in orthodontic imaging from a traditional pan/ceph to CBCT, it should not be an argument about increased exposure risk. That would be like arguing that one should only fly one-way to New York because the return trip would be too much radiation exposure.

Observing basic human nature shows us that people tend to accept risk that they impose on themselves, but are reluctant to accept the risks that are imposed on them by others. Therefore, when a doctor says, "You need an X-ray," most people question this if they do not see any immediate benefit. As a profession, it is our job to educate the public regarding the risks of X-rays, but more importantly, to clearly explain the benefits of CBCT radiation exposure. The benefits of CBCT X-rays far outweigh the increased risks. This is well described in previous *Orthotown Magazine* articles and will be a topic of interest in issues to follow this one. Also, search: "CBCT" on Orthotown.com for more information and discussion.

When it comes to 3D X-rays, we must explain that the increased exposure is miniscule, but the diagnostic benefits are extraordinary. We must use the scientific research data, some of

which is presented here, to help separate emotional responses from rational ones. We have the facts at our fingertips. As a profession, we must present these facts in an easy-to-understand way that puts dental X-ray risks in perspective with those risks of everyday living, which are generally accepted by the public.

Perhaps an example that most Moms can identify with is the new procedure being utilized for mammograms. At a local imaging center in Phoenix, Arizona, there is a sign welcoming patients announcing "3D tomosynthesis" being used for routine mammograms. This is a CBCT scan that is done *in addition* to the conventional 2D X-ray. The total radiation for this "routine" procedure is 283.3 mRads (per laboratory documents).

285 mRads is equal to 0.235 Rads, which is equal to .00235 Sieverts or 2,850 micro Sieverts. Given the current full volume i-Cat exposure of ~74 micro Sieverts, you could take more than 38 full-volume CBCT scans before equaling a single "tomosynthesis" mammogram. Not only is this something that we can use when equating orthodontic diagnosis to female medical diagnosis but we particularly like the term "tomosynthesis," although it is used exclusively for mammograms (Digital tomosynthesis combines digital image capture and processing with simple tube/detector motion as used in conventional radiographic tomography. Although there are similarities to CT, it is a separate technique).

Consider a mother being informed that her child needs a CBCT scan similar to tomosynthesis, just like they use for mammograms at the imaging centers with only 1/38th the radiation. Would this be more common terminology that would make sense to her?

If you had a diagnostic tool that was simple to use, reduced time in treatment and the risk of the root resorption, caries and decalcification and provided far more accurate information – would you use it? If the diagnostic tool could be used with 1/38th the radiation exposure of a routine medical procedure – why wouldn't you use it?

"If a picture is worth 1,000 words, then a cone beam scan is worth 1,000,000 pictures*** n

Defining CBCT

Dosimetry: The calculation of the absorbed dose of radiation in matter and tissue resulting from the exposure to indirect or direct ionizing radiation.

Sievert: International System of Units (SI) derived unit of dose equivalent radiation. A milliSievert (mSv) equals 1/1,000 Sv. A microSievert (µSv) equals 1/1,000,000 of a Sv (most often used in dentistry).

Gray: The SI unit of absorbed radiation dose of ionizing radiation.

Link to the International Commission on Radiological Protection (ICRP) occupational dose limits: www.remnm.nlm.gov/ICRP_guidelines.htm

** Internal testing by Imaging Sciences International performed in 2011 using protocol as described in Ludlow and Ivanovic, 0000E, 2008 (Permission provided by Ed Marandola)

***Editors note: At one-degree increments a 3D CBCT is 360 x 360 x 360 = 46,656,000 pictures.

References

1. Ludlow JB, Davies-Ludlow LE, White SC. Patient Risk Related to Common Dental Radiographic Examinations: The Impact of 2007 International Commission on Radiological Protection Recommendations Regarding Dose Calculation. *J Am Dent Assoc* 2008;139:1237-1243;
2. E. Pukkala et al., *BMJ*, 2002;September (vol 325)
3. Harrell WE, Scarfe, WC. Chapter "3D Imaging in Orthodontics". in *Cone Beam Computed Tomography Maxillofacial 3D Imaging Applications*, Springer Publishing, Berlin, Farman, Allan G.; Scarfe, William C. (Eds.) in press due to be published in 2012
4. 5th Edition *Orthodontics Current Principles and Techniques*, Graber, Vanarsdall, Vig (Eds). Chapter 4 - 3D Imaging in Orthodontics, by Harrell, Hatcher & Mah. Pub Elsevier, 2011.
5. Harrell, WE. "3D Cephalometric Imaging" chapter 21- in *Radiographic Cephalometrics: from basics to 3D*, Editor Jacobson, Publisher Quintessence, 2006.
6. *Mayo Clinic Proc. Radiation Risk from Medical Imaging*. 2010;85(12):1142-1146
7. Molteni R. The so-called cone beam computed tomography technology (or CB3D, rather). *Dentomaxillofac Radiol*. 2008;37:477-478
8. Mah J, Sachdeva R. Computer-assisted orthodontic treatment. *Am J Orthod Dentofac Orthop*. 2001;120:85-89
9. Moro A, Correna P, Boniello R, et al. Three-dimensional analysis in facial asymmetry: comparison with model analysis and conventional two-dimensional analysis. *J Craniofac Surg*. 2009;20:417-422
10. Rustemeyer P, Streubuhr U, Suttmoeller J. Low-dose computed tomography: significant dose reduction without loss of image quality. *Acta Radiol*. 2004;45:847-853
11. Adams GL, Gansky SA, Miller AJ, et al. Comparison between traditional 2-dimensional cephalometry and a 3-dimensional approach on human dry skulls. *Am J Orthod Dentofacial Orthop*. 2004;126:397-409
12. Peck JL, Sameshima GT, Miller AJ, et al. Mesiodistal root angulation using panoramic and cone beam CT. *Angle Orthod*. 2007;77:206-213

Author Bios

Dr. Sean Carlson is a board certified orthodontist who received his dental degree from Harvard University in 1994, where he was awarded the American Association of Orthodontists Award. He received his orthodontic specialty training and his Master of Science degree in Oral Biology from the University of California at San Francisco. He is currently an associate professor of Orthodontics at the University of the Pacific School of Dentistry and maintains a private practice in Mill Valley, California. Dr. Carlson is a senior investigator in the Craniofacial Research and Instrumentation Laboratory at the University of the Pacific. There he has served as principle investigator for a series of research grants and has published numerous papers and abstracts on a variety of clinical and theoretical subjects. His primary focus is on using computer technology to improve the way we study, teach and practice orthodontics.



Dr. John Graham lectures worldwide to both doctors and orthodontic staff on the most advanced orthodontic treatment philosophies available. He received his Bachelor of Science degree from Brigham Young University, a dental degree from Baylor College of Dentistry in Dallas, Texas and then a medical degree from the University of Texas Southwestern Medical School. After medical school, Dr. Graham completed an internship in general surgery at Parkland Memorial Hospital followed by training in oral and maxillofacial surgery. Following his surgical training, Dr. Graham received his certificate in orthodontics from the University of Rochester/Eastman Dental Center in Rochester, New York. He was a featured speaker at the 4th international Congress on 3D Dental Imaging in La Jolla, California.



Dr. William "Bill" Harrell graduated from the University of Alabama in Birmingham (UAB) School of Dentistry with a DMD degree in 1975, and received his certification in orthodontics from the University of Pennsylvania in 1977. Dr. Harrell became a diplomate of the American Board of Orthodontists in 1989 and is a member of the College of Diplomates of the American Board of Orthodontists. Dr. Harrell has served as president (1987-1988) and vice president (1986-1987) of the 9th



District Dental Society of Alabama and during that time served on the Alabama Dental Association's Board of Trustees and House of Delegates. Dr. Harrell has served as the president (1990-1991) and vice president (1989- 1990) of the Alabama Association of Orthodontists and served as a director to the Southern Association of Orthodontists from 1995-1997. Dr. Harrell also teaches at the University of Alabama Birmingham and the University of Pennsylvania. Dr. Harrell served as the American Association of Orthodontist's (AAO) Representative to the American Dental Association (ADA) Standards Committee on Dental Informatics (SCDI) from 2002-2009. Dr. Harrell has had an interest in 3D imaging since the early 1980s and has numerous scientific articles, text book chapters and lectures both nationally and internationally on 3D Imaging, TMJ disorders and sleep apnea as it relates to maxillofacial growth.

Dr. Ed Lin is an internationally recognized speaker and full-time practicing orthodontist and partner at both Orthodontic Specialists of Green Bay (OSGB), in Green Bay, Wisconsin, and also Apple Creek Orthodontics (ACO) in Appleton, Wisconsin. Dr. Lin received both his dental and orthodontic degrees from Northwestern University Dental School ('95, DDS; '99, MS).



Dr. Aaron Molen received his DDS from Loma Linda University and his orthodontic training at UCLA. Dr. Molen has given multiple lectures on the topic of CBCT at meetings for the AAO, PCSO, Angle and RMSO. In addition, he is the chair of the CBCT subcommittee on the AAO's committee on orthodontic information technology. Dr. Molen serves as a peer reviewer on the subject of technology for the AJO-DO and the Angle Orthodontist. Dr. Molen has published several papers on the topic of CBCT in the AJO-DO, seminars in orthodontics and practical reviews in orthodontics. He maintains a Web site on the subject of CBCT, www.3DOrthodontist.com and is on faculty at UCLA where he lectures on CBCT. Dr. Molen is in private practice in the Seattle area with his father and brother.



Dr. Wm. Randol Womack is a board certified orthodontist, and practices and is a partner at Affiliated Orthodontics in Peoria and Glendale, Arizona. Dr. Womack is also the editorial director of *Orthotown Magazine*.



Smiles Change Lives

Since 1997, Smiles Change Lives (SCL) has been connecting caring orthodontists with children in need. Since the program's national expansion in 2010, SCL now has 450 orthodontic providers who provide pro-bono care to approved SCL cases.

SCL has served more than 1,500 children in its history, with a goal of helping an additional 700 qualified kids in 2011. The program is well-known for its rigorous application and screening process to ensure that providers receive motivated and deserving cases for treatment. SCL boasts a 100 percent patient completion rate for the past three years and closely monitors compliance rates to ensure that each provider has a positive experience treating SCL cases.

Eligibility

SCL serves children who:

- Are aged 10-18
- Have moderate to severe malocclusion
- Have documented good oral hygiene
- Have taxable family income at or below 200 percent of the federal poverty level
- Are willing to pay a \$500 program fee to SCL to ensure compliance

The Process

First applicants submit a completed application at www.smileschangelives.org/ apply. SCL reviews and compiles all the information to determine eligibility. If the applicant meets all the guidelines, he or she must attend an orthodontic screening at a local dental school which partners with SCL or at a local SCL provider's office who wishes to assist with occasional applicant screening.

From here, the applicant is reviewed by the SCL National Review Panel of Orthodontists, notified of the decision and is assigned to an SCL provider for comprehensive orthodontic treatment. SCL currently approves an average of 70 percent of applicants.

Due to a rapid increase in applicants from across the U.S., Smiles Change Lives is in need of more providers in every state. Approximately 125 qualified, motivated youth are awaiting placement with a caring, dedicated orthodontist.

Expectations of Providers

There are no fees, fundraising or chapters that need to be established. Additionally, each practice simply selects how many approved SCL cases to treat annually, with a national average of three SCL cases per orthodontic provider. Each practice has the right to request or refuse any case assigned to them or change the number of SCL cases from year to year.

Providers are asked to submit a list of referring dentists to SCL. SCL will issue information to those referral sources to help brand the orthodontic practice as a caring corporate citizen and to begin generating high quality applicants from dental professionals.

SCL also provides a number of marketing opportunities, media support, branded office display items and corporate resources to make giving back easy and rewarding. n



Before treatment



Dr. Mark Underwood's SCL patient after treatment

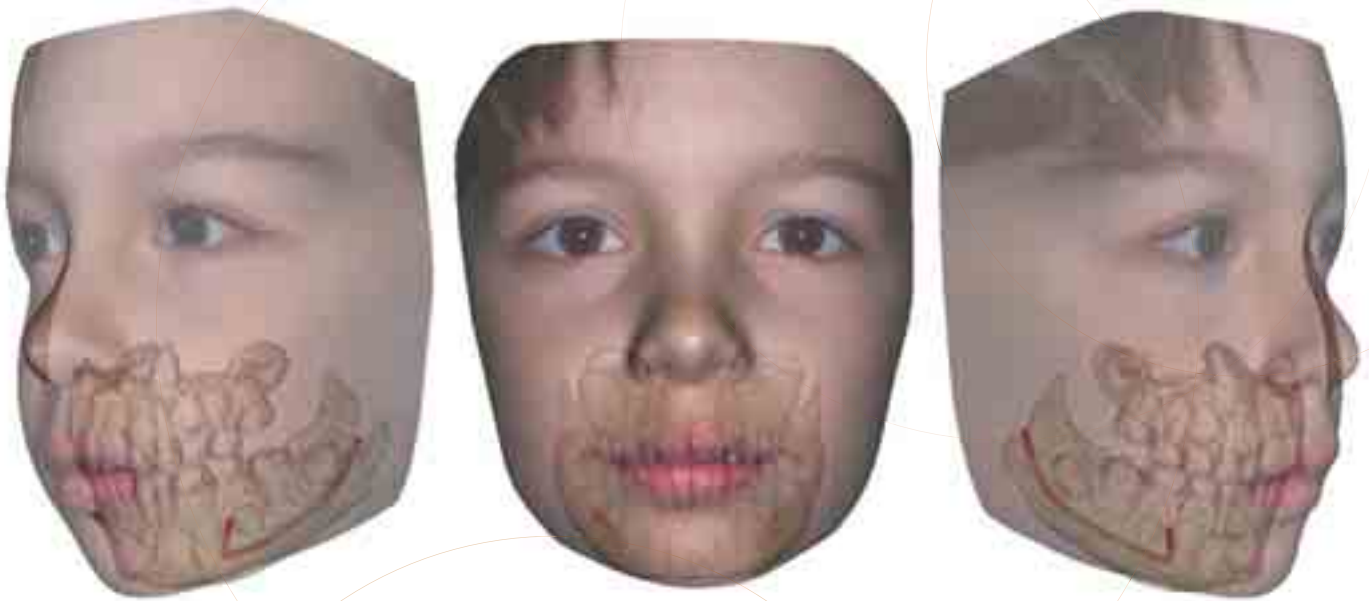
Contact Information

Practices interested in joining the program can visit www.smileschangelives.org/learnmore or contact Director of Marketing Andrea Umbreit at andrea@smileschangelives.org or 816-421-4949, ext. 229 to obtain paperwork to join the program. For an up-to-date list of orthodontic practices already in the program, visit www.smileschangelives.org/orthos.



LOC

Fig. 1: Anatomodel from Anatomage used to create a comprehensive diagnostic and forecast tool



by Juan-Carlos Quintero, DMD, MS

MAKING AIRWAY,

How one scan changed the life of one of Dr. Quintero's "most special" patients

**TMJ
and
Growth
with
CBCT
as
the
Key**

The male patient was seven years old. He arrived at the office because he was snoring, mouth breathing and grinding his teeth at night. He had also become plagued with frequent sinus and ear infections. After seeing numerous doctors, including an allergist and pediatrician without receiving a definitive diagnosis, it was decided an orthodontist's opinion would be beneficial. CBCT scanning with i-CAT technology was the central clue in solving the mystery. When the child's permanent teeth began to erupt, the parents noticed he had some crowding, so I performed a routine orthodontic work up using a 4.8-second Quick Scan and an Anatomodel from Anatomage (Fig. 1).

This 4.8-second scan is approximately half the dose of the i-CAT 8.9 scan – 74µSv, 2007 tissue weight – and is roughly equivalent to a traditional 2D X-ray series with rectangular collimation, or a pan/ceph/bitewings combination.^{1,2} To my surprise, the scan showed a very narrow trachea and airway with adenoid hyperplasia that caused a

continued on page 72

Fig. 2a-2b: Initial scan showing constricted airway



ENT referral and management

- Adenoidectomy and turbinectomy

Phase I expansion

- RPE to 6s, MX and MND 2x6s
- Hawley bite plane and LLA to 6s

Fig. 3: Phase I treatment plan

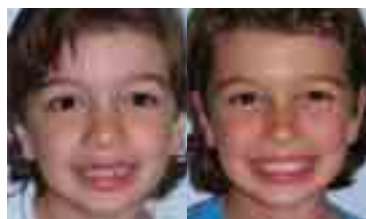


Fig. 4a-4b: Pre- and post-treatment of adenoidectomy, coblation of turbinates and Phase I expansion



Fig. 5a-5b: Dentition pre- and post-treatment of adenoidectomy, coblation of turbinates and Phase I expansion

significant airway obstruction (Fig. 2). The view of his airway obtained through 3D imaging explained his snoring, mouth breathing and frequent illnesses. Mouth breathers can have suboptimal mandibular growth, and this information helped us to understand some of the orthodontic problems, including why the mandible was not growing as favorably as it should have been at his age.

An appointment was quickly set up with the ENT to deliver a directive to remove the adenoids. Sometimes, to get the ENT to address this type of problem, a parent has to be a bit forceful about the necessity to perform this procedure. Some ENTs opine, “Most kids outgrow these problems,” and while this is true, it is also a fact, as orthodontists are aware, there is a critical window of facial growth during that period.

After viewing the i-CAT scan and seeing the anatomy in three-dimensions, a treatment plan was developed and set in motion that included adenoidectomy, coblation of turbinates and orthodontic palatal expansion (Fig. 3). The results were dramatic. The child progressed from being an obligatory mouth breather to a predominant nose breather. He instantly slept better, tasted his food better, ate better, breathed better and even had a better quality of life (Fig. 4, 5). Two years later, a follow-up included another 4.8-second Quick Scan, to measure the results over time (Fig. 6).

Personally, I was glad to be sitting down, because the results floored me. I could hardly believe my eyes. The airway almost tripled in volume from 8cc to 23cc, and the smallest cross-sectional area (the bottleneck) went from 23mm² to 168mm² (Fig. 7, 8). The obstruction was removed. The palatal shelf, being the floor of the nose, was expanded through Phase I orthodontic therapy. The mandible was unlocked from its transverse discrepancy, and the vector of mandibular growth was improved through nose breathing. The TMJs probably received less stress and grew better as well, which is consistent with a recent study showing an increased incidence of TMJ osteoarthritis on patients with environmental allergies.³

The child's everyday life has also improved. Now, there is room for the teeth to erupt, and the profile looks better. The color of his skin is improved, and his smile looks great. He has improved alertness during the day, and is more rested from more consistent sleep patterns. Eating better; sleeping better; living better – What more can we ask for?

Not only did this one scan change this boy's life, but it also completely changed my outlook on cases and my practice focus. There is a sensible reason why orthodontists concentrate so much on head and neck anatomy in school. And, there is also a very good reason to use CBCT to view this head and neck anatomy from all sides in three dimensions. CBCT allows orthodontists to not just look at teeth but at the greater craniofacial complex, with airways, bone, sinus and TMJ health – all part of an integrated system. Although this vital anatomy has always been taken into account, now with the capability for 3D, diagnosis and treatment planning takes on a whole new dimension because of our ability to view all of this vital anatomy and not make mistakes or miss clues to unusual dental conditions.

The view of his airway obtained through 3D imaging explained his snoring, mouth breathing and frequent illnesses

While to the patient it might seem that orthodontics is just focused on the appearance of the teeth, I know that achieving results entails much more than that. Now when I treatment plan, I look at airways and sinuses first, then TMJs, then skeletal relationships, then alveolar housing, and lastly, the teeth. Then, I can truly understand all of the underlying problems and better know how to fix them rather than just guessing, and having the child suffer the consequences later.

Having a CBCT scan to review during my treatment planning sessions is like having the patient right in front of me. I can expand or rotate the volume to any angle or view any axial slice, or completely dissect them if I want to, in order to really get to know the anatomy inside and out.

With all of the time spent on this young man's case, I had to overcome my guilt of not having caught this problem and alleviated this child's suffering earlier. After all, I should have known better, since the boy is, in fact, my own son. But, CBCT imaging helped me to improve his life, and in the long run, improve the lives of many other parents' sons and daughters because of all of the data I obtain with this precise imaging method. ■

References

1. Ludlow, John, et al., *Comparative Dosimetry of Dental CBCT Devices and 64-Slice CT for Oral and Maxillofacial Radiology. Oral Surg Oral Med Oral Path Oral Radiol Endod* 2008; 106:106-14.
2. Ludlow, et al. *Patient Risk Related to Common Radiographic Examinations. JADA, Vol. 139,, September 2008, <http://jada.ada.org>. (Accessed: Nov. 15, 2010).*
3. Masato Nishiokaa, et al., *TMJ Osteoarthritis/Osteoarthritis and Immune System Factors in a Japanese Sample. Angle Orthodontist, Vol. 78, No. 5, 2008.*

Author's Bio

Dr. Juan-Carlos Quintero received his dental degree from the University of Pittsburgh in Pennsylvania and degree in orthodontics from the University of California at San Francisco (UCSF). He also holds a Master's of Science Degree in Oral Biology. He has served as national president of the American Association for Dental Research – SRG, is a faculty member at the L. D. Pankey Institute and an attending professor at Miami Children's Hospital, Department of Pediatric Dentistry, as well as immediate past-president of the South Florida Academy of Orthodontists (SFAO). He currently practices in South Miami, Florida.



Fig. 6a-6b: Pre- and post-treatment scans showing results of adenoidectomy



Fig. 8a-8b: Pre- and post-treatment comparison of facial growth over time relative to improved airway

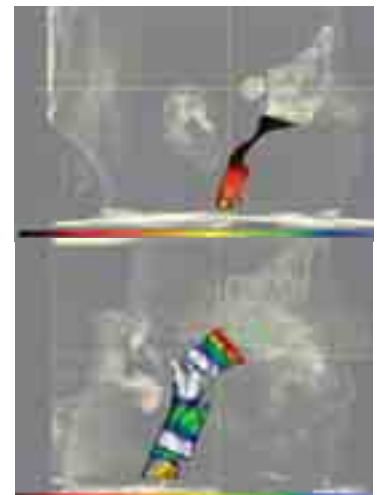


Fig. 7a-7b: Pre- and post-treatment scans show changes in segmented airway volumes

TADS



Temporary Anchorage Device Showcase

We consider it a mini buyers guide. Herein, companies including American Orthodontics, Forestadent, Ortho Technology and Dentaureum present their unique TAD systems. Whether you make decisions about products on a month-to-month basis or at year-end, now is a great time to brush up on the newest temporary anchorage device technology. This showcase section also includes contact information for each company, making it easy to ask additional questions or to find out further details about products online.

TAD Products

Cetacaine Topical Anesthetic Gel

Cetacaine Topical Anesthetic Gel from Cetylite is a fast-acting, long-lasting prescription topical anesthetic that can be applied directly to the required site. Cetacaine Gel features the triple-active formula of 14% benzocaine, 2% butamben and 2% tetracaine HCL. By lightly depressing on the pump of the convenient pump-top jar with your fingertip, a controlled amount of Cetacaine is dispensed. Cetacaine is also available in spray and liquid forms. For more information, visit www.cetylite.com.



VectorTAS

Designed by orthodontists specifically for orthodontic use, VectorTAS is a complete system with a full array of orthodontic-specific mini-screws, TAD-specific attachments and instruments designed to make temporary anchorage easy and effective. VectorTAS provides clinicians with all the benefits of temporary anchorage such as reduced anchorage demand for more control, surgery cases treated without surgery, no headgear and reduced reliance on patient compliance, reduced treatment time and greater patient comfort. For additional information, visit www.ormco.com.



Dual-Top TADs

RMO's Dual-Top Temporary Anchorage Device (TAD) system provides efficient and flexible biomechanics. Dual-Top TADs enhance treatment capabilities and are effective in reducing treatment time, surgeries and extractions. Dual-Top appliances can be inserted chair-side by the clinician and loaded immediately for anchorage where and when needed. Visit www.rmortho.com for more information.



One Touch Advanced

One Touch Advanced is a quick topical anesthetic oral gel from Hager Worldwide, Inc. One Touch Advanced works within 30 seconds of application and lasts up to 60 minutes. It does so by coupling the rapid onset of benzocaine (14%) with the slow/extended duration of tetracaine hydrochloride (2%) and bridging them with the intermediate action of butamben (2%). For more information, visit www.hagerworldwide.com/anesthetics.html.



continued on page 76

American Orthodontics



THE
aarhus
SYSTEM



The name behind The Aarhus System is one of the most recognized in orthodontics today. Professor Birte Melsen is recognized by her peers as a premier researcher and academic. She holds countless honors for her contributions in orthodontics with more than 300 published scientific articles and a 35+ year tenure as professor and chairman of the Department of Orthodontics at the Royal College, Aarhus in Denmark. Her work in skeletal anchorage has led to the introduction of the Aarhus Mini-Implant System, which is a culmination of years of research, experience and dedication to the field.

Pairing premium materials with optimal sizing, Aarhus mini-screws yield a perfect balance of strength and working diameter for effective clinical application. The material, Ti6AL4V, is a high strength titanium alloy noted for its biocompatibility and resistance to corrosion. The Aarhus System offers a high quality temporary anchorage device (TAD) that is user-friendly without sacrificing strength.

The device offers:

- 1.5mm thread diameter design for easy placement between dental roots
- 6mm and 8mm thread lengths for adaptation in different bone densities
- 1.5mm and 2.5mm collar lengths for accommodating the various soft-tissue thicknesses
- Multiple head options to accept any accessory items utilized during clinical application
- A variety of accessory items to complement treatment
- Compact and light-weight sterilizable instrument tray and screw magazine for efficient chairside delivery
- Secure locking driver tip that ensures screw placement without “wobble” during patient application

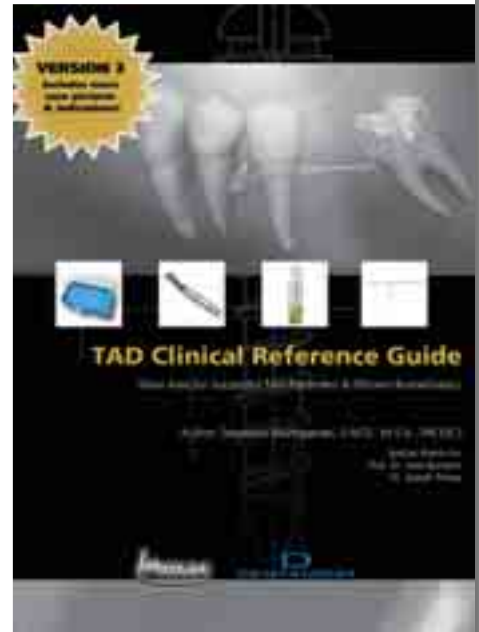
The Aarhus System offers a user-friendly mini-implant screw that delivers safe and consistent treatment and a complete line of accessories.

For more information, contact American Orthodontics at 800-558-7687 or www.americanortho.com. n

Dentaurum

Dentaurum USA is showing its continued focus on providing education and reference resources to the market by launching its third edition of the very popular TAD Clinical Reference Guide. This new and updated edition provides more progressive and challenging TAD cases than ever before and each case includes pictures and step-by-step instructions on exactly how you can overcome each challenging indication with TADs. This valuable reference guide can be received completely free of charge.

Additionally, Dentaurum is holding its Third Annual TAD User Forum at the Wynn Las Vegas Resort, November 4-6. Last year, this meeting was sold to capacity and was therefore moved to the Wynn to ensure an even bigger and more exciting meeting this year! This meeting promises to provide an incredible learning experience for practitioners of any experience level. The program includes 11 TAD speakers, a four-track lecture program, round-table discussion groups, live TAD placements, hands-on workshops, evening cocktail parties and up to 18 continuing education credits. Tuition is only \$499. If you are currently using TADs or have any interest in using TADs in clinical treatment, then you do not want to miss this exciting weekend event.



Lastly, Dentaurum is introducing its completely updated packaging of the TOMAS pin. This improved packaging reverses the position of the pin and allows it to sit in a sterile cradle with the head exposed. This change helps make the pin even easier to place in the everyday practice! The packaging allows for easy and direct placement using either: the TOMAS Screwdriver, TOMAS Thumb Driver or even the new TOMAS Contra-Angle driver! Dentaurum is offering closeout pricing on all remaining stock of TOMAS pins in the original packaging.

If you would like to access the digital version of the third edition TAD Clinical Reference Guide, or if you would like to register for the upcoming TAD User Forum, please visit www.tomasforum.com, call 800-523-3946 or e-mail sales@dentaurum.com. n



continued on page 78

FORESTADENT USA



ORTHOeasy®



When it comes to Temporary Anchorage Devices (TADs), there are many systems on the market to choose from. FORESTADENT has developed several unique design characteristics that make the OrthoEasy Pin System an excellent choice for treatment.

1. The OrthoEasy pins come in three color-coded lengths: rosé: 6mm, pink: 8mm and gold: 10mm. These three lengths are the most popular, and can treat just about any case. Typically the 6mm pin is used in the mandibular vestibule, the 8mm is used in both the maxillary vestibule and the anterior palate and the 10mm is generally used in the mandible for bi-cortical anchorage. With the majority of cases being able to be treated with these three sizes, a limited stock is required, reducing overhead cost for the clinician. The color coding is an added convenience when it comes to placement, because it easily distinguishes one size from another.
2. The transgingival conic screw neck (2mm) with integrated depth stop is a feature that is set in place to reduce infection. This stop in the screw neck corresponds to the average thickness of the gingival and operates similar to a bottle cork, which seals the perforation area safely and protects the gingiva at the insertion point from unwanted bacteria penetration.
3. Reduced vertical height of the head reduces irritation to the gingiva providing the patient with a comfortable experience for the duration of TAD treatment.
4. The octagon-shaped pin head features a double cross slot of .022 x .025in and an undercut for easy ligation. This innovative design of the screw head allows linking potential, and a flush insertion of two rectangular archwires when applicable. The cross design also allows for additional applications such as molar uprighting springs, power arms, L and U anchors and cross tubes to be utilized during treatment. The head of the OrthoEasy also allows for the use of abutments in situations requiring heavier anchorage, for example the use of the FROG when distalizing molars.
5. The body of the screw contains threads that make shark-like cuts at a new pitch on every single winding step. In addition, the special design of the thread peak offers a safe passage through to the gingiva. These very intricate and well-engineered details contribute to the easy placement of each screw in each individual patient.

To learn more about the OrthoEasy Pin System, to see upcoming TAD seminars and for additional information, check www.forestadentusa.com or call 800-721-4940. n



FORESTADENT USA
GERMAN PRECISION IN ORTHODONTICS

Ortho Technology

The Spider Screw's geometry is a result of careful design in every single detail. In fact, the Spider Screw has obtained two international patents since its inception, due to its innovative characteristics: the simultaneous presence of the external and internal rectangular slots and round internal slots.

Extremely versatile due to its small dimensions and unique design, the Spider Screw is easily placed in either the maxilla or mandible, even where access is limited and bone quality is less than ideal. Placement is simplified by the self-drilling feature found in the K1 and K2 Spider Screw Series.

The Spider Screw has been developed to offer a number of versatile anchorage options capable of immediate loading which is possible because the Spider Screw is a non-osteointegrable implant and consequently force can be applied immediately after placement. The applied force can range from 50 to 300 grams depending on screw choice, bone quality, and the desired orthodontic movement.

This anchorage device can be used during every phase of orthodontic treatment and is suitable for symmetric or asymmetric anchorage.

The Spider Screw package includes three removable labels containing important information (device name, reference code, lot number, etc.) which is to be applied to the patient's record card for traceability. Sterile packaging ensures the Spider Screws are ready to use whenever needed, saving valuable processing time.

Specifications & Comparison of Spider Screws

The Spider Screw Self-Ligating TAD K1 and K2 Plus Series and the Spider Screw K1 and K2 Series are self-drilling and self-tapping. Due to the design of the conical thread, drilling is eliminated in most areas of the mouth. In areas of high bone density, it might be necessary to utilize the 1.1mm drill for the K1 and 1.2mm drill for the K2 provided to penetrate the cortical plate.

- Self-ligating K1 Plus specifications: 3.9mm diameter head, 1.5mm diameter body. Available in 6.5mm, 8mm and 10mm lengths.
- Self-ligating K2 Plus specifications: 3.9mm diameter head, 1.9mm diameter body. Available in 5mm, 6mm, 7mm, 9mm and 11mm lengths.
- K1 specifications: 3.4mm diameter head, 1.5mm diameter body. Available in 6.5mm, 8mm and 10mm lengths.
- K2 specifications: 3.4mm diameter head, 1.9mm diameter body. Available in 5mm, 6mm, 7mm, 9mm and 11mm lengths.

The Spider Screw C1, C2 and Spider Pin are self-tapping and require pre-drilling. The Spider Screw C1 and C2 are available in long neck and short neck versions. The Spider Pin is available in a long neck version.

- Spider Screw C1 specifications: 3.4mm diameter head. Cylindrical thread - 1.5mm diameter body. Available in 6.5mm, 8mm and 10mm lengths.
- Spider Screw C2 specifications: 4.8mm diameter head. Cylindrical thread - 2.0mm diameter body. Available in 7mm, 9mm and 11mm lengths.
- Spider Pin specifications: 2.6mm diameter head. Cylindrical thread - 1.3mm diameter body. Available in 8mm and 10mm lengths.

For more information, contact Ortho Technology, Inc., at 800-999-3161 or visit www.orthotechnology.com. n



Spider Screw™



Self-Ligating TAD



TAD System



Short Order Cook or a Michelin Star Chef

by Dr. Ron Roncone

I believe that orthodontics is a lot like cooking. Even though we all start out with the same ingredients, the results can be vastly different. In my opinion, truly great orthodontics is based on three factors (excluding the extremely important patient cooperation): the scientific component, the experiential component and the artistic component (Fig. 1). I call this the SEA concept.



For many years we have moved in and out of various phases of orthodontics – the appliance phase, the mechanics phase, the functional phase and the face phase. We are now in what might be considered the technology phase. Superb orthodontics is the result of using all of these phases.

A short order cook (orthodontist) has the same basic ingredients (basic science, appliances, etc.) as does a great chef (also an orthodontist), but the final result can vary tremendously.

Knowing how to use established science is very important. But, please do not neglect the art aspect. We must have an eye for what a great orthodontic result looks like. It is not just a wide smile but the wide, natural-looking smile that also functions properly that is crucial. It is up to the experienced professional to achieve this result in a non-invasive way and in as short of time as possible.

One cannot hang the proverbial orthodontic hat on just evidence-based research. We must depend on our own experience in how to work with the connectivity of joints, muscles, occlusion, aesthetics and stability. Every day orthodontists are engaged in full-mouth reconstruction. Every day orthodontists are engaged in slow facial “plastic surgery.” There most certainly is an art to those endeavors!

We cannot base our goals on just the numbers. How many cephalometric analyses can be found in the literature? What numbers do we follow? There must be room for orthodontic individuality based on all three areas – science, experience and art.

Our professional journals should reflect and encourage papers which show a blend of the SEA principle and not just those of a purely scientific nature. ■

Ad Index

Our advertisers make it possible for us to bring Orthotown to you free of charge. Almost all of the advertisers provide telephone numbers in their advertisements for your convenience and fast response. Our advertisers want to hear from you.

Advertiser	Page #	Advertiser	Page #
Accutech Orthodontic	19	Forestadent USA	47
Align Technology, Inc.	15	Imaging Sciences	Insert
AMD Lasers, LLC	5	Ortho Technology, Inc. – Lotus Plus	11
American Orthodontics	IFC-1	Ortho Technology, Inc. – Spider Screw	3
American Orthodontics	60	Ortho2	31
Anatomage	13	OrthoSelect, Inc.	23
Appliance Therapy Group	32	OrthoSynetics	27
ChaseHealthAdvance	29	Planmeca, Inc.	BC
Cybermed, Inc.	25	The Scheduling Institute	39
Dentaurum USA	7	Smiles Change Lives	IBC
Dolphin Imaging & Management Solutions	21		



smileschangelives®

September is the Smiles Change Lives Provider Recruitment Month... **because kids in your community need you!**

Now is the time
to become an
Ortho-Hero!

ORTHO-HERO

Smiles Change Lives (SCL) needs 250 additional orthodontists to become Ortho-Heroes this month and change the lives of deserving children awaiting treatment. If you're interested in doing easy and rewarding pro-bono work for motivated and compliant patients, SCL is right for you!

How to become an SCL provider:

1. For more information or to sign up visit www.smileschangelives.org/orthohero.
2. Email provider@smileschangelives.org or call Andrea Umbreit at 816-421-4949 with any questions.
3. **Visit us at these meetings in September** to learn more about the program:
 - MASO/GLAO – 9/15-9/17 in Pittsburgh, PA
 - PCSO – 9/22-9/24 in Vancouver, BC
 - SAO – 9/29-10/1 in Boca Raton, FL

3M

Official Sponsor

www.3MBraces.com

To learn more or to join our family of caring orthodontists, visit www.smileschangelives.org/orthohero or email provider@smileschangelives.org

Introducing the NEW... ProMax[®] 3D Mid



PLANMECA[®]
ProMax[®] 3D Mid



Find us on
Facebook

2D / 3D FUSION

- 3D, Panoramic, Ceph, 2D Extraoral Bitewing, and more in one unit to meet your clinical needs
- Widest range of volume sizes available from a $\varnothing 4 \times 5$ cm - $\varnothing 16 \times 16$ cm
- Cephalometric upgrade available
- SmartPan for intelligent panoramic imaging

VERSATILITY

- Adjustable KV and MA - allows you to keep radiation levels low
- High resolution, low dose limits excess radiation
- Pediatric Mode
- Works natively in MAC OS environment
- Provides volume sizes for every clinical application
- Open architecture allows for 3D upgradeability

EASE OF USE

- User-friendly Graphic User Interface
- Open face architecture for easy positioning
- Comes with user friendly Romexis software for ease of use
- Fully integratable with 3rd party software
- Comes with a complete software system for diagnosis

For a free in office
consultation please call

1-630-529-2300

or visit us on the web @
www.planmecausa.com



Interpreting the **CBCT** Data Volume in Orthodontic Cases **Part 2**

Orthotown is pleased to offer you continuing education. You can read the following CE article, take the post-test and claim your CE credits. See instructions on page 6.

Cybermed
Advantage beyond imaging

This CE course is supported by an unrestricted grant from Cybermed, Inc. This course offers two ADA CERP CE Credits.

ADA CERP® | Continuing Education Recognition Program

Farran Media, LLC, is an ADA CERP Recognized provider. ADA CERP is a service of the American Dental Association to assist dental professionals in identifying quality providers of continuing dental education. ADA CERP does not approve or endorse individual courses or instructors, nor does it imply acceptance of credit hours by boards of dentistry. For more information, please visit <http://www.towniecentral.com/orthotown/onlineCE.aspx>

Part 2: Interpreting the CBCT Data Volume in Orthodontic Cases: *You Should See What You May Be Missing!*

by Dale A. Miles, DDS, MS, FRCD(C)

This is a two-part article designed to help clinicians understand the more common findings they will encounter in the anatomic regions they capture in larger field-of-view (FOV) CBCT machines. Many of these findings will also be seen in smaller FOV machines when the volume capture is moved around to view things like the temporomandibular joint or third molar regions. This article will be of interest to all clinicians, not just orthodontists. Part I addressed the skull, oropharynx, cervical soft tissues and cervical spine and can be found on Orthotown.com or in the July/August 2011 issue of *Orthotown Magazine*. Part II will cover the paranasal sinus regions, nasal cavity, sella tursica region and TMJ. Anyone who owns or uses the data from a CBCT machine will see these pathologic findings and need to recognize them. Some findings are incidental but reportable/recordable. Many cited in this article can significantly impact the patient's health and after finding them, the patient must be referred to a medical specialist for further evaluation and management. Some might even save your patient's life. Missing the most important findings could lead to harm to the patient and result in litigation. All of this information will benefit both you and your patients.

Part II: Paranasal Sinuses

The paranasal sinuses include the maxillary, sphenoid and frontal sinuses. Although not strictly sinus spaces, the ethmoid air cells are also included in this category. All of these spaces communicate with one another. Inflammatory changes are seen in all these spaces; however, the maxillary sinuses and ethmoid air cells seem to be involved more commonly. Frontal and sphenoid involvement is less common. Nevertheless if changes are seen in the sphenoid sinus region, because of the important neural, vascular and optic structures which travel in the parasellar region, referral to an otolaryngologist and/or the patient's primary care provider is mandatory. Inflammatory or infectious changes in the sphenoid sinus could disseminate rather rapidly because of the proximity of the neurovascular structures in this region. In addition diffuse headache symptoms are common with

paranasal sinus problems and can be confusing to delineate and diagnose. Most of the changes seen in the paranasal sinus region are from chronic inflammatory complaints. But, things like antroliths, foreign bodies and even osteoma can occur in any of these spaces. Furthermore, dental problem such as apical periodontitis and chronic periodontal conditions can affect the maxillary sinus and cause mucosal alterations. If the field of view (FOV) fails to include all of the paranasal sinus regions and substantial changes are seen in the more inferior spaces such as the maxillary sinus and ethmoids, then it might be necessary to reimagine the patient or refer them to an ENT specialist for clinical and endoscopic evaluation. The figures below demonstrate some of these problems.

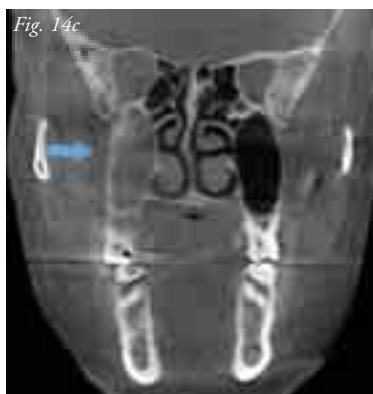
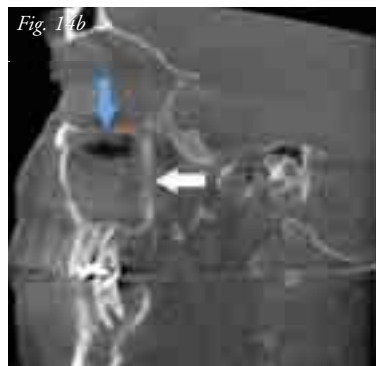


Fig. 14: (a. and b.) Blue arrows in the axial view and the white arrow in the sagittal view show a thickened lateral wall and a thickened posterior wall of the right maxillary sinus. The term for this is called "hyperostosis" and is indicative of a chronic inflammatory complaints or disease process. (c.) Hyperostosis is also seen in this coronal view of the right antrum. (d.) The white arrow shows an inflammatory change which is probably blocking the ostium (the communication between the maxillary sinus in the middle meatus). Blockages of this sort often lead to retrograde inflammatory change in the ethmoid air cells, frontal sinus and sphenoid sinus.

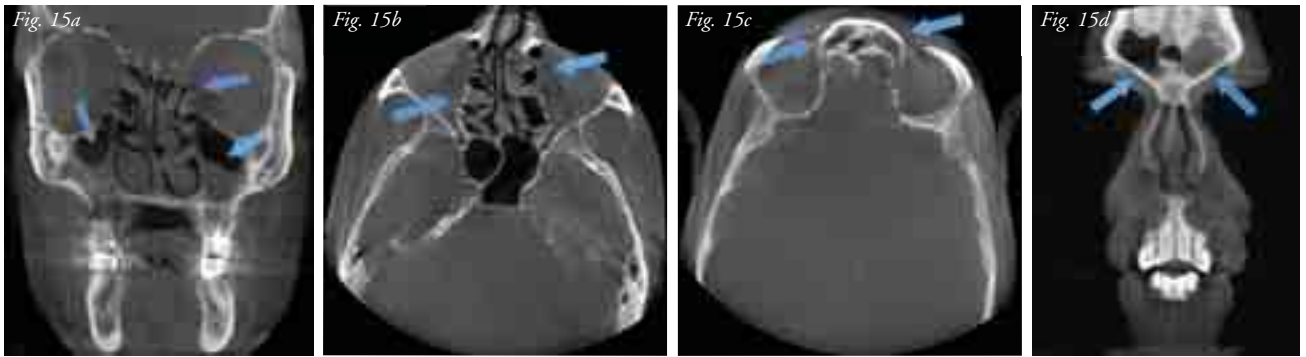


Fig. 15: (a.) A thin slice coronal view of maxillary antra and ethmoid air cell involvement. (b.) Axial view showing ethmoid air cell opacification seen in a. (c.&d.) Axial and coronal views of the frontal sinus involvement in the same case. Note the more florid involvement of the left frontal sinus.

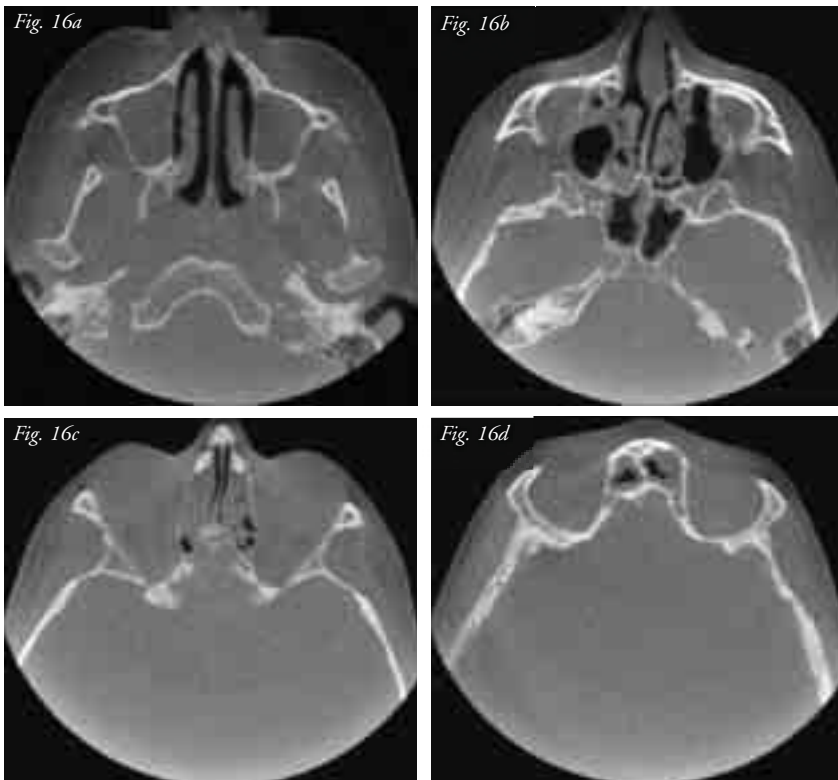
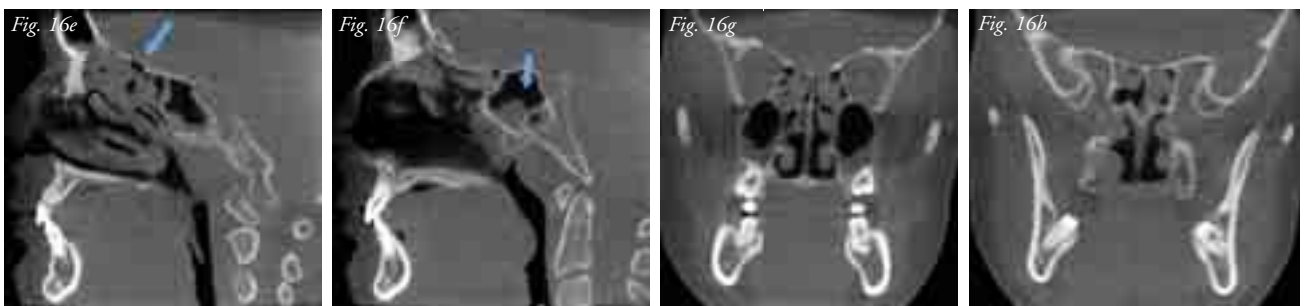


Fig. 16: (a.) Bilateral maxillary sinus involvement (axial view). (b.) Axial view showing ethmoid air cell involvement in uniform thickening in sphenoid sinuses, both left and right. (c.) ethmoid air cell involvement more superiorly. (d.) Bilateral involvement of the frontal sinuses in an axial view. (e.) Inflammatory changes in the frontal sinus, ethmoid air cell region and sphenoid sinus. Note how these spaces communicate one with the other. (f.) Sagittal view of sphenoid sinus involvement in the same case. (g.&h.) Thin slice coronal sections showing bilateral maxillary sinus involvement and involvement of the superior ethmoid air cell complex as well is sphenoid sinuses again bilaterally.



Nasal cavity

Anatomy of the nasal cavity is quite complicated. Besides typical structures like the turbinates and meatal shadows and nasal spine, there are additional anatomic structures like the uncinata process, the ostium, the ethmoid air cells, nasolacrimal ducts, sphenothmoidal recess and frontal sinus ostium. Luckily, as in the paranasal sinuses, most abnormal things will be radiopaque. Below is

an anomaly that occurs commonly in the nasal cavity called “concha bullosa.” This is an aeration or pneumatization of the middle turbinate structure. It can be uni- or bilateral. When inflammatory change occurs in the nasal cavity, either originating there or spread from other paranasal sinus spaces, this can also have inflammatory problems. There are examples of both normally appearing concha bullosa and some with inflammatory change.

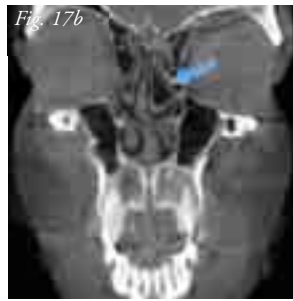


Fig. 17: (a.) Axial view of bilateral pneumatization states called concha bullosa (blue arrows). (b.) Unilateral concha bullosa state of left middle turbinate in coronal slice (blue arrow). (c.&d.) Inflammatory change filling one half of the concha bullosa anomaly in the right middle turbinate. (c.) Axial view (blue arrow); (d.) coronal view (blue arrow). (e.) Inflammatory material filling the right middle turbinate completely in an axial view. (f.) The same patient showing this change in a coronal slice. The left middle turbinate is patent. There is some mucosal thickening in the right antrum identified by the lowest blue arrow. (g.) A possible mucocele or pyocele in the superior ethmoid air cell complex. The round nature of the lesion suggests a fluid.

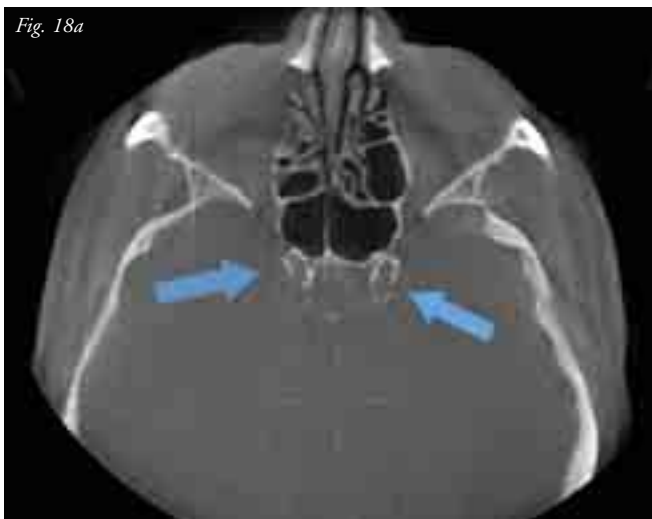
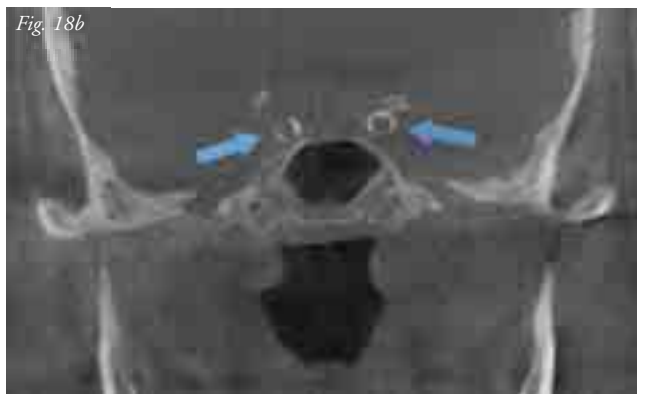


Fig. 18: (a.) Bilateral calcification of the internal carotid arteries on each side of the sella just posterior to the sphenoid sinus. (b.) The same calcifications as they loop anteriorly seen just superior to the sphenoid sinus and below the anterior clinoid processes.



Sella Tursica and Parasellar Regions

Adenomas, craniopharyngiomas and disorders such as acromegaly can affect the size of the sella tursica.¹ However, to date, in more than 9,000 CBCT scans I have seen only one enlarged sella tursica but many parasellar changes as were described in the section on carotid calcifications; namely, calcification of the internal carotid artery. Since the contents of the pituitary fossa (sella tursica) can only be seen by magnetic res-

onance imaging, the clinician is more likely to see the parasellar changes. Figure 18 again illustrates the calcification seen in the internal carotid arteries. Since uncontrolled type II diabetes mellitus (NIDDM – Non Insulin Dependent Diabetes Mellitus), especially when the renal involvement is severe (as in ESRD – end stage renal disease), is so prevalent in the North American population, the clinician is more likely to discover calcified arteries rather than altered size of the sella tursica.

Temporomandibular Joint Complexes

Of course the most common changes affecting the condylar head and sometimes the adjacent bone in the glenoid fossa are the same as those that affect the cervical spine and other weight-bearing joints.

These include:

1. osteophyte formation
2. subchondral cyst formation
3. subchondral sclerosis
4. surface erosion
5. lipping
6. loss of joint space

In addition to these changes of osteoarthritic, the clinician might also see hyper- or hypoplasia of one condylar head relative to the other, osteochondritis dissecans, avascular necrosis (AVN), loose body formation and occasionally synovial chondromatosis. In conventional 2D radiographic views such as panoramic or tomographic views loose bodies and even subchondral cyst formation can be misinterpreted. The focal trough layer or tomographic slice might not depict the true situation as can be seen in color 3D reconstructed views or even multi-planar views of the same joint. Figure 19 shows a number of these temporomandibular joint changes and disorders.

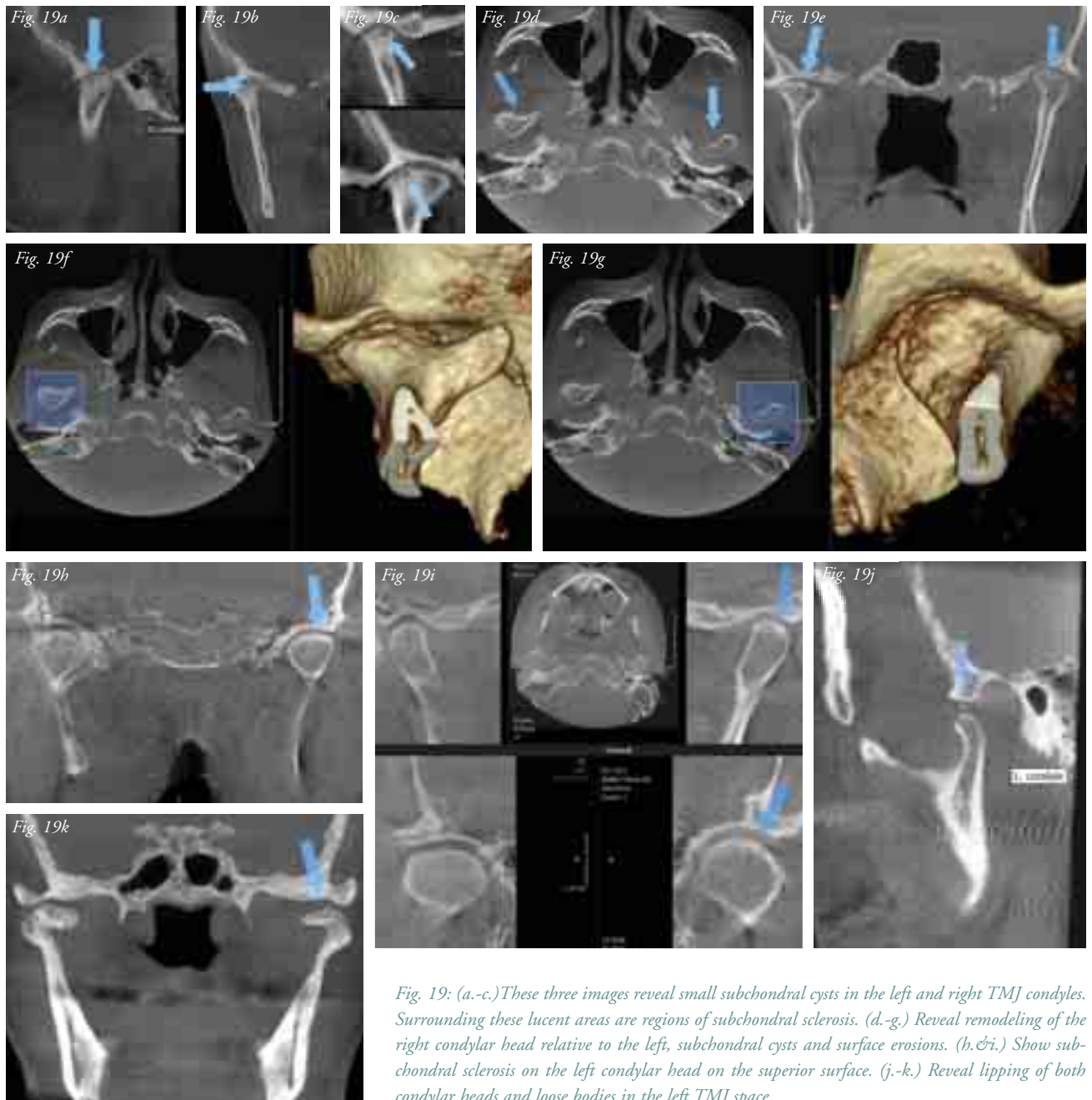
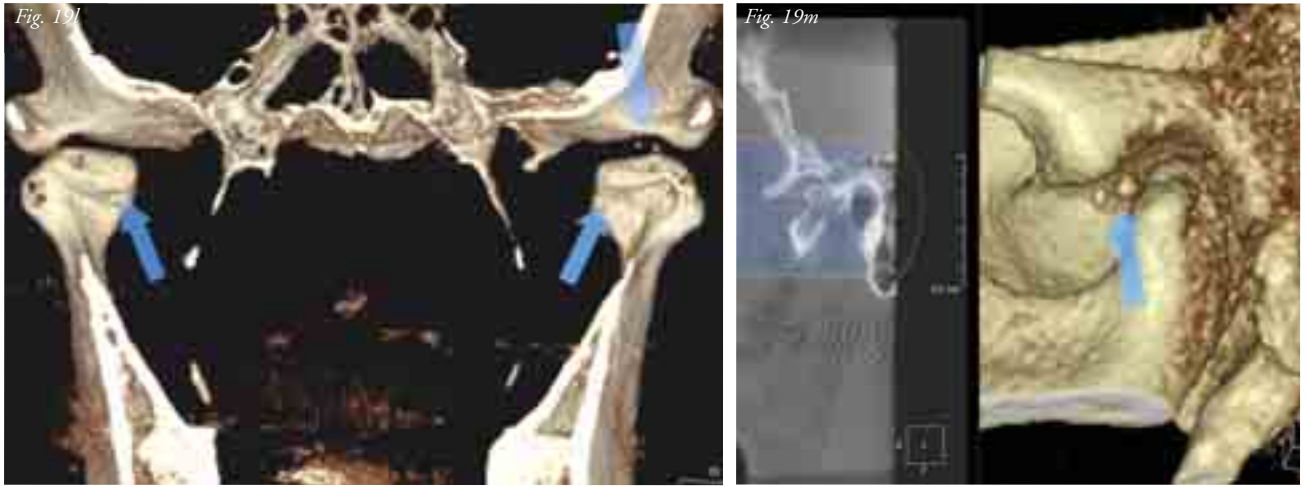


Fig. 19: (a.-c.) These three images reveal small subchondral cysts in the left and right TMJ condyles. Surrounding these lucent areas are regions of subchondral sclerosis. (d.-g.) Reveal remodeling of the right condylar head relative to the left, subchondral cysts and surface erosions. (h.&i.) Show subchondral sclerosis on the left condylar head on the superior surface. (j.-k.) Reveal lipping of both condylar heads and loose bodies in the left TMJ space.

Fig. 19: (l-m.) Reveal lipping of both condylar heads and loose bodies in the left TMJ space.



Osteophyte vs. Lipping

Until clinicians were able to see the changes on the temporomandibular joint condyles in 3D reconstruction, the terms “bird-beak” and osteophyte were often used as synonyms in 2D planar imaging such as panoramic, lateral cephalometric and even tomographic slices. So-called “bird-beak” changes were interpreted as such when indeed many cases might have represented lipping³ on the anterior aspect of the condyle, simply captured in a relatively thin slice, predominantly sagittal view. Figures 20a-c demonstrate this pitfall.

Conclusions

Relatively common pathologic findings have been reviewed for the anatomic area seen in large FOV CBCT machines. While all of these findings are certainly reportable, there are only a few which are truly significant and would impact the systemic health of the patient. Significant findings such as calcification of arteries, airway masses, florid paranasal sinus disease and lucencies in the vertebral column could lead

to a catastrophic health event for the patient. Knowledge of these more common findings and normal anatomy of the region cited will help the clinician avoid a missed diagnosis and possibly a subsequent legal problem. Even though the clinician does not have to make a diagnosis based on the radiographic findings alone, he or she must examine the volume or refer for examination to an oral maxillofacial radiologist or other competent provider so that significant findings are not missed. This practice of referral is not only prudent, but also professionally mandated in the American Dental Association’s Code of Ethics.⁴ n

References

1. Kurnick JE, Hartman, CR, Edward G. Lufkin, EG and Hofeldt FD: A Tumor Board Review of the Clinical Significance Arch Intern Med. 1977;137(1):111-117.
2. Vinik AI and Vinik E: Advances in Diabetes Care: Prevention of the Complications of Diabetes Amer J Managed Care 2003; 9(3), Supplement.
3. Miles DA: The Good, the Bad and the Ugly, Implant Practice 2009, 2(3): 42-45.
4. www.ada.org/sections/about/pdf/slada_code.pdf - 2010-04-30

All images were created using OnDemand3D software (Irvine, California and Seoul, Korea).

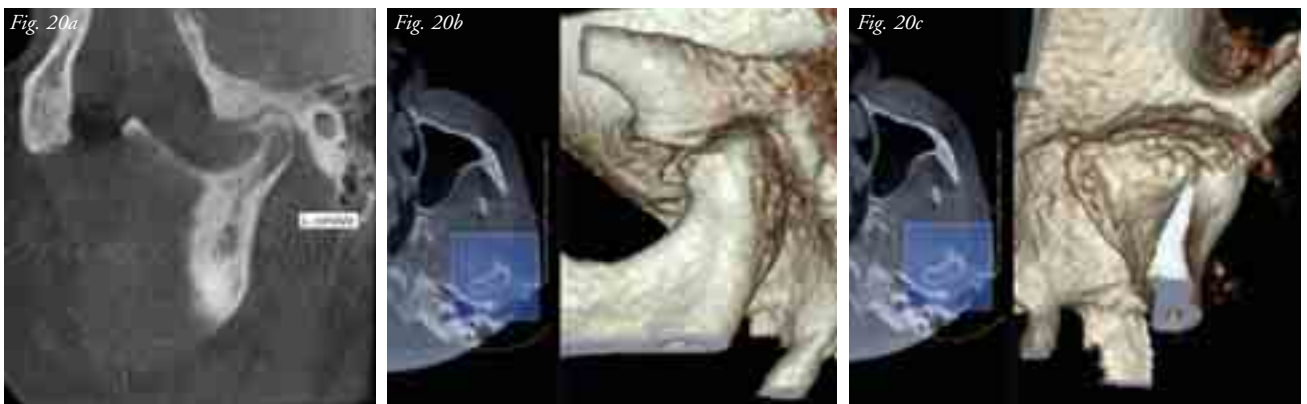


Fig. 20: (a.) This thin slice sagittal view of the left condylar head shows a pointed appearance on the anterior aspect resembling a “birds-beak.” (b.) This 3D reconstruction of the left condyle seems to mirror somewhat figure 19a. There appears to be a projection on the anterior surface which could be mistaken for an osteophyte. (c.) This 3D reconstructed coronal view reveals a deep pterygoid fovea and significant lipping of the anterior surface. There is no birds-beak or osteophyte on this condyle, simply unaltered surface morphology, deep depression and growth of the bone anteriorly.

Author's Bio

Dale A. Miles is a professor of radiology at the Arizona School of Dentistry & Oral Health and an adjunct professor at University of Texas, San Antonio. He has previously held several prestigious positions, including, associate dean for clinical affairs at Arizona, chair of the Department of Oral Health Sciences at the University of Kentucky and graduate program director of Diagnostic Sciences at Indiana University. He is a diplomate of the American Board of Oral and Maxillofacial Radiology and the American Board of Oral Medicine. Dr. Miles has been named one of the "Top 100 Clinicians in CE" for the last eight years by *Dentistry Today*. He has authored more than 130 scientific articles and five textbooks, including the latest on Cone Beam Imaging. He has been a consultant to the U.S. Navy Postgraduate Dental School in oral diagnosis, oral medicine and oral radiology for more than 15 years. Dr. Miles has a Web site for teaching dentists and auxiliaries about digital imaging at www.learn.digital.net. He is in full-time practice of oral and maxillofacial radiology in Fountain Hills, Arizona. To date he has read more than 10,000 cone beam CT scans for dental clients.



Post-test

Answer the test in the Continuing Education Answer Sheet and submit it by mail or fax with a processing fee of \$36. We invite you to view all of our CE courses online by going to <http://www.towniecentral.com/Orthotown/OnlineCE.aspx> and clicking the View All Courses button. Please note: If you are not already registered on www.orthotown.com, you will be prompted to do so. Registration is fast, easy and of course, free.

- Mucosal change in the maxillary sinuses can be caused by all of the following EXCEPT ONE. Which ONE is the EXCEPTION?
 - apical periodontitis
 - chronic periodontitis
 - allergic sinusitis
 - antrolithiasis
- Most commonly the changes seen in the paranasal sinuses are inflammatory; however, additional lesions can include all the following EXCEPT ONE. Which ONE is the EXCEPTION?
 - cholesteatoma
 - osteoma
 - antrolith
 - none of the above
- Blockage of the ostium most directly causes which of the following?
 - retrograde inflammation in the ethmoid air cells
 - retrograde inflammation in the maxillary sinuses
 - inflammation of the concha bullosa
 - inflammation of the frontal sinuses
- Osteoarthritic changes of the temporomandibular joint condyles include all of the following EXCEPT ONE. Which ONE is the EXCEPTION?
 - lipping
 - subchondral sclerosis
 - subchondral cyst(s)
 - synovial chondromatosis
- Which of the following is the term used for a common state of the nasal cavity found in the middle turbinates?
 - nasal polyp
 - uncinate bulla
 - ivory osteoma
 - concha bullosa
- In which of the paranasal sinus spaces is significant radiographic change, like opacification, a reason for immediate referral to the otolaryngologist?
 - ethmoid air cells
 - sphenoid sinus
 - frontal sinuses
 - none of the above
- All of the following disorders can alter the size of the sella tursica EXCEPT ONE. Which ONE is the EXCEPTION?
 - acromegaly
 - pituitary adenoma
 - craniopharyngioma
 - nasopharyngeal carcinoma
- Radiographic changes of the temporomandibular joint condyles might be seen in all of the following disorders EXCEPT ONE. Which ONE is the EXCEPTION?
 - avascular necrosis
 - synovial chondromatosis
 - anterior disk displacement
 - none of the above
- A "birds-beak" appearance in images of the temporomandibular joint is pathognomonic of osteoarthritic change.
 - True
 - False
- Which of the following anatomic regions, seen in CBCT scans, is important to examine for possible calcification of the internal carotid artery?
 - cervical soft tissues near C5-C6
 - inside the sella tursica
 - the region of the dens
 - parasellar region

Continuing Education Answer Sheet

Instructions: To receive credit, complete the answer sheet and mail it, along with a check or credit card payment of \$36 to: Orthotown, LLC, 9633 S. 48th Street, Suite 200, Phoenix, AZ 85044. You may also fax this form to 480-598-3450. You will need a minimum score of 70 percent to receive your credits. **Please print clearly.**

Interpreting the CBCT Data Volume in Orthodontic Cases Part 2

by Dale A. Miles, DDS, MS, FRCD(C)

License Number _____

Name _____

Address _____

City _____ State _____ ZIP _____

Daytime phone _____

E-mail (optional) _____

Check (payable to Orthotown.com)

Credit Card (please complete the information below and sign; we accept Visa, MasterCard and American Express.)

Card Number _____

Expiration Date – Month / Year _____ / _____

Signature _____ Date _____

Program Evaluation (required)

Please evaluate this program by circling the corresponding numbers: (3 = Excellent to 1 = Poor)

- | | | | |
|---|---|---|---|
| 1. Course objectives were consistent with the course as advertised | 3 | 2 | 1 |
| 2. Course material was up-to-date, well-organized and presented in sufficient depth | 3 | 2 | 1 |
| 3. Instructor demonstrated a comprehensive knowledge of the subject | 3 | 2 | 1 |
| 4. Overall, I would rate this course | 3 | 2 | 1 |
| 5. Overall, I would rate this instructor | 3 | 2 | 1 |

For questions, contact Dr. Howard Goldstein, director of continuing education at hogo@farranmedia.com

Legal Disclaimer: The CE provider uses reasonable care in selecting and providing content that is accurate. The CE provider, however, does not independently verify the content or materials. The CE provider does not represent that the instructional materials are error-free or that the content or materials are comprehensive. Any opinions expressed in the materials are those of the author of the materials and not the CE provider. Completing one or more continuing education courses does not provide sufficient information to qualify participant as an expert in the field related to the course topic or in any specific technique or procedure. The instructional materials are intended to supplement, but are not a substitute for, the knowledge, expertise, skill and judgment of a trained healthcare professional. You might be contacted by the sponsor of this course.

Licensure: Continuing education credits issued for completion of online CE courses may not apply toward license renewal in all licensing jurisdictions. It is the responsibility of each registrant to verify the CE requirements of his/her licensing or regulatory agency.

CE Post-test

Please circle your answers.

- a b c d
- a b c d
- a b c d
- a b c d
- a b c d
- a b c d
- a b c d
- a b c d
- a b
- a b c d