SPECIAL AAO EDITION

ORTHO TRIBUNE

The World's Orthodontic Newspaper · U.S. Edition

APRIL 2010 www.ortho-tribune.com VOL. 5, NO. 4

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Destination: D.C.

The Capitol Dome. (Photo/Jake McGuire)

AAO's 110th Annual Session makes itself at home in the nation's capital

By Kristine Colker, Managing Editor

There are going to be rallies, there are going to be congressional visits and there are going to be tours of monuments. And that's not even including the educational courses and hands-on workshops, the live clinical procedures or the exhibit hall teeming with new products and technology, all of which signal that the 110th Annual Session of the American Association of Orthodontists is about to get under way.

From April 30–May 4, orthodontists from across the country and the world, their staffs, orthodontic residents and guests will be taking over Washington, D.C., as the AAO pulls out all the stops to make this year's meeting better than ever.

There will be a variety of new course topics to engage in, including an examination of how stem cells and tissue engineering may impact the future of orthodontics, a look at current issues surrounding oral bisphosphonates and a discussion regarding the issue of access to orthodontic treatment.

Other topics include the use of aligners, clinical guidelines for miniscrews, the past and future of imaging, esthetics, practice management and orthodontics for adults.

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Miniscrews: a focal point in practice

Part 1 of 6: The basis and history of anchorage — the selection of screws

By Dr. Björn Ludwig, Dr. Bettina Glasl, Dr. Thomas Lietz and Prof. Jörg A. Lisson

In view of the plethora of publications, courses and advertising material on this subject, it would seem that miniscrews are widely used. Once some candid questions have been asked and answered, however, it becomes apparent that the reality is quite different.

It seems evident that there are valid reasons that miniscrews are not yet in daily use in many practices. With this series, the authors intend to encourage those practitioners who are hesitant to use miniscrews to use them routinely, by providing a compendium of experiences and new findings in this field.

Anchorage in general

Moving a body requires anchorage in the form of a counter support. The force required for the movement acts on both body and abutment. In his "Third Law" (1687), Newton specified that every action has an equal and opposite reaction. In dentofacial orthopaedics, this means that the force acts on all teeth involved in the case of the dental support of a tooth movement. Thus, both bodies ultimately move.

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Put your practice where it belongs — on Google Maps

Google is constantly changing its policies regarding local business services. Mary Kay Miller shows you how to keep on top of the changes and keep your listing where people can see it.

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What makes an orthodontist educated?

By Dennis J. Tartakow, DMD, MEd, PhD,
Editor in Chief

An orthodontic education often requires rote learning. Dentists, for whom wholeness is so uniquely important, are almost distinctively un-whole, a remediable consequence of their training.

Perhaps dentistry attracts individualists or encourages them to become individual in nature. Memory objectionably insists that even when the learning was without bias and restricted to a certain workload without prejudice, it was simply more esoteric in comparison to other brain functions. The field of orthodontics incorporates the entire human existence. Whatever the reason, it can lead to unsuccessful behavior.

Doctors are great technicians with exceptional etiquette and skillful hands, but personal philosophy should be left outside the office door like his or her shoes, which for the same reason would seriously contaminate the realistic and theoretical nature of the business of orthodontics. Amid intense appearance of professional self-respect, there is an overriding theme: orthodontics is not about realistically and theoretically untainted business, but rather about individuals who are not pragmatically pure. Orthodontists are not merely concerned with protocols or techniques — they are infinitely more diverse.

In the past few years, communication skills have become essential parts of undergraduate dental curricula. That is admirable and noteworthy but simply not enough.

To recognize ethics and morality as a distinct subject implies that there are times when individuals act ethically and, accordingly, times when individuals act unethically. Ethics and morality do not exist in a box to be carried around like a knife or microscope and whipped out when required.

This might imply that ethics and morality are not intrinsic to everything that doctors do or say. Teaching ethics and communication skills to individuals who do not know what or why they believe is like teaching pathology to those who have not endured the experience of preclinical sciences; students might be very good at listing signs and symptoms or reciting the treatment protocols, but in practice they would be dangerous without understanding the fundamentals of why something occurred. Those individuals would be unable to modify or adapt their practice skills to new situations.

Teaching undergraduate students ethics and morality is not necessarily the answer. Teaching non-medical courses at the undergraduate level would undoubtedly be extremely helpful. There is no question the undergraduate curriculum is crowded, but if the only way to seed exhausted and bored brains with Plato or Aristotle is to sacrifice a detailed and utterly irrelevant knowledge of the origin and insertion of the flexor pollicis brevis, then by all means do it.

Perhaps more could be required at the stage of selecting dental students. Dental schools would most likely admit that all the serious candidates have "A" grades and that determining factors include other distinguishing characteristics such as being president of the debate team, captain of the baseball team or a spectacular interview. There is no doubt the academicians would be right, but maybe the problem is in getting the right candidates to apply.

Other criterion might be considered or required such as courses in civil rights, ethics and principles of social justice. The individuals who should be accepted may be those who strive to understand human beings and behavior, and only want to understand the DNA molecule or the function of cellular mitochondria because it's a tiny but important part of the human cocktail. The moment someone sees the DNA molecule mainly as a money- or status-generating machine, the brakes should go on! Orthodontics can be a self-perpetuating geek-ocracy.

Humanities and historians are other ascending disciplines, but until now they have been confined to the province of a beleaguered minority of those who read such epics as Victor E. Frankl's "Man's Search for Meaning" rather than those whose uncles were GPs. It needs to be understood for its own importance, receiving sycophantic tribute from the secondary disciplines such as physiology, neurology and cariology.

Accreditation should demand that doctors do not snore their way through a day of drug-company sponsored propaganda on new NSAIDs, but rather that they also attend their local book club or public interest groups. The patients' best interests are wider than his or her "medical" best interests; they should insist that their clinicians who conduct those best interest resolves are doctors who work at more than just orthodontic techniques and their golf scores.

This is not a plea for a sniffily intellectual orthodontic salon ethos. It is not an assertion that orthodontists who listen to Beethoven at Lincoln Center are better people than those who listen to Gary Null over breakfast. It is a tentative suggestion that because Beethoven was and Gary Null is a member of the human race, knowledge of both of them are indices that the doctor is appropriately keeping up with the milieu of his or her profession via the need of the community and society.

Somerset Maugham wrote, "I do not know a better training for a writer than to spend some years in the medical profession." The converse of this is also true: there are few better ways for an orthodontist to appreciate the scope of his or her subject matter than to keep the company of musicians, artists, writers and philosophers who have struggled to understand the nature of what *homo sapiens* are about and what makes them tick. True evidence-based orthodontics involves consideration of all available evidence about human beings and their place in the universe.

(This editorial was inspired by an original essay: Foster, C. (2009). Why doctors should get a life. Journal of the Royal Society of Medicine, 102, pp. 518–520.) OT

OT Corrections

Ortho Tribune strives to maintain the utmost accuracy in its news and clinical reports. If you find a factual error or content that requires clarification, please report the details to Managing Editor Kristine Colker at *k.colker@dental-tribune.com*.

Image courtesy of Dr. Earl Broker.

Member Publication
AADE
American Association of Dental Editors

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The World's Orthodontic Newspaper · U.S. Edition

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BPA WORLDWIDE BUSINESS

Published by Dental Tribune America

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Going to AAO? What to know

What
American Association of Orthodontists' 110th Annual Session

When
Friday, April 30–Tuesday, May 4

Where
Walter E. Washington Convention Center (WWCC), 801 Mount Vernon Place, Washington, D.C., 20001

Online
www.aaomembers.org/mtgs/2010-AAO-Annual-Session.cfm

Exhibit hall hours
- 9:30 a.m.–5 p.m. Saturday
- 9:30 a.m.–5 p.m. Sunday and Monday
- 9:30 a.m.–2 p.m. Tuesday

The exhibit hall is located in the WWCC Lower Level, Halls A and B. Dedicated hours are from 11:15 a.m.–1:15 p.m. daily.

Table clinics
2–5 p.m. Sunday in WWCC Hall C

Scientific posterboard exhibits
10 a.m.–5 p.m. Monday in WWCC Hall C

Attire
The official dress code of the AAO is business casual, which includes slacks and skirts.

C.E. pavilion
While attending the AAO, record the lectures you attend and print your C.E. hours report. The pavilion can be found at east registration on street level.

Shuttle schedule
Daily shuttle service will be provided between the WWCC and all AAO-designated hotels. Washington, D.C., rush-hour traffic is heavy, so make sure you leave ample time for your commute. Shuttle hours are as follows:
- 7:30 a.m.–6:30 p.m. Friday and Saturday
- 7 a.m.–6 p.m. Sunday and Monday
- 7 a.m.–2:30 p.m. Tuesday

Shuttles operate at 15-minute intervals in the mornings from 7–10 a.m. and in the late afternoons from 3:30–6:30 p.m. and at 45-minute intervals from 10 a.m.–3:30 p.m. Friday–Monday. On Tuesday, intervals are 30 minutes all day.

Airport shuttle discounts
Two shuttle services, Shuttlefare and SuperShuttle/ExecuCar, are offering discounts to AAO attendees arriving at all three Washington, D.C.-area airports. Reservations are required to receive the discounts.

To receive discounted pricing on your airport transportation, your reservation needs to be placed online through the links provided at *www.aaomembers.org* and you must use the coupon code at checkout.

AAOF Breakfast
Places were still available as of press time at $25 per person for the AAOF Breakfast, taking place at 7 a.m. Monday in the Renaissance Ballroom, West A. Breakfast includes the presentation of Blair Award to John Pershing for his service to the AAOF. Complimentary tickets will be offered to current orthodontic residents who sign up on site at the meeting. See the AAOF display at the meeting for more details.

Audio recordings
Pre-order an audio DVD-ROM of conference lectures for a pre-event discount price of $85. Details can be found at *www.aaomembers.org*.

Tours
Tickets are still available, as of press time, for many of the AAO activity programs. Choices include:
- "A Special Look at Washington," 9 a.m.–1 p.m. Saturday, $32
- Mount Vernon with lunch at Gadsby's Tavern, 9:30 a.m.–3:30 p.m. Saturday, $99
- Shopping in Georgetown with lunch at Filomena's, 1–5 p.m. Saturday, $75
- "A Special Look at Washington" with boxed lunches, 9 a.m.–3 p.m. Sunday, $65
- Historic Annapolis with lunch at Treaty of Paris, 9 a.m.–5 p.m. Sunday, $126
- Arlington National Cemetery, 1–5 p.m. Sunday, $32
- "A Splashing Good Time! Aboard the DC Duck," 1–5 p.m. Sunday, $74
- Capitol Hill, 9 a.m.–1 p.m. Monday, $66
- "Lincoln's Life and Legacy" with lunch at Old Ebbitt Grill, 9:30 a.m.–3:30 p.m. Monday, $132
- "Monuments by Moonlight" with champagne and dessert, 8–11 p.m., $48
- Old Town Alexandria with lunch at Indigo Landing, 9 a.m.–3 p.m. Tuesday, $110.

AD

A view of the Walter E. Washington Convention Center from 7th Street, NW and Mount Vernon Place/New York Avenue. The convention center is where this year's AAO Annual Session is taking place. (Photo/ Destination DC)

AD

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One course highlight is a special risk-management program that will focus on common concerns at the beginning of an orthodontic career. This seminar, featuring legal and insurance expert panelists, will take place the afternoon of April 30.

In addition, there will also be live clinical procedures by orthodontists on patients and filmed and broadcast live to both doctor and staff seminars. Topics include mini-implant insertion and application of laser technology.

The hands-on workshops are always a popular attraction. As of press time, two sessions still have openings: "New Lingual Straight Wire Method: A Look at the Future" (8 a.m. Sunday) and "TADs Applications for Invisible Orthodontics in Adults" (1:15 p.m. Sunday). You can register for these sessions online at *www.aaomembers.org*.

Social activities

The AAO Annual Session is full of activities that will keep you busy when you aren't attending classes or checking out the exhibit hall. One such activity is the AAO Opening Ceremonies on Saturday, May 1. Come listen to the music of Frankie Valli and the Four Seasons and see a performance of the comedy "Defending the Caveman," the longest running solo play that has ever appeared on Broadway, where it opened in 1995.

There is also still plenty of space available for many of the AAO tours. Activities include such things as a "Monuments by Moonlight" tour, shopping in Georgetown, a ride on the DC Duck, a congressional visit and a tour of historic Annapolis.

For a complete description of all AAO's tours and to register, visit *www.capitalcityevents.net/aao2010*.

Exhibit hall and more

More than 300 companies will show off their newest and best products in the exhibit hall from Saturday to Tuesday, and you don't have to skip class to go shopping. Each day, 11:15 a.m. to 1:15 p.m. has been set aside as dedicated exhibit hall time.

Many companies are offering discounts, launching new products or putting on entertainment, such as political rallies, in their booths. (For more information on what will be in the exhibit hall, turn to Page 16.)

One company you'll want to check out is Alliance Tech, which is providing smart phone applications that will enable attendees to review conference information and create schedules on their phones. Alliance Tech will rent iPod Touches to those who do not have smart phones but wish to use the technology. See *www.aaomembers.org* for details.

Ortho Tribune at the AAO

For plenty more information on this year's AAO, including a look at new products and can't-miss events, don't miss the Ortho Tribune Daily Edition, available exclusively during the AAO Annual Session. OT

Find money, monuments, more in D.C.

Finding something to do in Washington, D.C., is not a problem. Everywhere you look you can find an array of museums, monuments, outdoor activities and more. The real question is how to narrow it down.

Here are some destinations you might want to consider as you take in the sights of our nation's capital.

Passport D.C.

Dozens of embassies and cultural centers open their doors to showcase their traditions, art, music, dance and cuisine in Cultural Tourism D.C.'s annual international celebration. It kicks off May 1 with 30 embassies offering various events and programs through Around the World Open Houses.

Celebrate Elvis

In honor of Elvis and the 75th anniversary of his birth, the exhibition, "Elvis! His Groundbreaking, Hip-Shaking, Newsmaking Story," at The Newseum tells the story of Presley as he was portrayed in the news media and explores how his music and physicality pushed the boundaries of mainstream taste and free expression during a time when America was experiencing deep generational shifts. Produced in collaboration with Elvis Presley Enterprises, the display includes rare objects from the Graceland vaults that have never before been publicly displayed.

Millennium Stage performance

Take in a free performance at The Kennedy Center's Millennium Stage every evening at 6 p.m. Acts include everything from performances by the National Symphony Orchestra to gospel groups to jazz musicians to poetry slams.

Making money

Make money (or see money made) with a free tour of the Bureau of Engraving and Printing.

Gargoyle Tour

Explore the beautiful grounds of the National Cathedral, then take a Gargoyle Tour ($10/adult, $5/child or $30/family), and see how these whimsical creatures reflect history in stone. There's even one fashioned after Darth Vader.

National Archives

See the original Declaration of Independence, U.S. Constitution and Bill of Rights at the National Archives, then stick around to research your own family's immigration records.

Relive history

Sit in the lobby of the Willard InterContinental Hotel to imagine history unfolding. The hotel is where Julia Ward Howe wrote "The Battle Hymn of the Republic," where President Ulysses S. Grant popularized the term "lobbyist" and where Rev. Dr. Martin Luther King Jr. wrote his "I Have a Dream" speech.

Head out into Washington, D.C.'s neighborhoods to see sights such as these rowhouses on Capitol Hill. (Photo/Destination DC)

Neighborhood exploration

Get out into D.C.'s neighborhoods to learn about history beyond the National Mall by experiencing Cultural Tourism D.C.'s free self-guided walking trails.

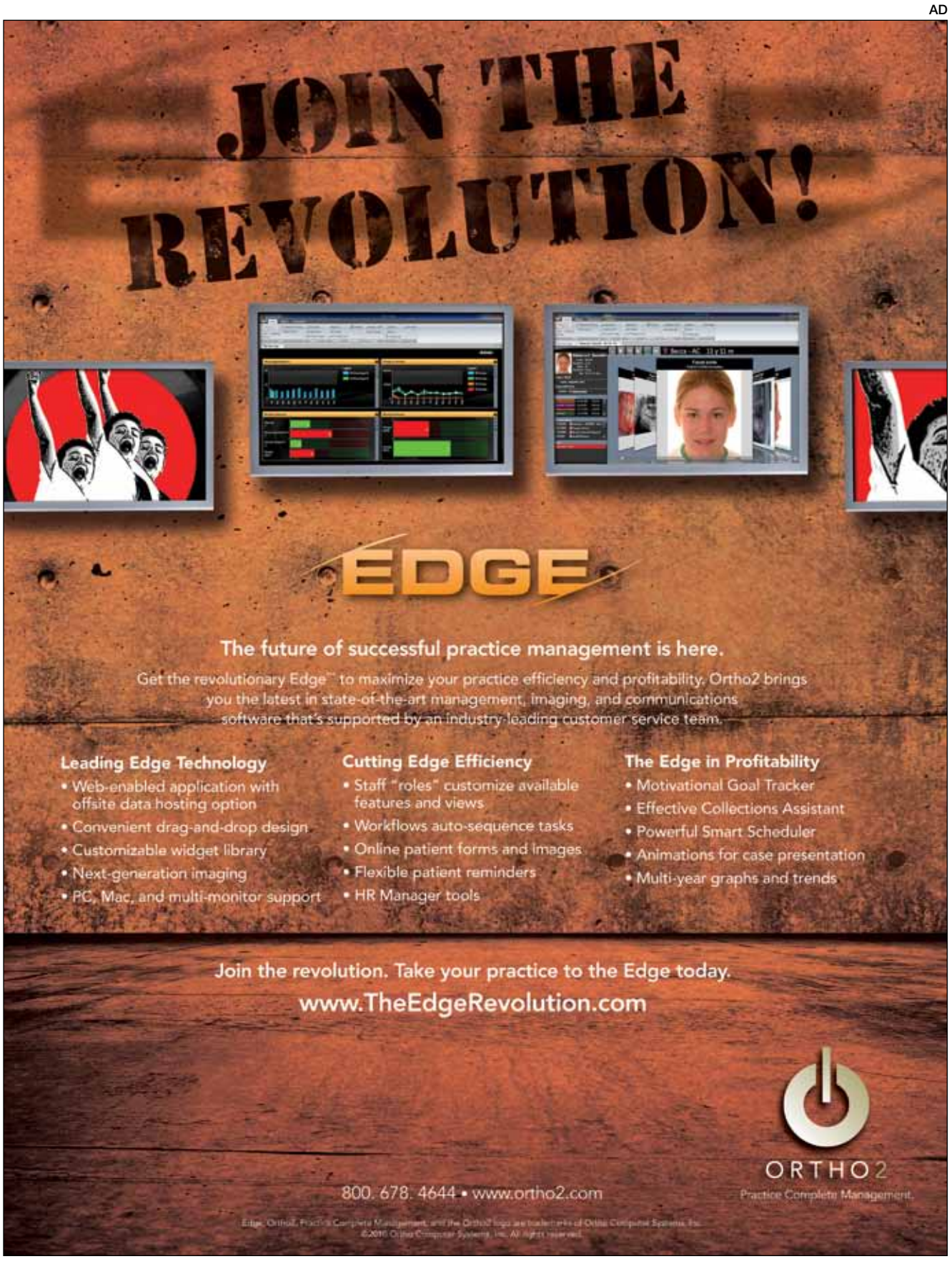
They are marked with illustrated signs revealing the stories behind Washington's historic neighborhoods.

D.C. from above

For a great and inspiring aerial view of the city (without the wait you'll find at the Washington Monument), visit the Old Post Office Pavilion on Pennsylvania Avenue. OT

(Source: Destination DC)

AD



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The extent of movement and countermovement does, however, depend on the anchorage strength of the individual teeth, i.e., on the number and length of the roots, the root surface, and the structure of the surrounding bone.

Anchorage quality can be divided into three categories:
1. minimum anchorage;
2. medium anchorage; and
3. maximum anchorage.

These three categories can be described using the example of a conventional canine retraction after removal of a first premolar (Fig. 1).

In the case of minimal anchorage, the support is provided by the individual teeth. Figure 1a shows that a single premolar is not sufficient as an abutment to distalise a canine. The premolar is clearly mesialised in reaction to the application of force.

Figure 1b shows how two, equally strong, anchorage segments are formed. Action and reaction are comparable in this case; the result is reciprocal tooth movement.

In the case of maximum anchorage (Fig. 1c), the posterior group of teeth is secured and held stationary by using a miniscrew. The canine can be retracted by the complete force vector, as the reactive force is completely absorbed by the anchorage block formed.

Apart from anchorage quality, the basis, i.e., the type of anchorage location, plays a role:

Dental or desmodontal support:
- use of additional intra-oral devices (nance, palatinal arch, lingual arch, lip bumper);
- modification of fixed appliance (buccal root torque, blocking); and
- incorporation of the teeth of the other jaw (Class II or III elastic bands).

Extra-oral support:
- headgear; and
- face mask.

Enossal support:
- implants, miniscrews, etc.

This article only deals with anchorage in bony structures. The terms *skeletal* or *cortical anchorage* are used interchangeably in this case.

Figs. 1a–c: After removal of the first premolar, the canine is to be retracted; results for a) minimum, b) medium or reciprocal and c) maximum anchorage.

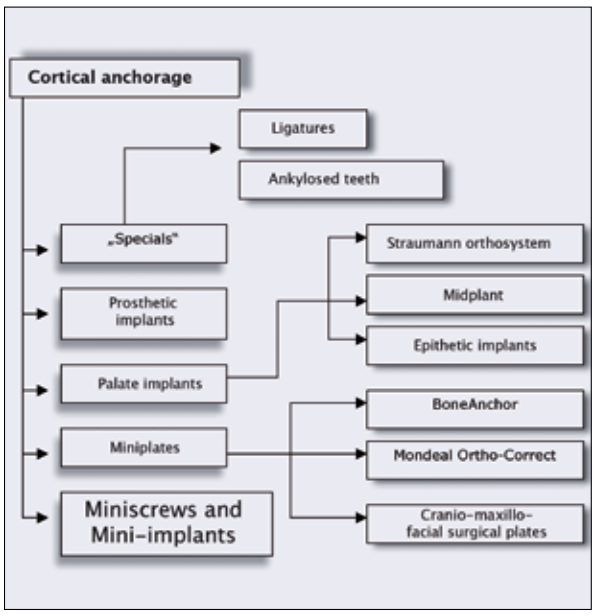
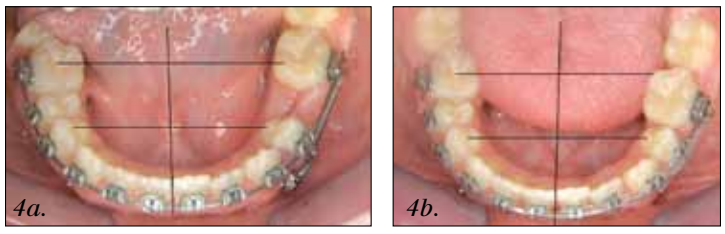
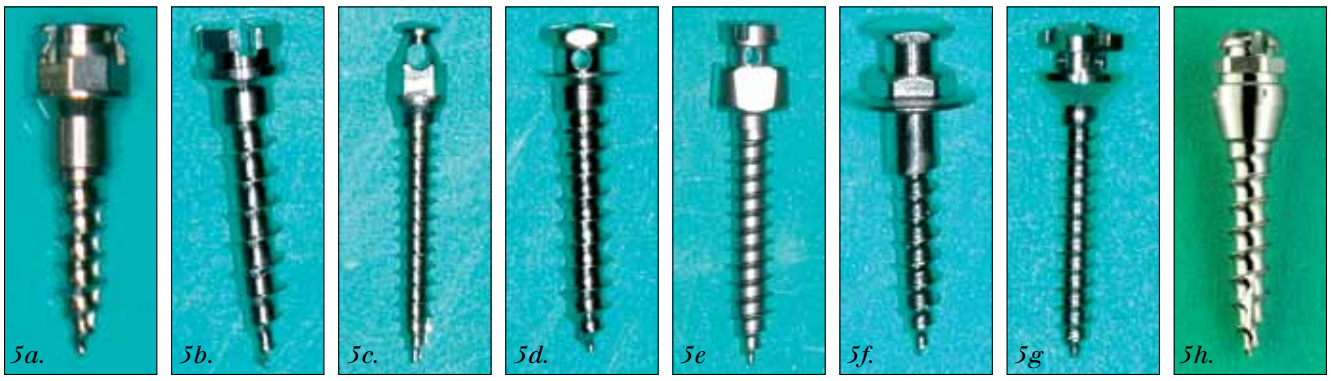


Fig. 2: Overview of the range of cortical anchorage options.

Figs. 3a, 3b: Clinical example of two typical miniscrew treatment applications: gap closure (3a) and straightening of tooth No. 7.



Figs. 4a, 4b: One-sided gap closure in the left lower jaw. Miniscrews prevented the expected reactive side effect of subsequent shifting of the middle line.



Figs. 5a–5h: Eight examples of the more than 700 different forms of miniscrews currently available: a) Ortho easy (FORESTADENT), b) Aarhus Mini Implant (Medicon), c) AbsoAnchor (Dentos), d) Dual-Top (Jeil Medical), e) LOMAS (Mondeal), f) Osas (Dewimed), g) Spider Screw (HDC) and h) tomas-pin SD (DENTAURUM).

History and overview of skeletal anchorage

Bony anchorage has its roots in Gainsforth's unsuccessful attempt to insert screws into the jawbone as load anchors in 1945. Many later experiments were unsuccessful and the method had become obsolete by the late 1970s.

From 1980 onward, various research groups (such as Creekmore, Roberts, and Turley[2–7]) took up the subject once more. Creekmore published the first, clinically successful patient treatment case.

There are now numerous options for cortical anchorage (Fig. 2), including (artificial or pathologically) ankylosed teeth on the basis of miniplates normally used in cranio-maxillo-facial surgery and the use of prosthetic implants.

Wehrbein and Glatzmaier were the first to present an implant system specifically designed for jaw orthopaedics (Orthosystem, Straumann[8–10]). These orthopaedic jaw implants, which also included Midplant (HDC), are mainly inserted into the palate. This method has been found to be both safe and successful.

In recent years, the requirements for cortical anchorage techniques have been defined in the literature. However, upon closer inspection, only orthopaedic mini-implants met these requirements favourably, in terms of:
- biocompatibility;
- small size;
- simplicity of insertion and use;
- primary stability;
- immediate load capacity;
- adequate resistance against orthodontic forces;
- usability with standard orthopaedic appliances;
- independence of patient cooperation;
- clinically superior results in comparison with standard alternatives;
- ease of removal; and
- cost-effectiveness.

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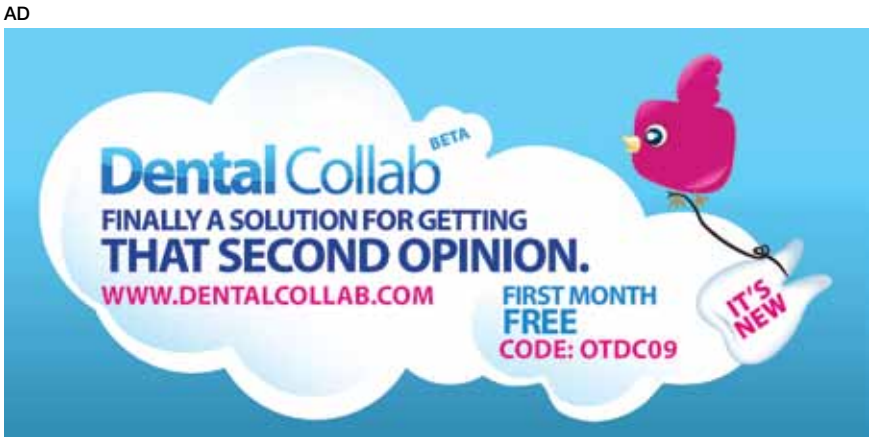

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Mini-implants

Any form of skeletal anchorage, including miniscrews, is by definition an implant: "An implant is an artificial material implanted into the body, which is to remain there either permanently or for an extended period."

More than 30 different terms for orthodontic screws are used in the international literature. The most common of these are mini-implant and miniscrew, while the terms minipin or pin are preferred when speaking to patients.

At present, there are more than 30 manufacturers of miniscrew systems (Fig. 5a–h). The number of screws per system ranges from two to 154 different types.

In order to assist practitioners in selecting such devices according to their practice's needs, the most important decision-making criteria for choosing implant systems are discussed below.

Material

All miniscrews are made from pure titanium or from an alloy of titanium with aluminium or vanadium. The biocompatibility of such materials, the metal surface of which is in direct contact with the bone, has been firmly established.[11–14]

Osseointegration

Brånemark was the first to define the concept of osseointegration, which he described as "a direct functional and structural link between living bone tissue and the surface of a force-absorbing implant."[15–17]

Several authors, such as Costa and Maino, view anchoring a miniscrew not as osseointegration, but as a skeletal resistance block.[18,19] In the opinion of Cope and Bumann, miniscrews are anchored by mechanical stabilisation and not by osseointegration.[20,21]

Diameter of the miniscrew

The diameter of the miniscrews on the market varies between 1.2 and 2.3 mm. Diameter specifications of a screw normally refer to its outer diameter, i.e., the size of the shaft, including the thread.

For secure and primarily mechanical anchorage, a certain amount of bone is required around the screw. To date there have been no studies on the amount of bone actually required; the information available suggests 0.5 to 2 mm. At an interradicular level, the amount of space available prescribes the maximum diameter of the screw.

Poggio et al.[22], Schnelle et al.[23], and Costa et al.[24–25] provide some suggestions as to the vertical space required, i.e., the space between the enamel/cement interface and the mucogingival line. These investigations clearly indicate that the diameter of a miniscrew should not exceed 1.6 mm. It should be noted that the stability of a miniscrew in the bone depends on its diameter and not on its length.[26–27]

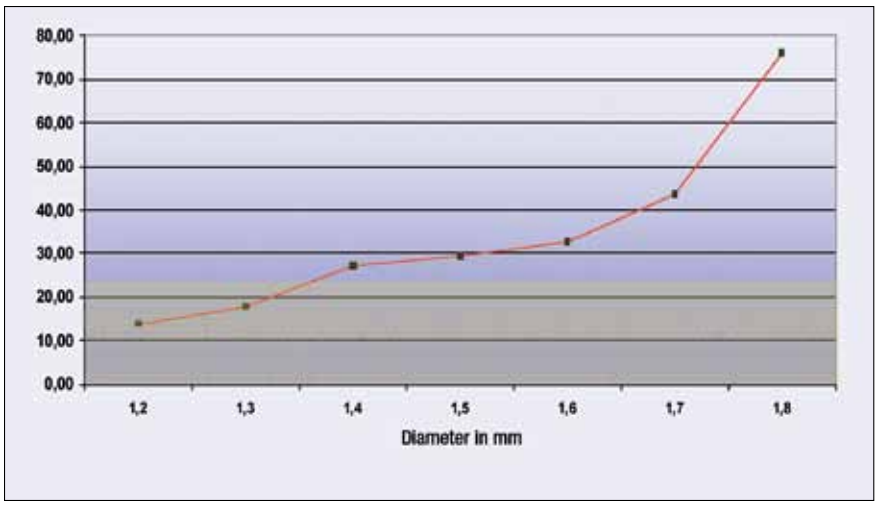
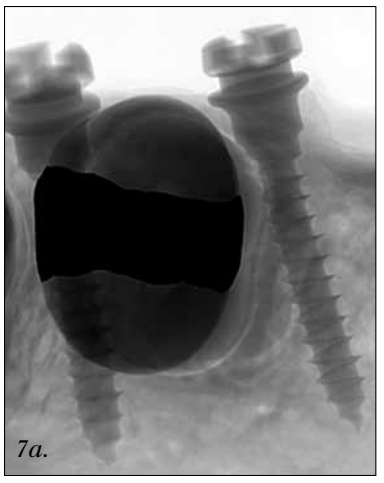


Fig. 6: The stress resistance (fracture level in Ncm) depends on the diameter of the miniscrew (according to Kyung, modification by the authors).



Figs. 7a, 7a: Interradicular X-ray image showing spatial ratios.

Length of the miniscrew

The length of the miniscrews on the market varies between 5 and 14 mm. Length specifications of a miniscrew usually refer to the shaft, i.e., the threaded section.

Like the diameter, the length of the screw selected depends on the amount of bone available. Depending on the region, the total thickness of the bone is between 4 and 16 mm.[28]

The length of a screw is of secondary importance to the diameter when it comes to secure anchorage, as mentioned above. Various studies have shown that it is the thickness of the cortical section that plays a more important role.[29–31] As far as the distribution of force over the body of the screw is concerned, FEM analyses have shown that the load is applied only in the region of the cortical bone.[32–33]

When selecting the length of the screw, the depth of the gingiva must also be taken into account, with an average layer depth of 1.25 mm. Thus, the ratio between the length of the head (the part of the screw outside the bone) and the length of the threaded section (the part of the screw inside the bone) should be at least 1:1.

Poggio et al.[22] recommend lengths of 6 to 8 mm. Costa[24,25] suggests miniscrews with a length of between 6 and 10 mm. Based on these studies, it would appear that it's not necessary to use longer screws. This has been confirmed by numerous clinical studies.

Easy identification of length and diameter through colour-coding of the screws can be accomplished by means of anodisation, using for example, Ortho easy (FORESTADENT).

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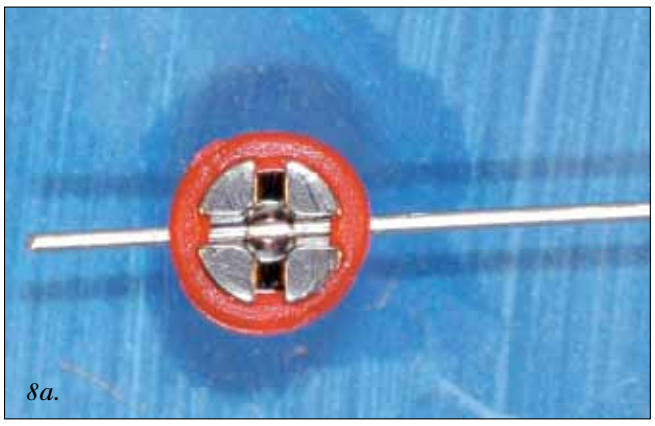
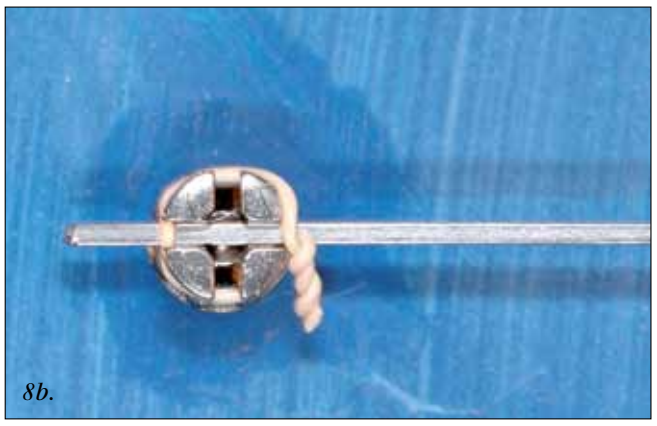
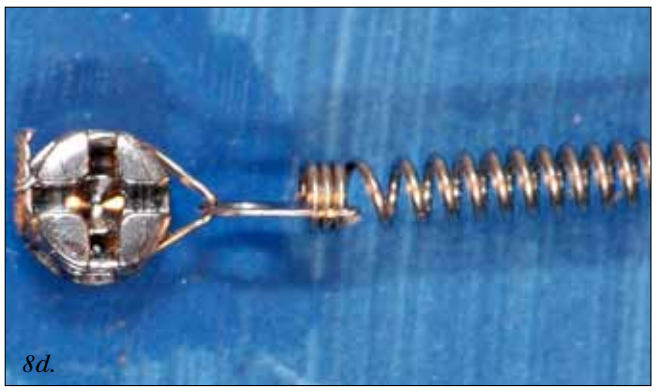
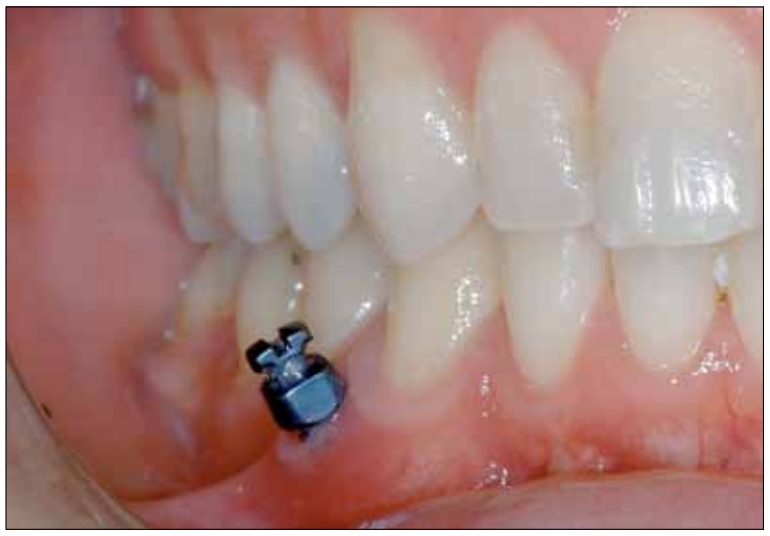

8a.


8b.

8c.


8d.

Figs. 8a–8d: For practical reasons, it is advisable to use systems that offer only one universally applicable head variant. This single head should allow for the attachment of all types of coupling elements (threads, elastic chains, round wires and square wires).



Figs. 9a, 9b (above and right): Height difference of the screw head in two clinical situations.

A positive side effect of this is that the oxide layer formed results in firmer anchorage of the implant in the bone.[34]

Screw head

Some suppliers have a special head variant for each potential application in their range, such as:

- hook tops;
- ball-shaped heads;
- eyelets;
- simple slots;
- cross-shaped slots; and
- universal heads (Figs. 8a–8d).

The screw head should be very small and compact, to ensure that the patient experiences minimal discomfort. However, it must be large enough for the coupling elements to be securely fastened to it (Figs. 9a, 9b).

Transgingival portion

The transgingival portion, also known as the gingival neck, is the most vulnerable part of an implant or a miniscrew. Perforation of the gingiva provides a potential access point for micro-organisms, posing the risk of peri-mucositis or peri-implantitis. This is one of the main causes of the premature loss of miniscrews.[35–36]

During the immediate post-operative phase, the mucosa should be as close as possible to the screw, to seal the area.[37] The most advantageous shape transgingival collum is that of a cone, as this shape naturally results in safe sealing without a pressure zone. This makes it more difficult for micro-organisms to penetrate, thus preventing infections. The cone shape also seals the perforation wound, as a cork would seal a bottle, thus reducing bleeding.

Conclusion

The correct method of anchorage with regard to shape and quality is crucial for successful treatment. Maximum anchorage is not necessary in all cases, and thus, neither is the use of a miniscrew necessarily essential.

From an historical point of view, the cortical anchorage system is, in common with other jaw orthodontic techniques, not new at all. The idea was conceived more than 75 years ago.

Of all forms of skeletal anchorage, the mini-implant is the most universally used and is the most suitable for routine use.

However, before practitioners can select the most appropriate miniscrew for use in their practice from the large range on offer, they will need to review the literature thoroughly. OT

Editorial note: A complete list of references is available from the publisher. This article first appeared in Dental Tribune Asia Pacific, Nos. 1 & 2, 2009. The next edition of Ortho Tribune will feature "Part II — Basic information on the insertion of miniscrews." All photos were provided by the authors.

OT Contact

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