Dubai hosts the unique competition in Dentistry

“Aesthetic Dentistry MENA Awards 2009”

For the first time for such event in the Middle East region, Dubai will host the “Aesthetic Dentistry MENA Awards 2009,” to recognize the outstanding achievements of dental professionals and to focus the public attention to the quality and level of dentistry in the region for the well-being of the patients. The award is organized by Dental Association - UAE and Centre for Advance Professional Practices (CAPP). The ceremony will be held for the first time in the Middle East region with the invaluable hospitality of UAE, Dubai.

Dr. Aisha Sultan, president of the MENA awards said, “Our vision is to create a platform that serves as a benchmark for dental care and industry players by recognizing exemplary performance in the Middle East region's dentistry.”

The award will show the ultimate in health and beauty, the latest in science and the art of dentistry - the beauty from the red carpet to the stage of knowledge and edge. Not only to give the patients a great looking teeth and smile, but also to make them feel better.

An independent judging panel of well-known leading figures in dentistry - representatives of associations and professional organizations in the field of dental aesthetic will study all entries and select the three best cases from each category.

Dr. Wolfgang Richter, President European Society of Cosmetic Dentistry, Dr. Ninette Ban, Head of Dental Services AHS - SIHA, Dr. Nadim Aboujaoude, Fellow of the International College of Dentists, Mohamed A Abdallah, Country Chairman Egypt European Society of Cosmetic Dentistry, Dr. Ramesh Bulbul, Associate Fellow American Academy of Implant Dentistry, Dr. Mazen Tamimi, President of DGZI International section, Dr. Philippe Tardieu, Associate Professor New York University. Are selected to be the jury panel. All Dental Associations from Middle East region and Professional Organizations as DGZI (German Implantology Association), ESCD (European Society for Cosmetic Dentistry), will be involved in the project.

New discovery may help to re-grow missing teeth, prevent cleft palate

In a breakthrough discovery, scientists have found that a system of opposing genetic forces determines why mammals develop a single row of teeth, while sharks sport several.

The study suggests that carefully understanding the genetic program may help for scientists to re-grow missing teeth and prevent cleft palate, one of the most common birth defects.

Gene expression is the process by which information stored in genes is converted into proteins that make up the body’s structures, and carry its messages.

And gene expression determines the development of teeth and palate while the baby’s face takes shape in the womb. Related abnormalities lead to the development of teeth outside of the normal row, missing teeth and cleft palate, and the new insights suggest ways to combat these malformations.

In the new study, it was found that turning off a single gene in mice resulted in development of extra teeth, next to and inside of their first molars. “This finding was exciting because extra teeth developed from tissue that normally does not give rise to teeth,” said Dr. Rulang Jiang, associate professor of Bio-medical Genetics in the Center for Oral Biology at the University of Rochester Medical Center.

He added: "It takes the concerted actions of hundreds of genes to build a tooth, so it was amazing to find that deleting one gene caused the activation of a complete tooth developmental program outside of the normal tooth row in those mice. Finding out how the extra teeth developed will reveal how nature makes a tooth from scratch, which will guide tooth regeneration research."

In the current study, Jiang and colleagues generated mice that lacked the oddskipped related-2 (Osr2) gene, which encodes one of many transcription factors that turn genes on and off.
Dubai: United Arab Emirates, February 24th, 2009. Under the patronage of H.H Sheikh Hamdan Bin Rashid Al Maktoum, Deputy Prime Minister and Minister of Finance, President of the Dubai Health Authority, the 15th UAE International Dental Conference and Arab Dental Exhibition AEEDC Dubai, is scheduled to be held from March 10th-12th, 2009 at the Dubai International Convention and Exhibition Centre.

Dr. Nasser Malik – The Conference Chairman said at the press conference; “In 2009, AEEDC will take a major shift in its focus, as we are including topics usually not covered in our previous conferences, topics such as Parodontal professions and business aspects of dentistry. We are also showing our support to the dental education community by starting for the first time, the AEEDC dental knowledge competition, for the undergraduates dental students of the Middle East region. With the honorary title of AEEDC Champion awarded to the winning school”.

Dubai Health Insurance Scheme

Dubai Health Insurance Scheme has opened two designated branches in Abu Dhabi and Al Ain and has a call centre to answer enquiries by Emirati citizens.

The new rule cuts back on the decision. However, in earlier years some of the benefits enjoyed by Emirati employees working in the private sector 50 per cent of the cost of pharmaceutical products and dental care services was made by HAAED. From our side we are technically prepared to implement the change and are currently in discussions with our providers to make sure the implementation process moves smoothly,” said Dr. Michael Littner, chief executive officer at DAMAN.

Abu Dhabi set to revise health insurance scheme

Abu Dhabi: The full medical insurance scheme for Emiratis working in the private sector will be withdrawn by the Health Authority Abu Dhabi (HAAD) effective from February.

A circular issued by the HAAD on February 5 states that Emiratis working in the private sector will henceforth have to bear 50 per cent of the cost of pharmaceutical products and dental care services.

The new rule cuts back on some of the benefits enjoyed by Emiratis under the “Thiqah” Health Insurance scheme. The Thiqah card earlier assured nationals of access to free medical coverage in all health care facilities and qualified them for broader geographical coverage and extra health benefits.

Dubai: The Thiqah health insurance scheme has opened two designated branches in Abu Dhabi and Al Ain and has a call centre to answer enquiries by Emirati citizens.

Dr. Amer Al Sharif, Director of Continuous Education Department, Dubai Health Authority, in behalf of H.E. Qadhi Saeed Al Maktoum, Deputy Ruler of Dubai, Minister of Health and Community Development, announced at a press conference held today at the Dubai International Convention and Exhibition Centre, that preparations are at full swing for the only dental gathering in the Middle East region and North Africa. The press conference was presided over by Mr. Abdal Salam Al Madani – Executive Chairman – AEEDC Dubai and Dr. Nasser Malik – Chairman of the conference.

Mr. Abdal Salam Al Madani the Executive Chairman of AEEDC Dubai added that “every year we strive to add new records to AEEDC conference and exhibition, this year the number of specialist speakers, and exhibitors participating in AEEDC 2009 are bigger than last year. The exhibition space is 20% bigger compared to last year, with an increase of 25% in number of exhibitors. We are also expecting more than 20,000 specialists from 113 country to attend and participate in AEEDC 2009”. Moreover, a number of Country representatives, chairmen and presidents of International associations and cooperations will participate in AEEDC 2009 Al Ain.
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Although the implant supported mandibular molar is very predictable the restoration of the single posterior implant presents its own unique set of problems. The most obvious problem is that the mesiodistal width of a molar is significantly greater than that of the standard 3.75mm diameter implant. A wider diameter implant would reduce this discrepancy but is reliant on available bone which due to resorption is often insufficient. (Figure 1)

Ideally the implant should be positioned in the centre of the edentulous space but if a standard diameter implant is used as a result of limited buccolingual bone width the crown will be grossly overcontoured. (Figure 2) Another option would be to place two standard diameter implants but this requires a minimum mesiodistal space of 14mm. Apart from the difficulty of sufficient space to accommodate two implants there is also an associated cost implication.

An alternative restorative option in this region of the mouth is the cantilever premolar which requires only a single implant for support. (Figure 5) The implant is positioned distally and used to provide support for a mesial cantilever premolar pontic. This type of restoration is indicated where the remaining dentition is sound, the occlusion stable and the mesial distal space is between 11-14mm.

Implant Site Preparation

Following a mid-crestal incision and exposure of the residual alveolar ridge a 2mm pilot bur is used to cut the osteotomy site to the predetermined depth. (Figure 4) As the tapered implant is self-drilling as well as self-taping it is not necessary to use any additional burs to enlarge the site prior to implant insertion. (Figure 5) This preserves bone and improves primary stability as well as speeding up the insertion procedure cutting back on surgical stages. As the implant is screwed down into position the bone is expanded improving ridge contour and the emergence profile of the definitive restoration.

Implant Positioning

It is important for the stability of the bone margin that there is 2mm bone on the buccal aspect of the implant. There should be 1.5mm bone between the circumference of the implant and root of the adjacent tooth. If the implant is placed closer to the root than 1.5mm the biologic...
width is violated and periodontal health of the tooth jeopardised. If the distance is greater than 1.5mm the definitive restoration will be over contoured predisposing to hygiene and maintenance problems. The implant should also be submerged by 1mm beneath the bone crest in order to provide sufficient space to develop the emergence profile.

Transmucosal Healing

Tissue closure is not required as the placement protocol ensures that primary stability is sufficient to permit the placement of a healing abutment after implant insertion. Instead the flaps are lightly sutured around the healing abutment. Once soft tissue healing is complete after three months impressions can be taken for the definitive restoration. (Figures 6, 7 and 8)

Cantilevered Premolar

Providing the long axis of the implant is parallel to the occlusal plane a friction fit abutment may be used. A friction fit abutment does not require a screw thus eliminating micro leakage associated with the micro gap. The crown is made from a composite restorative material (gradia) that is bonded directly to the friction abutment. This type of restoration delivers a premolarised posterior occlusion with a narrow occlusal table with low cusp angles reducing lateral load. (Figures 9 and 10) The cantilevered premolar pontic is amenable to routine oral hygiene procedures and is very well tolerated by patients.
CDE Self Assessment in Clinical Dentistry

Dr. Wong Foot Meow, BDS(Mal) FDSRCPGS (Gleng) FICS AM(Mal) FICOI

The article has been accredited by Health Authority - Abu Dhabi as having educational content and is acceptable for up to 2 (Category 1) credit hours. Credit may be claimed for one year from the date of subscription.

Prelude
This is a new section of the CDE Self Assessment Series in Clinical Dentistry, Dental Quiz Questions. Note that we have decided to be more clinically orientated with more emphasis on medically related conditions that can affect dental treatment. In this section, we will delve into the intricacies of some soft tissue and dental anomalies. This dental quiz serves to update your CDE prowess.

QUESTION 1: DIFFERENTIAL DIAGNOSIS OF JAW CYSTS AND TUMOURS
The most common intra-bony non-inflammatory diseases in the jaws are odontogenic cysts and tumours. However, in the differential diagnosis of jaw lesions, the following must also be considered: i.e., non-plasmas, primary and metastastic tumours, developmental lesions, fibrous and dysplastic processes. Think before you cut. An initial differential diagnosis can be established by obtaining a complete history after performing a thorough physical examination. These preliminary data obtained will influence the diagnostic tests ordered and the eventual choice of incisional or excisional biopsy.

CASE 1A
This 27-year-old Chinese female clerk was blissfully unaware of the huge swelling in the anterior floor of her mouth until her well-informed dentist, Dr. C, advised her to see me for further management.

a. What is wrong with the floor of the mouth? (Fig. 3a)
b. What anatomical structures are involved with the swelling?
c. Will she have any distinct functional problem in speech and mastication?
d. We decided to perform an excisional biopsy (Fig. 3b). What is the difference between an incisional biopsy and an excisional biopsy? Which important possible post-op complication must you warn the patient about before proceeding?
e. Why is the incision shaped like this? Describe what you see in Fig. 3b.
f. The lesion had been enucleated in toto as shown in Fig. 3c. What anatomical structures can you see? What is the yellow blob on the (L) lateral corner near tooth 54?
g. Consider the excised lesion in Fig. 3d. It measured 6 cm x 5 cm x 5 cm. What can you see? How can such a huge lesion exist without alarming the patient?
h. The surgical closure (Fig. 3e) and one week post-op (Fig. 3f).

ANSWERS QUESTION 1: CASE 1A
a. A huge soft tissue swelling is seen in the mid-line of the floor of the mouth, bulging upwards and outwards towards the oral cavity as the mouth is opened. Normally, the lingual frenum is near the lingual surfaces of teeth 31 and 41. In this case, even the opening of the sublingual salivary gland (seen as two modules lateral to the frenum) is displaced posteriorly. In addition, the outlines of the paired sublingual glands have disappeared and a distinct firm hemispherical swelling is apparent.
b. The floor of the mouth is the mylohyoid muscle. Above this muscle lies the mouth, below it lies the neck. The structures to watch for when operating around this area are: geniohyoid muscles, the lingual nerve, submandibular ganglion, submandibular duct and hypoglossal nerve. In addition, you must be mindful of the sublingual gland, lingual ar-

CASE 1B
This 16-year-old Chinese female student was worried about the increasing asymmetry of her face (Fig. 3g). She complained about this fluctuant mobile lump on her (L) cheek which had gradually increased in size.

a. How can you tell that this is so? (Fig. 3h)
b. Again we decided to do an excisional biopsy. What structures must you avoid when operating on the buccal mucosa of the cheek? (Fig. 3i)
c. What structures can you discern in the surgical bed after the enucleation of the tumour? (Fig. 3j)
d. The excised lesion Fig. 3j has features highly characteristic of a benign lesion. Judging from the colour and shape, what do you think this is?
e. Fig. 3k, indicated the immediate post-op scenario and the two weeks post-op appearance (Fig. 3l). What are the basic surgical principles that must be adhered to in order to achieve this result and avoid complications?
In the centre is the branch of the lingual artery which, if breached, will cause copious bleeding and possible haemorrhage.

• Parts of the (L) and (R) submandibular duct and lingual salivary glands are seen at the lateral margins.

• If the excision is extended posteriorly, we will come across the hyglossous muscle, submandibular duct and lingual nerve (‘tiger country’). The yellow blob is a daughter cyst of the huge cyst emulated (Fig. 5d).

• Listopathology reported the specimen in Fig. 5d as a dermoid cyst. The dermoid cyst is a form of cystic teratoma derived principally from embryonic germinal epithelium which in some instances contains structures of other germ layers. Origin: Those cysts are presumed to be derived from enclavement of epithelial debris in the midline during the closure of the mandibular and hypobranchial arches. Some of the teeth within the cyst will be competing in next year’s Nobel Prize for Dentistry award.

• The incision is made submucosally in the gutter between the hyglossous and mylohyoid muscles in an anterior location avoiding the opening of the sublingual duct and the superficial lingual vessels. In this way, you are likely to avoid traumatising the lingual nerve, submandibular duct and lingual vessels.

• In Fig. 5c, notice the bloodless field achieved by careful dissection. The following structures are discernible in the operating field:

• Grenzlosoglossus, which forms the bulk of the tongue (seen superior to the yellow blob).

• The genioglossus muscle sitting on top of the mylohyoid muscle.

• Malignancies.

• Normal adipose tissue in the submental area.

• In the centre is the branch of the lingual artery which, if breached, will cause copious bleeding and possible haemorrhage.

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growing mass arising from the submucous connective tissue of the cheek. They are very soft and may exhibit pseudo-fluctuation. This particular lipoma in the naso-labial fold is fully mobile in the cheek when palpated.

c. Post-operative complications for this type of operation will include swelling, acute pain, haemotoma formation, ecchymosis, brisk haemorrhage, infections and wound dehiscence.

d. Basic principles to ensure a successful operation should include the following:

- Treatment planning—pre-operative anatomical assessment of the operative site is essential to anticipate and pre-empt difficulties and complications. Avoid important nerves and vessels by careful dissection.
- Aseptic technique and use of sterilised instruments.
- Careful eburnation of the lesion via sharp precise dissection. Do not breach the maxillary nerve.
- Metulous wound closure in layers after achieving complete haemostasis.
- Good post-operative after care and instructions, mouth wash, antibiotics and analgesics.

CASE 1C

This 52-year-old Chinese housewife presented around Chinese New Year Eve 2004 for a rapidly enlarging swelling which started some months back.

a. The facial asymmetry is highly obvious. Describe what you see? (Fig. 3m)

b. The intra-oral appearance looks bleak. Why? What features in Fig. 3n suggest that we are dealing with something aggressive, fulminating and probably malignant?

c. The X-ray appearance in Fig. 3o confirms our suspicions beyond doubt! What can you see in the (R) maxillary sinus?

d. We actually excised the lesion in toto after an initial incisional biopsy confirmed the photos were lost. What do you think we did?

CASE 1D

This 60-year-old Chinese businessman has had a growth in the (L) maxilla for the last five years:

a. What features in Fig. 3p suggest a benign growth in the (L) maxilla?

b. Fig. 3q (mirror image appearance) actually the growth is on the (L) side! What is it? Which tooth is the culprit?

c. The X-ray appearance confirms the benign nature in contrast with Fig. 3r. What features indicate its non-aggressive nature?

d. The growth was enucleated (Fig. 3s). Are you likely to encounter any vital structures in the maxilla?

e. The excised lesion Fig. 3t is quite typical. What can you see?

CASE 1E

This 74-year-old Malay housewife complained of trismus, pain of (L) jaw and inability to eat plus difficulty in swallowing saliva.

a. What can you see in Fig. 3u? What signs indicate that this is probably not an aggressive growth but inflammatory in nature?

b. Fig. 3v is the extra-oral presentation. Describe what you see and correlate it with your diagnosis.

c. The intra-oral appearance Fig. 3w confirms that this lesion is probably of infective origin. Why?

d. The X-ray view (Fig. 3x) is highly informative. What can you see? How does the appearance of the mandibular bone explain your findings in Fig. 3w?

CASE 1F

The patient has squamous cell carcinoma of the maxillary antrum which accounts for more than 90% of antral malignancies.

a. Compare Fig. 3y (extra-oral view) with Fig. 3z. Notice the following:

- Unilateral swelling of the (R) cheek. The overlying skin is glistening and taut owing to massive expansion of the underlying (R) maxillary sinus.
- The (R) angle of the mouth is pushed inferiorly and outward with complete loss of the nasolabial fold.
- The (R) eye is pushed upward (proptosed) with loss of demarcation of the lower eyelids.
- The (R) nostril is pushed inwardly and upwards.
- There is complete anaesthetic state of the infraorbital skin and lack of facial expression.

b. The intra-oral view (Fig. 3a) is highly indicative of an aggressive malignant lesion. Notice the central necrosis of the (R) dental-osseous process and the fungating red margins. The upper (R) posterior teeth have all been exfoliated with complete obliteration of the (R) buccal sulcus. The palate is deformed with loss of palatal vault contour.

c. The characteristic radiographic changes of antral mucosal malignancy include the following (Fig. 3b):
CASE 1E

a. Severe infections are uncommon in the mouth but this case took on a combination of the following forms—osteomyelitis, cellulitis and soft tissue abcess. Fig. 3a reveals soft tissue abcesses in the lower (L) lower molar region and left extra-oral submandibular abcess. (The history indicated that cellulitis had occurred here before the abcess appeared.) The first step in the management of this case is to determine that the patient is not medically compromised with diabetes or on immuno suppressive drugs or other chronic conditions.

f. Establishment of a differential diagnosis of abscesses can be methodically done with the following steps i.e., history, physical examination, diagnostic imaging and biopsies.

• History

Pain—Not a feature of cysts and tumours unless there is secondary infection or neural invasion.

Swelling—Persistent slow growth suggests an expanding lesion. Rapid growth suggests concurrent infection or an aggressive lesion.

Loss of Function—Trismus results from intra-capsular or extra-capsular TMJ disease. Extra-capsular causes of decreased function include inflammation of the muscles of mastication, paramanubral pain of any artiology and tumour invasion from the jaws into the surrounding soft tissues.

Sensory or Motor Changes—Altered or lost sensation along the distribution of V1, V2 or V3 indicates spreading infection, and invasive malignant or aggressive benign tumour.

Physical Examination: Inspection, palpation and thorough physical evaluation. Surface Changes—Is it chemical, traumatic, vesicular bullos, nesplastic, metabolic or inflammatory?

Swelling—Note the location, tissue and origin, time of onset, rate of enlargement, changes in size and relation to eating and jaw function.

X-ray examination

CASE 1D

Odontogenic cysts arise from epithelium concerned in tooth formation and comprise three main types—peridontal, den- tigorous and primordial. The pe- ridontal cysts form the majority of the adontogenic cysts. This pa- tient had a long-standing periodontal cyst arising from a non- vital upper (L) lateral incisor tooth.

a. Although the growth was allegedly present for at least 5 years, the only visible signs were splaying of the (L) maxil- lary anterior teeth and a distinct bulge of the (L) buccal sulcus. The colour and mark- ings of the labial mucosa are normal.

b. Visible and palpable expansion of the (L) palate is seen in Fig. 5g. Normally, this sort of swelling occurs with maxil- lary cysts related to the pos- teriorly inclined root of the lateral incisor and palatal roots of the first pre-molar and molar teeth. Notice the bluish tone of the palatal mucosa where the cyst had perforated the palatal bone and the labial proclination of tooth 21 and 22. Although tooth 22 is the culprit, tooth 21 has moved quite a bit labially. The swelling is confined to the left because of the midpalatal raphe and rugae.

c. The following features are highly indicative of a benign cystic growth (Fig. 5g).

• Minimal displacement of teeth with intact roots in a rounded clearly radiolucent area with a sharply defined outline.

• Unilocular lesion with clear condensed peripheral ra- diopaque margins or cortex.

• Surrounding structures and alveolar bones remain intact.

• No loss of teeth and dental tissue in spite of the size of the cyst.

d. In Fig. 5e, a trapezoidal mu- coperiosteal flap was raised from tooth 11 to tooth 26. The labial window was naturally created as it has become egg- shell in the thickness. Notice the smooth internal walls.

e. The specimen in Fig. 7t repre- sents the cyst wall and cap- sule. The cyst capsule con- tains collagenous fibrous con- nective tissue. There is mini- mal inflammatory infiltrate with evidence of areas split up by spaces and clefts (choles- terol clefts). The fluid had been evacuated but was wa- ter with a shimmering ap- pearance because of the cho- lesterol crystal effect.

• The only vital anatomical struc- tures of note in this operation would be the apices of the neighbouring teeth, the incisive canal and the (L) maxillary antrum. Avoid trau- matising the inferior lateral floor of the (L) maxilla and pos- sible perforation of the palatal mucosa.

Applied to the raw surface of the cheek flap and the ptery- goid fossa. This is important. If the inner surface of the flap is not grafted, the cheek will con- tract badly. A denture obtura- tor with black gutta percha stent is used to fill the cavity and the inner surface of the flap is applied to the raw surface of the cheek flap and the ptery- goid fossa. This is important. If the inner surface of the flap is not grafted, the cheek will contract badly. A denture obturator with black gutta percha stent is used to fill the cavity and give support to the cheek flap. The denture obturator is held in place by (R) and (L) circumzygomatic stainless steel wires.

CASE 2E

Patient has osteomyelitis of the mandible secondary to the (L) retro- molar area giving a classic view of the (L) buccal or lingual cortical plate. The lingual and buccal sulci are within normal limits. The tongue looks coated and furry, indicating an infective origin.

d. The X-ray view is highly unique (Fig. 5x). The patient has multiple “susak”. These are gold needles inserted by bombus (medicine men) in Asian women who believe that it will retard ageing and help maintain their attractiveness.

Notice the following in Fig. 5x:

• The sharp trabecular pattern of the bone is lost where bone had been resorbed and areas of ra- diolucency indicative of bone destruction have appeared. These areas extend from tooth 15 all the way to the (L) retro- molar area giving a classical appearance of bone with ill-defined margins resembling a fluffy or “moth-eaten” appearance.

• Patient has osteomyelitis of the mandible secondary to the “susak”. There were no obvi- ous dental causes. The princi- ples of management for this case were as follows:

• Bacteriological diagnosis via a specimen of pus

• Antibiotics—Clindamycin 300mg,bd x 10 days

• Incision and drainage of the infra-oral and extra-oral soft tissue abscesses.

• Removal of sequestra after infection was controlled. The key in this case was the Clindamycin, which in my expe- rience works beautifully in resolving osteomyelitis as seen in the post-treatment views of Fig. 5y and Fig. 5z. Notice the sequestra healing with no signs of scarring whatsoever. Osteomyelitis is a severe infection and must be treated with the utmost respect as it can cause the following complications: (a) Inferior dental nerve anaes- thesia, (b) pathological frac- ture, (c) cellulitis especially if stecptococi is involved and, (d) septic arthritism especially in older patients.

b. Visible and palpable expansion of the (L) palate is seen in Fig. 5g. Normally, this sort of swelling occurs with maxil- lary cysts related to the pos- teriorly inclined root of the lateral incisor and palatal roots of the first pre-molar and molar teeth. Notice the bluish tone of the palatal mucosa where the cyst had perforated the palatal bone and the labial proclination of tooth 21 and 22. Although tooth 22 is the culprit, tooth 21 has moved quite a bit labially. The swelling is confined to the left because of the midpalatal raphe and rugae.

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X-ray examination
Miniscrews—a focal point in practice

Six-part series by Dr Björn Ludwig, Dr Bettina Glasl, Dr Thomas Liezt & Prof. Jörg A. Lisson—Part I

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.

The basis and history of anchorage: the selection of screws

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 (1887), Newton specified that every action has an equal and opposite reaction. In dentofacial orthopaedics, this means that the tooth movement does, however, depend on the anchorage strength of the individual teeth, ie, 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 (Figs. 1.1).

In the case of minimal anchorage, the support is provided by the individual teeth. Figure 1.1a 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 1.1b 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. 1.1c), 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, ie, the type of anchorage location, plays a role:

1. dental or desmodontal support: for jaw orthopaedic appliances (nance, palatal arch, lingual arch, lip bumper);
2. extra-oral support: headgear; and
3. mesial 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.

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 onwards, various research groups (such as Creekmore, Roberts, and Turkey) took up the subject once more. Creekmore published the first clinically successful patient treatment case.

There are now numerous options for cortical anchorage (Fig. 1.2), including (artificial or pathologically) ankylosed teeth on the basis of miniplates normally used in crano-maxillo-facial surgery and the use of prosthetic implants. Vehrenhein and Glätzung were the first to present an implant system specifically designed for jaw orthopaedic (Orthosystem, Straumann)17). 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 meet these requirements favourably, in terms of:

- biocompatibility;
- small size;
- simplicity of insertion and use;
- primary stability;
- immediate load capacity;
- adequate resistance against orthopaedic forces;
- usability with standard orthopaedic appliances;
- independence of patient cooperation;
- clinically superior results in comparison with standard alloplastic implants;
- ease of removal; and
- cost-effectiveness.

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 thirty different terms for orthodontic screws are used in the international literature. The most common of these are mini-implant and miniscrew, while the terms miniaugment or pin are preferred when speaking to patients. At present, there are over thirty manufacturers of mini-screw systems (Fig. 1.5). 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.16,17

Ossos-integration

Bränemark was the first to define the concept of ossos-integration, which he described as “a direct functional and structural link between living bone tissue and the surface of a force-absorbing implant.”14 Several authors, such as Costa and Maino, view an-
choring a miniscrew not as osseo-integration, but as a skeletal resistance block. In the opinion of Cope and Bumann, miniscrews are anchored by mechanical stabilisation and not by osseo-integration.

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, ie, 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 inter-radicular level, the amount of space available prescribes the maximum diameter of the screw.

Poggio et al., Schnelle et al., and Costa et al. provide some suggestions as to the vertical space required, ie, 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.

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, ie, the threaded section. Like the diameter, the length of the screw selected depends on functional requirements of the biomechanism and the bone stability.

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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. Poggi et al.22 recommend lengths of 6 to 8 mm. Costa24,25 suggests mini-screws with a length of between 6 and 10 mm. Based on these studies, it would appear that it is 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 (FORSTADENT). 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;
- half-shaped heads;
- eyelets;
- simple slots;
- cross-shaped slots; and
- universal heads (Figs. 1.8).

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. 1.9).

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

During the immediate post-operative phase, the mucosa should be as close as possible to the screw, to seal the area. The most advantageous shape transgingival column is that of a cone, as this shape naturally results in a 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.

Conclusions
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 mini-screw 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 mini-screw for use in their practice from the large range on offer, they will need to review the literature thoroughly.37

Editorial note: A complete list of references is available from the publisher. The next edition of Dental Tribune Asia Pacific will feature Part II – Basic information on the insertion of mini-screws.

Contact Info
Dr Björn Ludwig can be reached at bludwig@kieferorthopaedie-mosel.de.

Figs. 1.9: Height difference of the screw head in two clinical situations.

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A ‘First Touch’ with new glove from Cranberry

At IDS 2009, Cranberry USA will present the latest in their range of high-quality nitrile medical gloves. The new Naturale, which is in-line with the company’s mission to design and market products with dental professionals’ health in mind, is the only Low Derma glove approved by the US Federal Food and Drug Administration, with low allergy and dermatitis potential due to the absence of accelerator chemicals, latex protein, and sulphur. Additionally, the glove features improved stretch for more comfort and good tensile properties for maximum protection.

According to the company, Naturale has passed chemotherapeutic drug permeation, viral penetration, and skin-sensitivity testing. Each pair of gloves is manufactured, examined, and packaged with zero direct skin contact exposure—the ‘First Touch’ approach—to prevent potential cross-contamination at source. In an average manufacturing process, a pair of gloves may be exposed to human skin up to eight times.

Naturale will be available from Cranberry to customers in the US and through dealers worldwide. www.cranberryusa.com

Most dental implants today are made of a single material, although integration into hard and soft tissue requires different materials. Because of this, the TBR Group in France has redefined dental implants and developed a hybrid system that optimises integration in both bone tissue and gingiva.

The result of this process will be exhibited at IDS 2009: the TBR Hybrid implant. This one-stage titanium implant with a zirconia trans- gingiva collar promises to be more resistant than a regular titanium implant because it combines the mechanical advantages of titanium in flexion and those of zirconia in compression, the company says.

According to Julien Benhamou, CEO of the TBR Group, following over seven years of studies and articles in the Journal of Oral and Maxillofacial Implants and the Journal of Applied Biomaterial and Biomechanics, his company found that zirconia is an optimal material for gingiva-integration because, compared with titanium, it features no significant bacterial colonisation. Additionally, it is dense, smooth as glass, and offers perfecte transparency for high aesthetic results.

“Titanium is recognised as a very adapted material for bone integration, but we saw that it was not the best material for gingiva integration with regard to bacterial colonisation, grey transparencies, and aesthetic results,” Benhamou said.

TBR’s new hybrid zirconia-titanium technology, which received the Frost and Sullivan Award for Technological Innovation in 2007, is available in 45 countries and will be shown at IDS 2009 in Cologne. It is CE certified and has received clearance from the US Food and Drug Administration.

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Filtek™ P90 was introduced in UAE through a two-day lecture in Abu Dhabi and Dubai with more than 200 attendees.

The country’s dental community was very eager to learn about the new 3M ESPE solution, which is already available in the market in Europe and the US, and also has been launched recently in the region in Lebanon and Kuwait. The invited dentists showed promising excitement for latest advancement in restorative dentistry and the market will be provided with the product immediately after the event.
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