Ten facts about dental implants

By Sebastian Saba DDS, Cert. Pros., FADI, FICD, Editor in Chief

Dental implant marketing often emphasizes “simplicity,” underplaying an inherent complexity in the product, procedure — and patient. Prosthetic dentistry is not simple. And patients rarely have simple problems. Potential complications can be far from simple to correct. To ease your learning curve with implant dentistry, following are some core variables that can be managed based on proven research.

1. Implant surface design: Choose implants that have micro-topography and bioactive surfaces that enhance bone contact and have macro-topography (overall shape) that better stabilize bone profiles with little or no crestal bone loss.

2. Abutment connections: Internal connections have simplified abutment insertion. And if the abutment-implant margin is kept shy of the implant outer surface, a connective tissue zone will develop. The result is improved bone preservation at the crest. Abutments should be torqued to position and have specifically designed abutment screws that support long-term stability.

3. Provisionalization phase: Once thought optional, today this step is a critical diagnostic and management tool used to verify osseointegration, occlusion, esthetics, soft-tissue management, hygiene, prosthetic design and abutment selection.

4. Prosthetic options — screw versus cement: Some companies emphasize a “simpler” and familiar cement-only option. But irretrievability — presence of subgingival cement — can be problematic. Plan your designs to minimize complications.

5. Earlier osseointegration and restorative phases: Improved implant surfaces and shapes support primary stability in bone and enhanced osseointegration. Early loading is becoming more feasible — choose cases carefully.

6. Soft- and hard-tissue management: Timely placement of provisionalals can influence the support and contour of tissue. Advancements in bone grafting and tissue preservation help preserve soft tissue, maintain anatomical bone contour and improve gingival esthetics.

7. Enhanced marketing: Implant dentistry is aggressively promoted. However, costs remain high for average-income patients. It’s critical that benefits a patient realizes far outlast any corresponding debt.

8. Technological improvements: Zirconia ceramics and CAD/CAM have created an explosion in design, customization and improved esthetics. Zirconium is doing for esthetics what titanium did for osseointegration.

9. Computer-guided implant therapy: You can’t deny the value of 3D software that helps measure and locate vital structures such as the mandibular nerve, sinus cavities and nasal floor. But most practices still rely primarily on conventional radiography.

10. Long-term studies: Implant companies provide education, solid research and ongoing support to customers (you). Incorporating up-to-date knowledge into the clinical variables you’re managing on a daily basis will enable you to achieve a predictable approach in your decision-making with dental implants.

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CBCT zones of the jaw
Bone quality related to implant location

By Souheil Hussein, Dubai

The causes of early implant failures during the osseointegration process include poor quality and quantity of bone and soft tissue, unfavorable bone and soft tissue, the patient's medical condition, the patient habits (bruxism, heavy long-term smoking, poor oral hygiene), other conditions, and the surgical technique. Inadequate surgical planning and techniques, surgical implant design and surface characteristics, implant position or location and unknown factors.

This article attempts to further investigate implant location as one of many factors in early stages of diagnosis that improves success rate in implant dentistry procedure. Predicting factors to implant complications in different jaw regions are discussed.

CBCT Zones D1 to D5 are formulated to better analyze implant dentistry procedure preparation during the diagnostic phase based on the location that has a logical sequence during examination of the alveolar ridge of both maxilla and mandible to have pre-existing information regarding the demands and the clinical requirements in different zones of the jaw. This article identifies the Hounsfeld units (HU) of different alveolar jaw regions, according to which dental implants can be inserted with better understanding of what to expect.

Five CBCT zones are identified in this article in a logical sequence: the discrete zone D1 being the anterior maxilla, the danger zone D2 being the posterior mandible, the death zone D3 being the anterior maxilla, the demand zone D4 being the posterior maxilla and the delicate zone D5 being the posterior maxilla that requires sinus lift procedure.

Table 1

<table>
<thead>
<tr>
<th>Zone</th>
<th>Total HU of different areas in the mouth</th>
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<tbody>
<tr>
<td>D1</td>
<td>14</td>
</tr>
<tr>
<td>D2</td>
<td>13</td>
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<tr>
<td>D3</td>
<td>10</td>
</tr>
<tr>
<td>D4</td>
<td>16</td>
</tr>
<tr>
<td>D5</td>
<td>13</td>
</tr>
</tbody>
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Table 2

<table>
<thead>
<tr>
<th>Zone</th>
<th>No. of Cases</th>
<th>Avg. HU per zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>14</td>
<td>655</td>
</tr>
<tr>
<td>2</td>
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<td>529</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>213</td>
</tr>
</tbody>
</table>

*Page 3*
venal bone and 1,320 and 1,560 HFU at the basal bone. The highest bone density in the maxilla was observed in the canine and premolar areas and maxillary tuberosity showed the lowest bone density. Density of the cortical bone was greater in the mandible than in the maxilla and showed a progressive increase from the incisor to the retromolar area.

D5, known as the sinus zone, is a bilateral zone of the alveolar ridge of posterior maxilla located at the base of the maxillary sinus from the second premolar to the pterygoid plates. There are certain common features of replacement of missing tooth or teeth (rarely two premolars and commonly one or two molars) with dental implants in this zone. It often relates to the degree of sinus pneumatization and vertical bone deficiency that may require supplemental surgical procedures in the subantral area in order to place endosseous implants.

This bilateral maxillary posterior zone that extends from the second premolar to the pterygoid plates is located at the base of the maxillary sinuses (antra of Highmore). Embryologically, the palate and the alveolar process of the maxilla form the barrier between the maxillary sinus and the oral cavity. The bone height between the floor of the maxillary sinus and the alveolar crest is routinely analysed in oral implantology when posterior maxillary implants are contemplated. An increase in sinus volume or sinus pneumatization after a loss of posterior tooth/teeth, often necessitates vertical bone augmentation with a sinus lift procedure. The bone of this region is also known to have compromised bone quality (types 3 and 4) that can increase an implant failure rate. The blood supply to the posterior maxilla derives from the posterior maxillary artery, the ascending pharyngeal branch of the external carotid artery, and the ascending palatine branch of the facial artery. An injury to the posterior superior alveolar artery during the lateral approach for subantral augmentation can cause haemorrhage that may require coagulation.

Materials and method
From a data base of 1,134 patients that were observed from seven months to eight years follow-up occlusal loading, 170 endosseous implants placed in posterior maxilla with sinus lift procedures respectively. Estimated HFU can assist the surgical phase, as the number of the ancillary procedures can be pre-estimated according to different areas in the mouth during the diagnostic phase.

Results
In the data table 1, out of 100 samples, demonstrated that the average HFU was the minimum HFU (213 HFU) and followed by D5 (518 HFU), D3 (654 HFU) and D2 (561 HFU) in ascending order respectively (Fig 1 and Table 1).

Discussion
There are few literature reports that attempt to study implant location, among a multitude of other factors, to determine its influence on the success or failure of dental implant treatment. Becker et al. evaluated 282 implants placed in the maxillary and mandibular molar positions in a prospective study. The six-year cumulative success rate (CSR) for maxillary posterior implants was 82.9 per cent, for mandibular posterior, 91.5 per cent. He concluded that CSR in the posterior regions is lower than usually reported for anterior regions of the maxilla and mandible due to differences in bone quality and quantity. Eckert et al. assessed 1,170 endosseous implants placed in partially edentulous jaws in a retrospective study: anterior maxilla, posterior maxilla, anterior mandible, and posterior mandible. In his report, the location of implants did not appear to have any effect on implant survival, implant fracture rate, screw loosening, or screw fracture. Parent et al. analysed 392 consecutively placed Branemark implants that were inserted in 152 partially edentulous posterior mandibles and restored with 36 crowns and 69 bridge restorations in a long-term retrospective study. The CSR of all implants in the posterior mandible was 89.0 per cent at six years.

Fewer complications were found in implant prostheses located exclusively in the premolar region versus molar and mixed molar–premolar implant restorations. Draghi investigated the location-related osseointegration of 673 implants placed in 169 patients that were observed from seven months to eight years follow-up occlusal loading. Implant osseointegration was 89.5 per cent in the anterior maxilla, 73.4 per cent in the posterior maxilla, 96.7 per cent in the anterior mandible, and 98.7 per cent in the posterior mandible. Moy et al. analysed implant failure rates and associated risk factors, observed implant failure of 8.16 per cent in the maxilla and 5.95 per cent in the mandible. Increased age (over 60) was strongly associated with the risk of implant failure. Bass et al. evaluating 305 patients with 1,907 implants over a three-year period, assessed the success rate of implants in the maxilla at 93.4 per cent and 97.2 per cent in the mandible. Poor bone quality played the major role in implant failure with bone quantity demonstrating less importance.

All presented reports agree to appear that the CSR of dental implants is generally high and that implant location plays an important role in implant success. CSR of implants in the mandible seems to be slightly higher than in the maxilla—a difference of about 4 per cent. The success rate of implants in the anterior regions seems to be higher than in the posterior regions of the jaws, mostly due to the quality of bone: about 12 per cent difference between anterior maxilla and posterior maxilla, and about 4 per cent difference between anterior mandible and posterior mandible. On the basis of reviewed literature reports, an implant treatment in the anterior mandible appears to be the most successful. The posterior maxilla appears to be the least successful region of the jaws for implant rehabilitation.

Conclusion
There is a trend of escalating levels of HFU in different parts of the oral cavity. The highest being the anterior mandible; followed by the posterior maxilla, posterior mandible, anterior maxilla and posterior maxilla with sinus lift procedure respectively. Estimated HFU can assist the surgical phase, as the number of the ancillary procedures can be pre-estimated according to different areas in the mouth during the diagnostic phase.
**Fundamental misconceptions about Dental implants among patients**

By Implant Magazine

Investigating patients’ knowledge and perceptions regarding implant therapy, a Chinese study has found that an alarming number of participants had inaccurate and unrealistic expectations about dental implants. Moreover, the study determined that only at per cent felt confident about the information they had about the treatment. In the study, the researchers investigated preoperative information levels, perceptions and expectations regarding implant therapy via a questionnaire. Responses from 277 patients were obtained during 2014 and 2015 in three different locations in China (Yixing, Sichuan and Jiangsu). The analyses established that about one third of the participants had mistaken assumptions about dental implants.

The study, titled “What do patients expect from treatment with dental implants?” was published online ahead of print on 23 March in the Clinical Oral Implants Research journal.

**Increase in caries rates after Fluoridation cessation**

By Implant Magazine

Community water fluoridation is a matter of debate around the globe. While it is used widely in North America, many European countries have stopped the practice. Owing to a lack of contemporary research on fluoridation cessation, however, researchers in Canada have now investigated its impact on dental caries experience.

In Canada, community water fluoridation has been in place since 1945. In a recently published study, researchers at the University of Calgary thereupon compared changes in caries experience in schoolchildren in Calgary with those in Edmonton, which has fluoridated its community water since 1967. In examining data sets from the school years of 2004/2005 and 2013/2014, the researchers observed an overall increase in primary caries rates.

The researchers focused on smooth tooth surfaces, where fluoride is most likely to have an impact.

The study titled “Measuring the short-term impact of fluoridation cessation on dental caries in Grade 2 children using tooth surface indices,” was published online on Feb. 17 in the Community Dentistry and Oral Epidemiology journal ahead of print.