An Introduction to Dental Implants

**Aims:** This article provides an introduction to dental implants, outlining the categories of dental implants, the phases involved in implant dentistry and assessing a patient for implants.

**Objectives:**

On completion of this verifiable CPD article, the participant will be able to demonstrate, through completion of a questionnaire, the ability to:

- Identify the different categories of dental implants
- Identify the different phases of implant dentistry
- Identify some of the factors considered in the assessment and planning of an implant

**Introduction**

Dental implants are widely used and have proved to be a valid treatment with a high success rate.\(^1\) This high rate is due to the ability of the implanted material to integrate with the surrounding bone.\(^2\) Dental implants are used in restoring completely edentulous jaws as well as in replacing single and multiple missing teeth. Dental implants may be an option for people who have lost a tooth or teeth due to periodontal disease, an injury, or some other reason.

The dental implant, typically made of titanium, is a safe and proven effective replacement for the tooth root, the very foundation of a natural tooth. Because it is placed in the jawbone and fuses, or integrates with, the natural bone, the dental implant forms the stable and sturdy base for the replacement teeth.\(^3\)

**Categories of Dental Implants**

There are three main categories of dental implants:

- **Endosseous** implants are placed in the jawbone. This is the most commonly used type of implant. The various types include screws, cylinders or blades surgically placed into the jawbone and generally made of titanium. Each implant holds one or more prosthetic teeth. This type of implant is generally used as an alternative for patients with bridges or removable dentures. Endosseous osseointegrated implants have today become the norm for the replacement of missing teeth. There are many implant systems on the market based on the concept of osseointegration. The concept was originally
introduced by a Swedish research team headed by Per Ingvar Branemark in 1952.\textsuperscript{4}

**Endosseous Implant**\textsuperscript{5}

- **Subperiosteal** implants are placed under the gum but on, or above, the jawbone. This type of implant may be used in patients who have a shallow jawbone or severely resorbed jawbone and cannot or do not want to undergo a procedure to rebuild it. This type of implant has been in use successfully for the past 30 years and has the longest period of clinical use of any implant. The implant is custom made to each individual jaw and is made of a metal framework, shaped according to the jaw anatomy and surgically inserted underneath the periosteum. On completion of the surgery, the metal inserts or bar visibly project from the gingival tissue. The denture carries an internal attachment which clips onto the projecting inserts, thus aiding retention.\textsuperscript{4}

**Subperiosteal Implant**\textsuperscript{6}
• **Transosseous** implants are designed mainly for use in the mandible and are surgically inserted into the jaw bone; however, they penetrate through the entire jaw so that they emerge opposite the entry site, most commonly through the jaw at the bottom of the chin. At this site they are secured with a pressure plate and nut. Two long screws penetrate the jaw bone and emerge from the gingival tissue. Separate attachments are placed on the screws projecting from the gingiva onto which the prosthesis is retained. These implants require an extra-oral surgical approach and often necessitate the use of general anaesthesia. They are a type of endosseous implant as they are screwed through the jaw bone. The success rates of these implants has remained questionable. Therefore, this in conjunction with the complexity of the procedure has resulted in the demise of these implants especially as other endosseous implants are much more reliable.4

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**Transosseous implants**

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**Implant Restorations**

There are two phases to placing an implant, the surgical phase and the prosthetic phase. The surgical phase involves all the procedures that are necessary to place the implant into the jaw bone to facilitate the prosthetic phase. The prosthetic phase includes everything required to put a tooth or teeth on top of the implant.

Following the surgical phase the implant is allowed to integrate with the jaw bone for a period of up to 6 months. However, advancing technology has reduced the waiting time to 8 weeks or less. Once the integrated implant is ready for the prosthetic phase, the prosthesis can be either fixed to the implants or removable.

The prosthetic component normally comprises the abutments and screws. The abutment connects directly to the top of the implant and extends through the gingiva to the oral cavity. An abutment screw is used to connect the abutment to the implant. The crown is then either screwed onto the abutment with a prosthetic screw or cemented onto the abutment. Sometimes the crown and abutment can be made in one piece and screwed directly into the implant. The fitting surface of the abutments will contain a matching hex surface that enables accurate seating of the abutment onto the implant.4
Assessing a Patient for Implants

Before the placing an implant, a considerable amount of surgery time is used to undertake a preoperative and pre-treatment plan with the patient. This time ensures that the patient can make a fully informed decision about the treatment and that the clinician can identify the level of the patient's compliance, motivation and dental awareness. A full medical and dental history is taken.

Extra Oral Assessment

Examination of the patient begins with an extra-oral assessment. A standard approach, including checking for any swellings of the head and neck region and palpation of the temporomandibular joints and musculature, is performed. Particular attention should be placed on the degree of mouth opening, as the instrumentation involved with various stages of implant therapy requires the patient to be able to open wide. This is especially true when considering the use of handpieces and screwdrivers in the area of the posterior dentition. Assessment of the smile line and how much gingival tissue is exposed should also be carried out. Problems in achieving a satisfactory aesthetic result can be anticipated by assessing how much of the teeth and gingival tissues are exposed.6

An assessment of facial and dental asymmetry should also form part of the extra-oral assessment.

Intra Oral Assessment

Intra-orally, an assessment of the soft tissues, the periodontium including an evaluation of the oral hygiene, gingival health, pocket depths, restored and unrestored teeth, any drifting or overeruption, any prosthesis worn and the occlusion.4 The gingival margin profile should be looked at in dentate patients when replacing teeth in the anterior region. In some circumstances predicting the final gingival contour dictates the position and choice of implant, as well as the need for additional hard and soft tissue surgery.
Radiographic Assessment

Radiographs are taken to provide information relating to bone volume, the angulation of adjacent tooth roots, any pathology that may be present around existing roots of teeth and the presence of unerupted teeth. There are other anatomical structures that are also examined. Generally, panoramic and intra-oral radiographs are used the choice is decided by the specific clinical case. In more recent years some clinicians use cross-sectional imaging such as computed tomography (CT) or cone beam computed tomography (CBCT) to create a three-dimensional image of the mandible and maxilla. This is increasingly becoming the standard diagnostic technique for clinicians. Data from CT and CBCT can be used with CAD-CAM software to assist in implant treatment planning.

The European Association for Osseointegration provide the following guidelines to summarise the recommended standard radiographic techniques to be used in implant planning in different areas of the mouth.

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Study Models and Diagnostic Set Up

Impressions are taken to create accurate articulated models that allow the clinician to measure many factors. They also allow a diagnostic wax-up of the proposed restorations which aids in planning the position and number of implants that the teeth on the final prosthesis and that they are positioned correctly. A try-in of the teeth in wax can also be produced so that the patient can gain a further understanding of what the final restoration will look like.

Conclusion

This article provides an introduction to dental implants and the treatment planning stage of the treatment. Due to the complex nature of this subject it is necessary to provide a series of articles to fully cover the subject therefore, further articles on this subject will follow in due course.

The following article written by Reena Wadia discusses how to access and maintain dental implants and provides excellent further reading as part of this verifiable CPD. Reproduced with permission from Reena Wadia.
HOW TO: ASSESS AND MAINTAIN DENTAL IMPLANTS

In her third article for BDJ Student, Reena Wadia discusses how to assess and maintain implants.

Over the past decade, implantology has become an indispensable part of mainstream dentistry. I’m sure you’ve already assessed many patients with dental implants during your undergraduate clinics. If you haven’t, you will very soon.

Below are my answers to five commonly asked questions about dental implants, including their assessment and maintenance.

1 What are the components of an implant?
An implant consists of an osseous part that interacts with the bone, a transmucosal component that emerges through the mucosa and then the restoration, such as a crown, bridge or attachment for a denture. Implants are usually made from commercially pure titanium or titanium alloys. There are some newer implants made of zirconium (also a metal) but there are no long-term clinical trials for these as yet. Implants are generally threaded but have many design variations.

2 What should my assessment involve?
   i) Always make a note of the oral hygiene of the patient, as well as the tone, colour and texture of the peri-implant tissues.

‘Peri-implant disease is arguably one of the most significant risks associated with implants. It is a multifactorial disease that, if not diagnosed at an early stage, can ultimately lead to failure of the implant.’

ii) Gentle probing should be carried out routinely. Probing depths may differ around implants, owing to the depth that the implant has been placed. Therefore, probing depths around implants can sometimes be deeper than around teeth and still be healthy. Look out for any bleeding or suppuration on probing.

iii) If you detect a particularly deep periodontal pocket and there are signs of inflammation, a radiograph is recommended to evaluate any bone loss. Two millimetres of bone loss is generally acceptable in the first year, and 0.2 mm each year after.

3 What is peri-implant disease?
Peri-implant disease includes both peri-implant mucositis and peri-implantitis. Peri-implant mucositis is a reversible inflammatory reaction in the soft tissues surrounding a functional implant. Peri-implantitis is an inflammatory reaction associated with loss of surrounding bone around an implant. Peri-implant disease is arguably one of the most significant risks associated with implants. It is a multifactorial disease that, if not diagnosed at an early stage, can ultimately lead to failure of the implant. Treatment of peri-implant disease depends on the specific case and the aims of treatment. However, the treatment of peri-implantitis usually involves some form of surgery.

4 How do I maintain dental implants?
It is particularly important to go through oral hygiene instructions with your patients. To maintain good gingival health, patients have to understand they need to clean underneath the reconstruction especially around molar teeth where the crown is much wider than the abutment. Using a single tufted brush for awkward areas can help improve plaque control.

There is no real consensus on which instruments are best to use to clean implants but plastic tipped inserts are now available to use with ultrasonic scalers. Hand instruments can be used gently being careful not to damage the titanium abutment.

5 How often should I be reviewing patients with dental implants?
Patients who have implants and a history of periodontitis should be seen once every three months and have six-point probing charts recorded on an annual basis. This may be more often if there are signs of problems. Other patients can be seen less often depending on their susceptibility to peri-implant disease but generally patients with implants should be seen at least twice a year.

Dr Reena Wadia
CV

1987 Born in London
2011 Graduated from Barts and The London
2011-2012 DF1 at MK Vasant & Associates
2012-2013 DF2 in Restorative Dentistry and Oral Surgery at Guy’s Hospital
2013-2014 Associate at Pure Periodontics
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   STIR in Periodontology at Guy’s Hospital
   Associate at Harley Street Dental Group and Woodford Dental Care

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Clinical Tutor at Barts & The London
BDA Committee Member, Croydon
FGDP Board Member, Central London
References