

Introduction

Dental implants are used to replace both the form and the function of missing teeth. In the case of existing teeth, the tooth root holds the tooth in place. When a tooth has been lost due to infection, gum disease, an accident, or injury, a dental implant can be used in order to replace the tooth root and secure an artificial replacement for the tooth.

The actual dental implant is a metal screw designed to thread into the jawbone and allow for the attachment of a variety of prosthetic dental replacements. Most of the time, the implant is made of medical grade titanium or a titanium alloy. Titanium is used due to its excellent compatibility with human biology. Tens of thousands of dental implant procedures are performed every year.

Forms of dental implant procedures have been performed for thousands of years. Egyptian mummies have been discovered with gold wire implants in their jawbones, and pre-Columbian skeletal remains have even shown dental implants made of semi-precious stones.

In Europe, ancient Roman soldiers have been found with iron dental implants. In the Middle East, remains have been unearthed exhibiting ivory dental implants dating back to the Middle Ages.

Dental implants can be used for a variety of replacement situations. The implants may be used to replace one single tooth, eliminating the need to grind down and alter adjacent teeth. On the other hand, they can be used to support replacement teeth for mouths which are entirely toothless. Dental implants can be used as anchors to provide support for a fixed bridge, or to provide stability for a complete denture set,

eliminating unsightly and bothersome moving and/or clicking associated with dentures.

Predictable formation of a direct bone-to implant interface is a treatment goal in implant dentistry. For this purpose, the existence of appropriate bone quality and quantity is necessary and important.¹

Loss of alveolar bone may occur prior to tooth extraction because of periodontal disease, peri apical pathology, or trauma to teeth and bone. Damage to the bone tissues during tooth extraction procedures may also result in bone loss. Finally, alveolar bone atrophy after tooth extraction is a well-known phenomenon.

Sufficient alveolar bone volume and favorable architecture of the alveolar ridge are essential to obtain ideal functional and esthetic prosthetic reconstruction following implant therapy.¹

Four methods have been described to increase the rate of bone formation and to augment bone volume: osteoinduction using appropriate growth factors,² osteoconduction where a grafting material serves as a scaffold for new bone growth,³ distraction osteogenesis by which a fracture is surgically induced and the two fragments are then slowly pulled apart⁴ and finally, guided bone regeneration (GBR) which allows spaces maintained by barrier membranes to be filled with new bone.⁵ The membrane must also protect the clot from being disturbed by movement of the overlying flap during healing. It is therefore often, but not always, fixed into position with sutures, mini bone screws, or bone tacks. Sometimes, the edges of the membrane are simply tucked beneath the margins of the flaps at the time of closure, providing stabilization.