AMERICAN COLLEGE OF PROSTHODONTISTS
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Position Statement

Use of Implants in the Pterygoid Region for Prosthodontic Treatment

Placement of implants in the posterior maxilla is challenging due to the quality and quantity of available native bone and the presence of the maxillary sinus.[1,2] Common methods to mitigate implant placement in the posterior maxilla are direct sinus membrane elevation ("lateral window sinus lift") and indirect sinus membrane elevation ("internal sinus lift"). These methods provide a good survival rate for dental implants, according to studies in the scientific literature.[3,4] However, they have a number of disadvantages that preclude some patients from being able to benefit from implant therapy. These disadvantages include higher surgical morbidity, need for bone grafting, and increased treatment cost and time. Additionally, they do not allow immediate loading/function in edentulous patients.

Though the maxillary tuberosity is known to have the lowest bone density in the oral cavity, it rests against a denser mass of cortical bone formed by the pyramidal process of palatine bone and the pterygoid process of the sphenoid bone.[1,2] In 1989 Tulasne identified this anatomic advantage and first described the use of dental implants in the pterygomaxillary region.[1] Depending upon each clinical situation, implant placement in the posterior maxillary region can encompass one, two, or all three of the following anatomic structures: maxillary tuberosity, pyramidal process of palatine bone, and the pterygoid process of the sphenoid bone.[5] Therefore, by definition, all 'pterygoid implants' encompass the tuberosity region, but all 'tuberosity implants' do not necessarily engage the pterygoid process.[6] The pyramidal and pterygoid processes are composed of dense cortical bone, and the average thickness of bone at their juncture is between 6 and 6.7 mm.[7,8] If an implant is passed through this juncture at an angle of 45°, it can incorporate up to 8 to 9 mm of dense cortical bone, and its apex protrudes 2 mm into the pterygoid fossa.[7]

The scientific literature on the survival of implants placed in the pterygoid region is similar to other alternatives in this region. A systematic review in 2011 indicated a 92% short-term survival rate.[6] However, these baseline findings included data on machined (obsolete older surfaces) and modern micro-roughened surfaces. A more recent study focusing exclusively on implants with micro-roughened surfaces reported a 3-year survival rate of 99%.[9] This was similar to another study in 2005 that reported a survival rate of 98.6%.[10] Nevertheless, long-term data (>10 years) on pterygoid implants is scarce, as is the case for any other type of dental implant in clinical use today. The surgical complications related to pterygoid implants are largely related to the complex anatomy of the region. Common surgical complications reported in the literature are unremarkable and include hemorrhage, trismus, and pain, all of which can be managed adequately.[6]

The primary reason for using implants in the pterygoid region is the availability of dense cortical bone for implant engagement.[1,2,7,11] It also helps to overcome the need for maxillary sinus elevation and bone grafting procedures.[2,11] Surgical placement of pterygoid implants is straightforward for an experienced clinician and can be performed under local anesthesia in a dental office.[7] This is in contrast to zygomatic implants, which usually entail a larger surgical procedure and require sedation or general anesthesia.[12] This can shorten the treatment time and allows immediate loading of the pterygoid implant.[10] Furthermore, it allows the fabrication of a partial arch or complete arch prosthesis, allows for sufficient posterior extensions, eliminating the need for detrimental distal cantilevers, and is biomechanically advantageous.[6,10,11] However, the disadvantages of the pterygoid implant are the learning curve and technique sensitivity associated with the procedure and proximity to certain vital anatomic structures. Clinicians must understand surgical anatomy before placement of implants in this region.[6] Additionally, use of cone beam computed tomography (CBCT) imaging is helpful during treatment planning. Due to the significant posterior location of these implants, they are more challenging to access for clinicians and patients.[1,2,10,11] The use of non-angulated abutments is helpful to mitigate the access in complete arch fixed prostheses. Non-angulated abutments allow a rotational path of insertion of the prosthesis. Additionally, it is radiographically difficult to assess the marginal bone loss around these implants due to their position.[6] Pterygoid implants are indicated for patients with partially edentulous arches,[11] completely edentulous arches,[13] or maxillectomy defects.[14] They are especially helpful in maxillary complete arch fixed implant-supported prosthetic rehabilitation when four implants do not adequately provide distribution of forces and prosthetic support. They are contraindicated in patients with trismus or reduced mouth opening and are not feasible when the maxillary tuberosity is absent or when the presence of an impacted maxillary third molar obliterates access to the pterygomaxillary region.

It is the position of the American College of Prosthodontists that implants in the pterygoid region offer a scientifically validated and predictable treatment option. Pterygoid implants help to overcome the need for maxillary sinus elevation and bone grafting procedures and may simplify the surgical phase of prosthodontic treatment. Pterygoid implants can also shorten the treatment time and allow immediate function for the edentulous patient; however, clinicians should understand the special surgical anatomy before placement of implants in this region and be prepared to manage potential surgical and prosthodontic complications. Patient education is paramount, and as for any other prosthodontic treatment procedure, dentists should discuss advantages, disadvantages, alternative treatment options, risks/complications, sequence, and approximate cost of treatment before obtaining a patient's informed consent.

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