



A REVIEW ON PTERYGOID IMPLANTS AND SELECTION CRITERIA

Dentistry

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ABSTRACT

There is a high failure rate in implants that are placed in the posterior atrophic maxilla. That also occurs with those placed in type IV bone (thin cortical bone around poor density trabecular bone). However, there is a higher predictability while placing implants in the pterygoid plate. These implants can help to gain the stability of the prosthetic system when we are going through this kind of clinical situation. The aim of this article is to review the procedure of implant placement within the pterygoid plate. We tend to develop the applied anatomy concepts in this area, and a surgical and prosthetic protocol for this special approach additionally. The surgical protocol includes the cortical anchorage of the implant into the pterygoid plate. To achieve this goal the fixture must be placed within the occlusal plane angulation, in such a way as to make contact with the three bones: the maxilla, the palatine bone, and the pterygoid plate of the sphenoid bone. The prosthetic protocol also includes some variations. For example, we must take the impression directly from the implant, instead of taking it from the abutment. These changes improve the biomechanical conditions of the implants.

KEYWORDS

Dental implants, Pterygoid plate, atrophic maxilla.

INTRODUCTION

Dental implants are widely used for the replacement of missing teeth. However, dental rehabilitation of patients with severe atrophy of the maxillary posterior region due to various factors like lack of bone volume, pneumatization of the maxillary sinus, presence of type III and IV bone, etc., has been made it very challenging. 1

Under such compromised considerations, the pterygomaxillary area has been considered for implant placement due to the large quality of cortical bone. 2,3

Tulsane and Tessier were the first to describe pterygoid implants in 1992. 4,5 A pterygoid implant can be defined as an implant placed through the maxillary tuberosity and into the pterygoid place by GOMS (Glossary of oral and maxillofacial surgery) 6

The use of these pterygoid implants eliminates the need for sinus lift procedures, GBR, grafting, etc, thereby saving valuable treatment time and reducing the number of appointments. They are especially used in partial edentulism in order to avoid distal cantilevers. 5

In this article, we will carry out a review of the literature regarding the history, surgical protocol, prosthetic loading, and healing of pterygoid implants.

History

Paul Tessier proposed the idea of placing implants in the pterygoid region in 1989 4 and was described by Tulsane in 1992. 6

It was considered as a less invasive procedure by Vila -Biasca et al in 1999. 7 A detailed description of the technique and prosthetic procedure was developed by Mateos et al in 2002. 8

Ridell in 2002 concluded that pterygoid implants can be used as an alternative to more extensive surgeries (e.g: sinus lift procedures) 9 and augmentation procedures. 10

X Rodriguez in 2015, suggested that the minimum implant length should be atleast 15mm to take advantage of the quality and quantity of the bone in this region. 11

Anatomy

The 3 major bones associated with the insertion of pterygoid implants are: 8

1. Pterygoid process of the sphenoid bone
2. Maxillary bone
3. Palatine bone

The pterygoid process is 2 small bony columns which are located at the

bottom of the sphenoid bone and there is a pterygoid notch in which the pyramidal process of the palatine bone gets articulated. 12

The posterior edge of the maxilla is rounded and very thick, which is called maxillary tuberosity. 13 Its upper half is smooth and it forms the anterior wall of the pterygomaxillary fossa.

In its lower half, it is covered with roughness to articulate with the palatine bone and it is the point where the posterior palatine canal is present, into which the anterior palatine nerve descends.

Palatine bone

- The anterior surface adapts against the internal face of the maxilla
- The posterior surface adapts against a pterygoid process Vertical portion of palatine bone has 4 edges
- Anterior- very thin, adapt against the maxillary internal face. From its middle part, comes a tab that covers the posterior part of the maxillary sinus
- Posterior- articulates with the medial aspect of the pterygoid process
- The triquetral process of palate, emerges from the lower edge and runs backward and outwards toward the space between 2 wings of the pterygoid process

Special attention should be given to the inferior maxillary artery, which lies 10-23.5 mm above the pterygomaxillary suture. 14,15 Also, GP canal and nerve should be paid attention while placing the implant. 5

Surgical Procedure

Pre-operative clinical evaluation and radiological study

- ↓
- Premedication and LA
- ↓
- Median supracrestal incision(should extend the most posterior part of tuberosity from PM region) and vertical discharge (relieving) incision at an anterior level.
- ↓
- Reflect mucoperiosteal flap which completely exposes the tuberosity
- ↓
- Palpate the hamular process with the index finger of assisting hand
- ↓
- Drill at 45 angulation to occlusal plane 3-5 mm in the lateral direction 6,16
- ↓
- The drill will find dense cortical bone at a depth of about 10-15 mm (It results in a decrease in speed due to an increase in bone density)
- ↓
- Implant is inserted

Adapt the flaps and sutures to be placed

2nd surgery –

Transepithelial pillar connection surgery - Performed after 6 months of surgery 17

↓
Raise the flap through a palatinized supracrestal incision

↓
This gives access to the coronal part of an implant

↓
It will allow to remove of the cover screw and protect the internal thread from intraosseous fixation

↓
Place healing abutment after checking torque (min20N/cm)

↓
Reduce the thickness of soft tissue to a maximum of 3-4mm 18

↓
Suture the flap

Determination Of Length Of Implant

If 'X' is the distance from the access point of the maxilla to the posterior edge of the maxillary tuberosity, then variations in cos b will determine 'Y' i.e., the length of the implant.

Eg: If $x=10\text{mm}$

Angle of approach = 45°

Then $\cos 45^\circ = 0.70$

So, $Y = 10/0.70 = 14.28$

So, we should choose a 14mm implant.

Prosthetic Protocol

A 2 step direct impression technique is done using open trays with the help of putty and light body impression material after splinting of multiunit impression copings.

Multiunit impression analogs are attached to implant copings

↓
The gingival mask is placed around the implant's analog

↓
To form the final cast, die stone is poured

↓
Jig trial, jaw relation and bite registration are recorded and sent to the lab CAD-CAM designing of screw-retained fixed prosthesis.

↓
Metal trial and bisque trial

↓
Final prosthesis

CONCLUSION

Pterygoid implants are a boon for rehabilitation of the maxillary posterior region, even in severe bone resorption, sinus pneumatization cases, etc.

It is a complex procedure, requiring precise anatomical knowledge and surgical skill. In literature, the highest success rate of pterygoid implants has been mentioned. With proper anatomic knowledge, skill and protocol, they can be the ray of hope for thousands of people with the atrophic posterior maxilla.

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