

REVIEW ARTICLE

Preprosthetic Surgery - An Overview

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ABSTRACT

The preparation of your mouth before the placement of a denture (or prosthesis) is referred to as preprosthetic surgery. The aim of preprosthetic surgery is to prepare the soft and hard tissues of the jaws for a comfortable prosthesis that will restore oral function, esthetics, and facial form. It helps to restore the function of the jaws (mastication of food, speech, and swallowing), preserve or improve jaw structure, improve the patient's sense of well-being, and improve facial esthetics. One of several procedures might be performed to prepare the mouth for a denture, which includes bone smoothing and reshaping, removal of excess bone, and removal of excess gum tissue. This paper reviews these major procedures briefly outlining the surgical procedure, and discusses the indications and techniques of these procedures.

Keywords: Esthetics, preprosthetic, prosthesis.

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INTRODUCTION

The preparation of your mouth before the placement of a denture (or prosthesis) is referred to as preprosthetic surgery. Some patients require minor oral surgical procedures before receiving a partial or complete denture, to ensure

the maximum level of comfort. A denture sits on the bone ridge, so it is very important that the bone is the proper shape and size.^[1] One of several procedures might need to be performed to prepare your mouth for a denture including bone smoothing and reshaping, removal of excess bone, and/or removal of excess gum tissue.^[2] In the average person, satisfactory dentures can be constructed without many difficulties a few weeks or months after being rendered fully edentulous and such dentures usually render several years of trouble-free service.^[3,4] The alveolar process initially develops as the teeth calcify and erupt, a phenomenon that takes place with both the primary and permanent dentitions. This process stimulates the alveolar process to grow and leads to the shape of the fully grown jaws of the adult.^[5] This growth is a result of the remodeling of bone and, as in the whole skeleton, is brought about by the processes of resorption and deposition. As soon as the physiological function of the teeth is lost, there is no longer a functional stimulation of the alveolar process, and the resorption process becomes dominant.^[6]

Differences in the shape of the upper and lower alveolar ridges result in:^[7]

1. A reduction in the height of the residual ridges.
2. An increase in interarch distance.
3. A prognathic mandible in prole.
4. In the horizontal plane, the maxillary arch becomes narrower and the mandibular arch wider as resorption progresses.

TYPES OF PREPROSTHETIC SURGERY^[8]

- Respective
- Recontouring
- Augmentation.

Involved Areas

- Osseous tissues
- Soft tissues.

Category of Patient

- Completely edentulous patient
- Partially edentulous patient.

Alteration of Alveolar Bone

- Removing of undesirable features/contours
- Osseous plasty/shaping/recontouring
- Bone reductions

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- Bone repositioning
- Bone grafting.

Soft Tissue Modifications

- Soft tissue plasty/recontouring
- Soft tissue reductions
- Soft tissue excisions
- Soft tissue repositioning
- Soft tissue grafting.

OBJECTIVE OF PREPROSTHETIC SURGERY^[9]

Correcting conditions that preclude optimal prosthetic function

- Hyperplastic replacement of resorbed ridges
- Unfavorably located frenular attachments
- Bony prominences undercut.

ALVEOLOPLASTY

An alveoloplasty (also referred to as alveoplasty) is a surgical procedure used to smooth and reshape a patient's jawbone in areas where teeth have been extracted or otherwise lost.

The purpose of this procedure can be two-fold:

- When performed before (partial or complete) denture construction, it is used to optimize the shape of the patient's jawbone (ridge) so to avoid complications with appliance insertion, comfort, stability, and/or retention.
- When performed in association with tooth extractions, it also establishes a jawbone shape that helps to facilitate the healing process that follows.
- An alveoplasty also aims to facilitate the healing procedure as well as the successful placement of a future prosthetic restoration.

Faster healing is important for certain people, such as cancer patients. They may need to have decayed teeth extracted before they receive radiation therapy to the head or neck. Radiation can "dry up" the salivary glands and reduce blood flow to the jaw, increasing the risk of further decay and infection of the jaw bones (osteoradionecrosis). Once the teeth are removed, radiation therapy cannot begin until the sockets are healed.^[10-17]

REDUCTION OF GENIAL TUBERCLE

The genial tubercles are extremely prominent as a result of advanced ridge reduction in the anterior part of the body of the mandible. If the activity of the genioglossus muscle has a tendency to displace the lower denture, the genial tubercle is removed and the genioglossus muscle detached.^[18] Genial tubercles are the bony projections located on the lingual aspect of the mandible, two on

either side of the midline, which gives attachment to the genial muscles. The two genial tubercles located superiorly are more prominent than the inferior ones due to the gross resorption of the mandibular ridge.^[19] This may elevate the ridge lingually, giving a shelf-like appearance and making the anterior lingual seal impossible. Genial tubercles are exposed by blunt dissection. Using bur, chisel, or rongeurs, the tubercle is removed, and the rough bony margins are smoothed using file.^[4]

VESTIBULOPLASTY

Vestibuloplasty should be performed in case of the shallow vestibule to widen denture-bearing area. There vestibuloplasty should be performed in case of the shallow vestibule to widen denture-bearing area. There are different techniques of vestibuloplasty. Most of them provide access from the buccal aspect of the mandible.^[4]

KAZANJIAN VESTIBULOPLASTY

A mucosal flap pedicled from the alveolar ridge is elevated from the underlying tissue and sutured to the depth of the vestibule. The inner portion of the lip is allowed to heal by secondary epithelialization.^[4]

CLARK VESTIBULOPLASTY

Clark's vestibuloplasty technique uses mucosa pedicled from the lip. Horizontal incision is performed from canine to canine between immobile gingiva and mobile gingiva.^[4] After supraperiosteal dissection, the mucosa is sutured at the depth of the vestibule. The denuded periosteum heals by secondary epithelialization. It is possible to use tissue graft on exposed periosteum. The healing process is more rapid in this situation.^[3]

CORN VESTIBULOPLASTY

This vestibuloplasty is similar to Clark's vestibuloplasty. Difference: Horizontal incision is through soft tissue/mucosa and periosteum/to the mucoperiosteal flap is dissected, and the bone is exposed. Disadvantages: More painful procedure; the healing process is longer.^[3]

OBWEGESER VESTIBULOPLASTY

Vestibuloplasty described by Obwegeser is the method in which labial extension procedure and Trauner's procedure provide a maximal vestibular extension to both the buccal and lingual aspects of the mandible.^[3]

MAXILLARY TUBEROSITY REDUCTION: (SOFT TISSUE)

The primary objective of soft tissue maxillary tuberosity reduction is to provide adequate interarch space for

proper denture construction in the posterior area and a firm mucosal base of consistent thickness over the alveolar ridge denture-bearing area.^[3] Maxillary tuberosity reduction may require the removal of soft tissue and bone to achieve the desired result. The amount of soft tissue available for reduction can often be determined by evaluating a presurgical panoramic radiograph.^[3] Local anesthetic infiltration in the posterior maxillary area is sufficient for a tuberosity reduction.^[20] An initial elliptical incision is made over the tuberosity in the area requiring reduction, and this section of tissue is removed. After tissue removal, the medial and lateral margins of the excision must be thinned to remove excess soft tissue, which allows further soft tissue reduction and provides a tension-free soft tissue closure. This can be accomplished by digital pressure on the mucosal surface of the adjacent tissue while sharply excising tissue tangential to the mucosal surface. After the flaps are thinned, digital pressure can be used to approximate the tissue to evaluate the vertical reduction that has been accomplished.^[21] If the adequate tissue has been removed, the area is sutured with interrupted or continuous suturing techniques. If too much tissue has been removed, no attempt should be made to close the wound primarily. Sutures are removed in 5–7 days and impressions can generally be taken 3–4 weeks postoperatively.^[21]

MANDIBULAR TORI

Mandibular tori are bony exophytic growths that are present on the lingual aspect of the mandible, opposite to the bicuspid. They present in early midlife and tend to grow with age. Mandibular tori occur in 6–7% of the population. The etiology of exostosis is multifactorial including genetic and functional influences.^[21]

TORI CAN BE CATEGORIZED BY THEIR APPEARANCE

- Flat tori - arising as a broad base and a smooth surface, are located on the midline of the palate and extend symmetrically to either side.
- Spindle tori - have a ridge located at their midline.
- Nodular tori - have multiple bony growths that each has their own base.
- Lobular tori - have multiple bony growths with a common base. The torus may be bosselated or multilobulated, but the exostosis is typically a single, broad-based, smooth-surfaced mass, perhaps with a central sharp, and pointed projection of bone producing tenderness immediately beneath the surface mucosa.

It is believed that mandibular tori are caused by several factors. They are more common in early adult life

and are associated with bruxism. The size of the tori may fluctuate throughout life, and in some cases, the tori can be large enough to touch each other in the midline of mouth. Consequently, it is believed that mandibular tori are the result of local stresses and not solely on genetic influences.

INDICATION FOR REMOVAL OF MANDIBULAR TORI

- (1) Interfere with tongue positioning.
- (2) Speech interference.
- (3) Prosthodontic reconstruction.
- (4) Patient with poor oral hygiene around the lower posterior teeth.
- (5) Traumatic ulceration from mastication.^[22]

FRENECTOMY

A frenectomy is the surgical alteration of a frenum which is a fold of tissue which restricts movement. In the mouth, this is generally a small portion of tissue related to the upper lip, the tongue, or the lower lip.^[22] Usually, one end of the frenum is connected to a muscular part of the body such as the tongue or lip and the other to a relatively static part such as the floor of the mouth in the case of the tongue or to the gums in the case of the upper lip.^[22] Too much restriction of movement of the tongue, for example, is not necessarily a good thing since it can interfere with normal function and this is why a frenectomy may be required.

RIDGE AUGMENTATION

Superior Border Augmentation

It was described by Davisin, 1970. This procedure is indicated when mental foramen is situated in the superior border. In this procedure, autogenous bone graft is used. The rib graft can be fixed to the superior border of the mandible.^[20-23] Two segments of the rib, about 15 cm long, are obtained from the 5th to 9th ribs. The rib is contoured by vertical scoring in the inner surface. The second rib is cut into small pieces to later pack against the solid rib. Fixation is done by means of transosseous wiring or circumferential wiring.^[22,23]

Disadvantages

- Morbidity of the donor site
- Secondary surgical site
- Necessity of the patient to withdraw denture until the surgical wound heals for a period of 6–8 months.

Inferior Border Augmentation - Visor Osteotomy

This technique was first described by Sanders and Cox, in 1986, for reconstruction of a resected mandible. This procedure is indicated to prevent and manage fractures

of an atrophic mandible. Visor osteotomy was described by Harle to overcome the resorption of free onlay bone graft. This technique is followed where the muscle insertion to the mandible and nutrient supply is maintained. In this procedure, the mandible is divided buccolingually by a vertical osteotomy from external oblique ridge of one side of the mandible to the other side. The osteotomized lingual segment is pushed superiorly and fixed with the buccal segment using stainless steel wire in the lower border of the lingual segment.^[23]

REFERENCES

1. Taylor RL. A chronological review--1960-1985 of the changing concepts related to modifications, treatment, preservation and augmentation of the complete denture basal seat. *Aust Prosthodont Soc Bull* 1986;16:17-39.
2. Hopkins R. *A Colour Atlas of Preprosthetic Oral Surgery*. Vol. 2. London: Wolfe Medical Publications; 1987. p. 136-43.
3. Lytle RB. Complete denture construction based on a study of deformation of the underlying soft tissues. *J Prosthet Dent* 1959;9:539-51.
4. Mercier P, Lafontant R. Residual alveolar ridge atrophy: Classification and influence of facial morphology. *J Prosthet Dent* 1979;41:90-100.
5. Wowern N. Bone mineral contents of mandibles: Normal reference values--rate of age-related bone loss. *Calcif Tissue Int* 1988;43:193-8.
6. Bradley JC. A radiological investigation into the age changes of the inferior dental artery. *Br J Oral Surg* 1975;13:82-90.
7. Tideman H. A technique of vestibular plasty using a free mucosal graft from the cheek. *Int J Oral Surg* 1972;1:76-80.
8. Härle F. Visor osteotomy to increase the absolute height of the atrophied mandible. A preliminary report. *J Maxillofac Surg* 1975;3:257-60.
9. Davis WH, Delo RI, Ward WB, Terry B, Patakas B. Long term ridge augmentation with rib graft. *J Maxillofac Surg* 1975; 3:103-6.
10. Steinhäuser E, Obwegeser H. Rebuilding the alveolar ridge with bone and cartilage autografts. *Trans Int Conf Oral Surg* 1967; 24:203-8.
11. Gerry RG. Alveolar ridge reconstruction with osseous autograft: Report of case. *J Oral Surg (Chic)* 1956;14:74-8.
12. Liposky RB. Use of the mandibular staple bone plate with augmentation in bone grafts. *J Oral Maxillofac Surg* 1971; 29:792-8.
13. Schnitman PA, Shulman LB. Recommendations of the consensus development conference on dental implants. *J Am Dent Assoc* 1979;98:373-7.
14. Adell R, Lekholm U, Rockler B, Brånemark PI. A 15-year study of osseointegrated implants in the treatment of the edentulous jaw. *Int J Oral Surg* 1981;10:387-416.
15. Boyne P. The science of alveolar ridge augmentation. *Compend Contin Educ Dent* 1982;Suppl 2:S49.
16. Topazian RG, Hammer WB, Boucher LJ, Hulbert SF. Use of alloplastics for ridge augmentation. *J Oral Surg* 1971;29:792-8.
17. Stoelinga PJ, de Koomen HA, Tideman H, Huijbers TJ. A reappraisal of the interposed bone graft augmentation of the atrophic mandible. *J Maxillofac Surg* 1983;11:107-12.
18. Lekkas K. Absolute augmentation of the mandible. *Int J Oral Surg* 1977;6:147-52.
19. Hopkins R. *A Colour Atlas of Preprosthetic Oral Surgery*. Vol. 55. London: Wolfe Medical Publications; 1987. p. 136-43.
20. Hillerup S. Preprosthetic mandibular vestibuloplasty with split-skin graft: A two-year follow-up study. *Int J Oral Maxillofac Surg* 1987;16:270-8.
21. Bays RA. The pathophysiology and anatomy of edentulous bone loss. In: Fonseca R, Davis W, editors. *Reconstruction Pre- Prosthetic Oral and Maxillofacial Surgery*. Vol. 34. St. Louis: Mosby; 1999. p. 456-9.
22. Quayle AA. The atrophic mandible: Aspects of technique in lower labial sulcoplasty. *Br J Oral Surg* 1978;16:169-78.
23. Tallgren A. The continuing reduction of the residual alveolar ridges in complete denture wearers: A mixed-longitudinal study covering 25 years. *J Prosthet Dent* 1972;27:120-32.