

GINGIVECTOMY

OUTLINE:

The gingivectomy is a primitive surgery in periodontal therapy. The design of the free gingival margin by surgical means, gingivoplasty, must be taken into consideration. Depending on the long and painful healing for the patient, a gingivectomy should be preserved. Gingivectomy is done to correct gingival levels, esthetic contour, and adequate crown length which is required. Gingivectomy is a type of clinical crown lengthening. The tooth requiring endodontic treatment requires a clinical crown lengthening procedure because of overgrowth of gingiva. Gingivectomy can either be done using a scalpel or laser depending on the procedure

INTRODUCTION:

Gingiva is part of the oral mucosa that covers the alveolar processes of the jaws and surrounds the neck of the tooth.

- Marginal gingiva
- Attached gingiva
- Inter dental gingiva

Depth of the gingival sulcus:

- Under absolutely ideal conditions - 0mm
- Histological depth – 1.8 mm with variation from 0 to 6mm.
- Histologic depth of a sulcus does not be exactly coincide with depth of penetration of the probe.
- Probing depth of a clinically normal gingival sulcus is 2 to 3mm.

OBJECTIVES OF PERIODONTAL SURGERY

- Accessibility of root surface
- Elimination of inflammation
- Conduciveness to oral plaque control

- Regeneration of lost/ destroyed tissues
- Resolution of mucogingival problems
- Preparation of gingiva for restorative or prosthetic treatment
- Esthetic improvement

METHODS OF PERIODONTAL SURGERY

1. Closed curettage
2. **Gingivectomy & Gingivoplasty**
3. Flap Surgery (Curettage, Resective & Regenerative)
4. Mucogingival surgery
5. Combinations of various procedures

GINGIVECTOMY

- Gingivectomy is thought to be introduced as an official periodontal therapy when the idea of periodontal etiology shifts from bone to soft tissue.
- This is mainly due to Kronfeld in 1935, who emphasized that periodontal disease is not a disease of the bone.
- The pocket is viewed as a pathologic entity rather than a physiologic entity and thus needed to be eliminated. In the early fifties, gingivectomies are considered to be radical, with a goal of pocket elimination.
- When the pocket is extended past the mucogingival line, the result is unesthetic, with a “long” tooth appearance.
- Other limitations include the creation of a shallow vestibular trough, incision of frenum attachment, and loss of attached gingiva.
- Gingivectomy can be done via mechanical or chemical, with aim to eliminate the pocket to restore form and function.



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HISTORY

1742- Fauchard described the procedure to remove excessive tissue.

1921-William Ziesel- pyorrhea examination; gingivectomy the rationale and treatment.

1928-Ward- surgical eradication of Pyorrhea.

1935- Kronfeld – autopsy study of periodontitis

1939- Orban- indication technique and postoperative management of gingivectomy in post operative periodontal pocket.

“cutting with knives and scissors, electrocoagulation or the use of thermocautery or short waves or chemical cauterization... In removing the free gum margin, we must be sure to remove entire gum to the bottom of the pocket, no more, no less.”

- Probing depth more than 3mm surgical.
- Less than 3mm non-surgical.

1952-Ramfjord- review article on gingivectomy

1955- Weaurhaug- zero depth cannot be maintained

DEFINITION:

- The surgical approach as an alternative to gingival scaling for pocket therapy. **Robiscek**
- The surgical procedure which aimed at pocket elimination was usually combined with recontouring of the diseased gingiva to restore physical form. **Grant et al 1979**
- According to the **World Workshop of Periodontics (1989)**, gingivectomy is defined as “an excision of the soft tissue wall of the periodontal pocket.”
- **Gingivoplasty** is a procedure “which involved reshaping of the gingiva to obtain more physiologic contour; a contour that allows a gradual rise of tissue interproximally and a fall on the labial and lingual surfaces.
- Both gingivectomy and gingivoplasty are usually performed at the same time.

RATIONALE

- Pocket elimination to allow accessibility for root instrumentation
- Restoration of a physiologic gingival contour.

OBJECTIVES

1. To eliminate fibrous hyperplasia of the gingiva, to restore normal contours and to minimize crevicular depth.
2. To eliminate pockets by removing diseased tissues to create normal contours, and to establish a result that is cleanable to prevent further bone loss.
3. To eliminate soft-tissue craters and defects.

INDICATIONS

1. Suprabony pockets
2. Adequate zone of keratinized gingiva
3. Pockets greater than 3 mm

4. Gingival enlargements
5. Unesthetic or asymmetrical gingival topography
6. To enhance eruption
7. To facilitate restorative / prosthetic rehabilitation
8. Post-ANUG and flap procedures to restore a physiologic contour
9. Crown lengthening

CONTRAINDICATIONS

1. Inadequate zone of keratinized tissue.
2. Pockets extending mucogingival line
3. Highly inflamed or edentulous tissues
4. Need for osseous resection or inductive techniques
5. Areas of esthetic compromise
6. Shallow palatal vaults and prominent oblique ridges
7. Treatment of infrabony pockets
8. Poor oral hygiene

ADVANTAGES

- Predictability
- Simplicity
- Ease of pocket elimination
- Good access
- Favorable esthetic result.

DISADVANTAGES

- Healing by secondary intention.

- Bleeding postoperatively
- Loss of keratinized tissue
- Inability to treat underlying osseous defects

METHODS – TECHNIQUES

Techniques:

- Scalpel
- Electrode
- LASER
- Chemical
- Cryosurgery

Two phases:

- Presurgical phase
- Surgical phase

Pre-surgical phase:

- The objective of the pre-surgical phases is
- To totally eliminate local factors,
- To reduce gross inflammation to obtain fibrotic tissue favourable to healing, and
- To have better assessment of the zone of attached tissue.
- Pocket depth and topography is also evaluated.
- Other factors that is carefully reviewed are oral hygiene compliance, caries rate, and patient expectation. The next phase would be the actual surgery.

SCALPEL – SURGICAL GINGIVECTOMY

ARMAMENTARIUM

- Krane Kaplan Pocket Marker

- Orban periodontal knife
- Kirkland Knife
- Waerhaug knife
- Bard – parker handle & blades
- Supra & subgingival scalers
- Curettes

STEPS IN- SURGICAL GINGIVECTOMY:

- Anaesthetize area
- Mark the pocket
- Resect the gingiva
- Remove granulation tissue
- Remove calculus
- Place periodontal pack

Robisek and Zentler technique:

- The line to which gingiva is to be resected is determined first, following a straight(Robicsek1884) or scalloped (Zentler1912) incision - first on the labial and then on lingual surface of each tooth, the disease tissue should be loosened and lifted out by means of hook shaped instrument.
- After elimination of the soft tissue the exposed alveolar bone should be scrapped.
- Then area should be covered with antibacterial gauze or be painted with disinfecting solution.
- The result obtained should include eradication of the deepened periodontal pocket and a local condition which could be kept clean more easily.

Gingivectomy for drug induced gingival overgrowth:

- Gingival enlargement is one of the side effects associated with the administration of several drugs.
- These drugs can be basically divided into three
- groups: anticonvulsants, calcium-channel blockers and the immunosuppressant cyclosporin.
- The gingival enlargement leads to the following problem.
 - it poses a plaque control problem;
 - it may affect mastication;
 - it may alter tooth eruption;
 - it may interfere with speech;
 - It may cause aesthetic concerns.

ELECTROSURGERY

- It is the application of a high-frequency radio waves to biological tissue as a means to cut, coagulate, desiccate, and fulgurate the tissue.
- **Active electrode:** The cutting tip of the electrosurgery machine
- To cut efficiently with electrosurgery, the electrode tip is used to guide the radio signal through the tissue and to make an incision. Because the radio signal of the electrosurgery machine is actually performing the incision, and not the electrode tip, the electrosurgery incision is without pressure.
- A light, gentle 'paintbrush-like' stroke should be used to guide the electrode.
- Electrode is positioned perpendicular to the tissue to concentrate the radio signal efficiently at the tip of electrode and to give a more stable and predictable incision
- Electrode should be always in motion in order to prevent a build-up of lateral heat at the tip of the electrode.
- When making a deep incision it is better to make two or three shallow cuts, than to attempt to make one deep incision, in order to control the cut.

- A foot pedal or fingerswitch is supplied with the unit to activate the power to the electrode handpiece.

The passive electrode:

- It is a metallic plate that acts as an antenna to draw the radio signal back to the electrosurgical unit. It has been found that the closer the passive electrode is to the surgical site the less power is required.
- The radio signal is transmitted from the active electrode through the tissue, being received by the passive electrode and returned directly to the electrosurgery unit. This path for the radio signal is the most efficient and produces a more stable and consistent cutting current.



<https://i.ytimg.com/vi/VbNvEapW5CI/maxresdefault.jpg>

Types of passive electrodes available,

- Metallic Plate
- Coated/Insulated passive Electrode
- Metallic Wrist Band Connected To Electrosurgical Unit – produces least amount of power to create an incision.
- Metallic hand held rod

Recommended tips for gingivectomy:

- Electrode tips 101, 109, 110, 111, 112 and 118 are straight wire electrodes which can be used for making any type of incision.
- Electrode tips 102, 103, 104, 105, 106, 107, 108, 108H, 114 and 115 are all forms of small 'U' shaped electrode tips.

TISSUE RESPONSE TO ELECTROSURGERY CONTACT

● **Epithelium**

- Volatilization of cells in the line of delivered high frequency energy.
- Loss of cellular detail secondary to the lateral heat produced, but subsequent wound healing stages do not appear adversely affected.
- Use of the instrument in the gingival crevice may result in varying degrees of gingival recession. But misuse results in increased recession.

● **Connective Tissue**

- Histologic changes reported a small denatured zone (averaging 100 microns) resulting from lateral heat adjacent to the path of incision.

CHEMICAL GINGIVECTOMY

- Max Crutzinger in 1945 investigated the technique of chemical cautery to eliminate pocket using potassium hydroxide paste a powerful caustic agent.
- Placed via blunt instrument.

Agent Used:

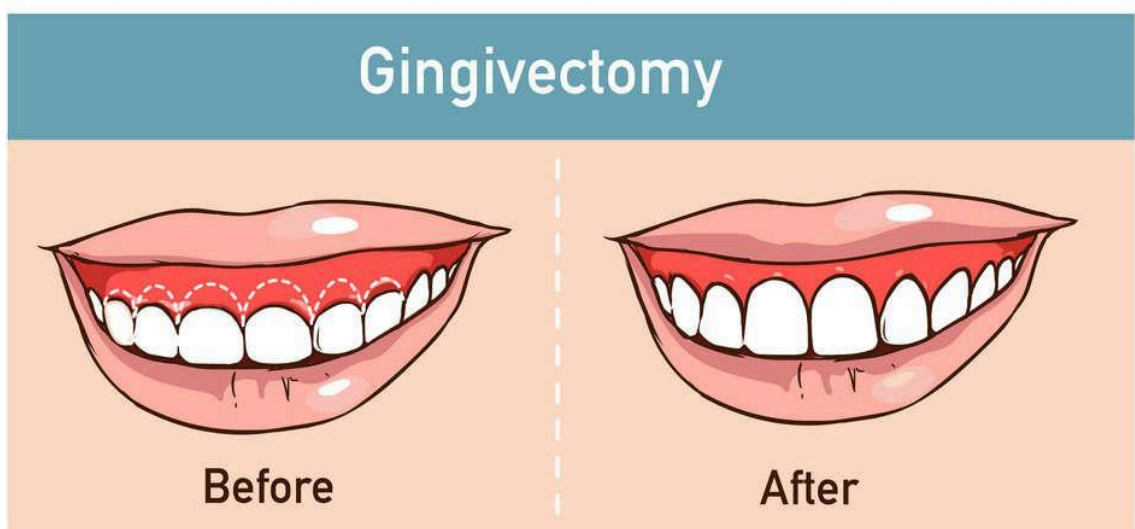
- 25% phenol with 75% camphor.
- 5% paraformaldehyde in ZnO eugenol pack.

Advantages of Chemosurgery

- No analgesia or anesthesia required for the procedure.
- Procedure is easy to perform & require less instruments.

Disadvantages:

- The depth of action cannot be controlled and therefore healthy attached tissue underlying the pocket may be injured.
- Gingival remodeling cannot be accomplished effectively.
- Epithelization and re-formation of the junctional epithelium and reestablishment of the alveolar crest fiber system occur more slowly in chemically treated gingival wounds than in those produced by a scalpel.



<https://carmichaeldds.com/wp-content/uploads/2020/01/Gingivectomy-01.jpg>

CRYOSUGERY:

- Cryosurgery uses cold substance to destruct cells by freezing the cells.
- This newly defined characteristic of freezing injury may provide an opportunity to manipulate the course of injury and repair so that it would be beneficial for therapy.

Material used:

- o Liquid nitrogen (-187deg C)
- o Pressurized argon or nitrous oxide

Mechanism of action:

- Ice crystal formation.
- Microcirculatory failure.

Tissue response:

- Inflammatory to destructive.
- Minor freezing – injury
- Severe freezing - destruction

LASER

- Light amplification stimulated emission of radiation.
- In 1985 the documentation of use of LASER in periodontal surgery was published (PICK PH)
- Early efforts were limited to those soft tissue procedures that could be performed using a straight optical lens / articulated arm delivery system .
- This limitation meant that only areas accessible by direct vision could be treated. A second and equally important limitation was the inability of lasers to interact favorably with calcified tissues such as tooth structure and bone
- In 1985 MEYERS and MEYERS modified ophthalmic ND:YAG LASER for dental use. It soon was noted by clinicians that this wavelength could be used for soft tissue surgery.
- Diode laser operates in continuous wave or pulses mode and are very effective for use in soft tissue applications with excellent effects of incision hemostasis and coagulation.

Uses in periodontics:

- Non-surgical periodontal therapy
- Frenectomy
- Gingivectomy
- Depigmentation
- Osseous recontouring

- Periodontal regeneration therapy

- The use of laser surgery to remove excess gingival tissue has been described by a number of authors (**Barak & Kaplan 1988, Gold 1991, Hattler 1992 Roed Perersen 1993**)

- Laser has remarkable cutting ability and they also generate a coagulated tissue layer along the walls of the laser incision which promotes healing (**Goharkly1999**)

- Laser gingivectomy was first attempted by Pick in 1985.

- Lasers used for gingivectomy.
 - Diode.
 - Nd YAG.
 - Er YAG.
 - Co2.

- Diode and Nd YAG: deep penetration.
Er YAG, Co2: superficial action.

- Comparison of LASER to scalpel excision in the management of DIGO using a split mouth cross over study design demonstrated a significantly lower rate of recurrence for laser gingivectomy over a 6 months follow up period (**MACROGIANNIS 2006**)

- The study employed the diode laser at a wavelength of 810nm. Post -operative pain scores were similar for the two treatments.



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ADVANTAGE (Wigdor et al)

- Instant sterilization
- Hemostasis
- Less post-operative pain and swelling
- Reduction in bacterial population at surgical site
- Less need for suturing
- Faster healing
 - Faster healing – (CARRUTH, HALL)
 - Slow healing – (POGREL, PICK)
 - No difference – (MORDON, MAHASTI)

GINGIVOPLASTY

- Reshaping of the gingiva to create physiological gingival contours in the absence of pockets.

RATIONALE:

- Eliminate gingival deformities caused by gingival and periodontal disease that may alter normal food excursion and act as reservoirs of plaque.

INDICATIONS:

- Gingival clefts and craters.
- Shelflike interdental papillae in ANUG.
- Gingival enlargements.

TECHNIQUE:

● **Instruments used:**

- Periodontal knife
- Scalpel
- Rotary coarse diamond stones *Pope et al 1968*
- Electrodes *Engler et al 1964*

● **Techniques:**

- Tapering the gingival margin
- Creating a scalloped marginal outline
- Thinning the attached gingiva
- Creating vertical interdental grooves
- Shaping interdental pathways to provide sluiceways for food



<https://post.healthline.com/wp-content/uploads/2020/07/Before-and-after-gingivoplasty-1296x728-slide1.jpg>

EXCISIONAL NEW ATTACHMENT PROCEDURE - ENAP

- Also called Internal bevel gingivectomy or Mini Flap.
- Developed by U.S. Naval Corps in 1975
- It is a subgingival curettage with a knife
- Treatment of mild to moderate periodontitis.

Indications

- Slight bone loss with minimal pocketing(3-5 mm)
- Primarily in maxillary anterior region and in areas of increased gingival exposure. eg: patients with a high lip line.
- Supra bony pockets with base coronal to mucogingival line

Objectives

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eg: patients with a high lip line.
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TECHNIQUES

- Adequate anesthesia
- Internal bevel incision given from margin of free gingiva apically to a point on the base of the pocket.
- Remove excised tissue with a curette and then scale and root plane the roots.
- Coapt tissues back to the teeth with interrupted sutures
- Place protective dressing
- During review cauterize the areas of granulation overgrowth with trichloroacetic acid and neutralize with isopropyl alcohol.

Excisional New Attachment Procedure (ENAP)

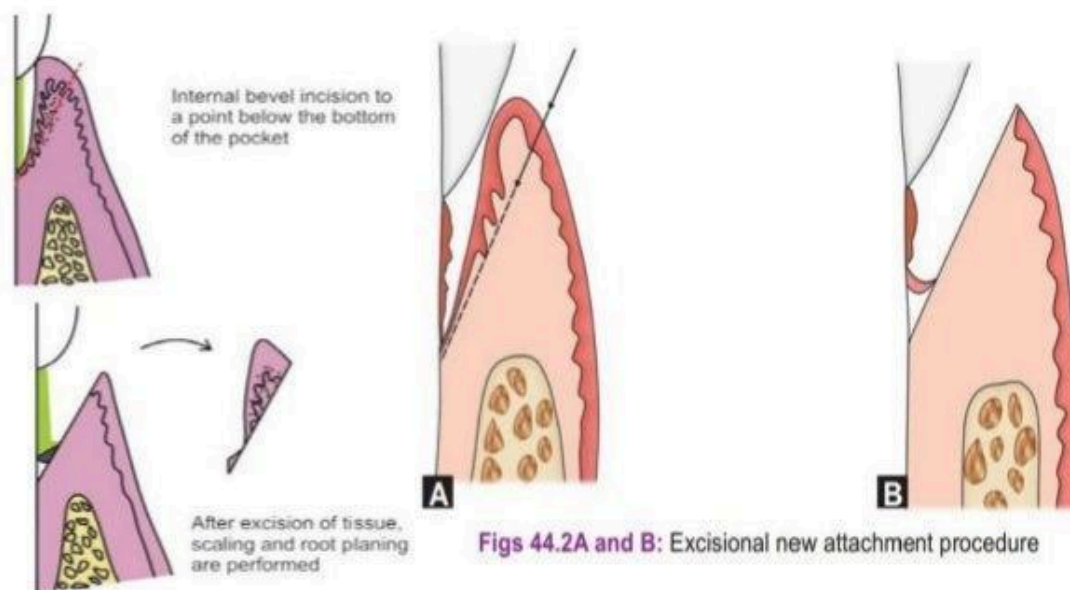


Fig. 39.3: Excisional new attachment procedure (ENAP)

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HEALING AFTER GINGIVECTOMY

Wound healing:

- Development of acute inflammation and granulation tissue. This occurs both in the depth of the tissue and in the superficial layer. Dilation of blood vessels and migration of leukocytes.
- The connective tissue surrounding the blood vessels responds by proliferation of mitotic activity in the fibroblast, endothelial cells and the undifferentiated mesenchymal cells. This is called the fibroplasia and development of granulation tissue.

Surface changes:

- Blood clot covers the surface of the connective tissue,
- After 2 days the blood clot contains three distinct layers.

- Necrotic
 - Stratum leukocytes
 - Fibrinous
- After 4 days the necrotic surface cost off and epithelium proceeds to cover the surface at a rate of 0.5mm a day.
 - At 8th day only small surface of the wound is unepithelialised.
 - At 14th day the entire wound is completely epithelialised.
 - New attachment is formed in the form of basement membrane, and the epithelium needs 2 weeks to restore the crevicular epithelium and around 35 days to re-establish the junctional epithelium.

Dimension changes after gingivectomy:

- After 2 weeks the fibroblast in the supra alveolar tissue adjacent to the tooth surface proliferate and new connective tissue lay down. (Wearhaug 1955)
- If the wound healing takes place in a plaque free environment a free gingival unit will form which has all the characteristic features of normal gingiva (Hamp et al 1975)
- The reestablishment of a new, free gingival unit by coronal regrowth of tissue from the line of gingivectomy incision implies that sites with so called “zero pocket”

Aids in the wound healing:

- Frequent change in the dressing.
- Avoid excess blood clot.
 - To promote wound healing.
 - To prevent infection

Postsurgical instruction:

- Avoid eating or drinking till the pack sets.
- Brushing should be limited to the occlusal surface.

- Dressing should be cleansed gently with a soft tooth brush.
- Prescribe Chlorhexidine gluconate rinses
- To report patient after 3 or 5 days for change of pack.

CONCLUSION

The clinician must have a better understanding of periodontal etiology, wound healing, the significance of attached gingiva and bony topography, tissue response to therapy, the behavior of treatment approach, etc. prior to making the decision toward surgery. The most important indication is the finding of suprabony periodontal pockets 3 to 5 mm in depth with firm fibrotic walls several weeks following root instrumentation. This is easily comprehended since gingivectomy is the soft tissue excision procedure, not designed to gain access to bone. Consequently, when intrabony pocket are present and access to them is needed to treat these defect, flap is the better alternative. Attached gingiva is also sacrificed in gingivectomy and thus careful analysis of the amount of attached gingiva and anticipation of the maintenance of the result must be evaluated.

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REFERENCES:

- Newman MG, Takei H, Klokkevold PR, Carranza FA. Carranza's clinical periodontology. Elsevier health sciences; 2011 Feb 14.
- Coluzzi DJ, Convissar RA. Lasers in clinical dentistry. Dental Clinics. 2004 Oct 1;48(4):xi-i.
- Camargo PM, Melnick PR, Pirih FQ, Lagos R, Takei HH. Treatment of drug-induced gingival enlargement: aesthetic and functional considerations. Periodontol 2000. 2001;27:131-8.
- Lang NP, Lindhe J, editors. Clinical periodontology and implant dentistry, 2 Volume Set. John Wiley & Sons; 2015 Mar 25
- Cohen ES. Atlas of cosmetic and reconstructive periodontal surgery. PMPH-USA; 2007.

- Kumar P, Rattan V, Rai S. Comparative evaluation of healing after gingivectomy with electrocautery and laser. *J Oral Biol Craniofac Res.* 2015 May-Aug;5(2):69-74.
- Mavrogiannis M, Ellis JS, Thomason JM, Seymour RA. The management of drug-induced gingival overgrowth. *J Clin Periodontol.* 2006 Jun;33(6):434-9.