DOI: 10.14260/jemds/2014/3930

REVIEW ARTICLE

PRACTICAL PERIODONTAL SURGERY: AN OVERVIEW

Krishna Kripal[1], Chandrashekar B. M[2], Anuroopa P[3], Senthil Rajan[4], Syed Sirajuddin[5], Sandeep S. Prabhu[6], Kumuda M. N[7], Ashwini Apine[8]

HOW TO CITE THIS ARTICLE:
Krishna Kripal, Chandrashekar B. M, Anuroopa P, Senthil Rajan, Syed Sirajuddin, Sandeep S. Prabhu, Kumuda M. N, Ashwini Apine. "Practical Periodontal Surgery: An Overview". Journal of Evolution of Medical and Dental Sciences 2014; Vol. 3, Issue 66, December 01; Page: 14398-14409, DOI: 10.14260/jemds/2014/3930

ABSTRACT: The efficacy of periodontal surgery in the treatment of periodontal diseases not yet been systematically evaluated. The objective of this review was to systematically evaluate the efficacy of periodontal surgical procedures in the various treatment modalities. Periodontal disease is multifaceted in nature and scope. The problems created due to this inflammatory condition are different eg. gingival enlargement, osseous deformities, mucogingival problem which ultimately may lead to tooth loss. There are different surgical treatment modalities to treat periodontitis and its clinical manifestation. There is no one way or single method to approach this inflammatory condition. The ultimate treatment selection is determined by training, ability, and philosophy to attain complete regeneration of the lost periodontal tissue.

KEYWORDS: Surgery, Periodontium, Gingiva, Pocket.

INTRODUCTION: The efficacy of periodontal surgery in the treatment of periodontal diseases not yet been systematically evaluated. The objective of this review was to systematically evaluate the efficacy of periodontal surgical procedures in the various treatment modalities.[1] Periodontal surgery procedures are performed to prevent or correct anatomical, developmental, traumatic, or plaque induced defects of the gingiva, alveolar mucosa, and bone.[2]

OBJECTIVES OF PERIODONTAL SURGERY:

- Accessibility of instruments to root surface.
- Elimination of inflammation.
- Creation of an oral environment conducive to plaque control.
    - Establish gingival sulcus for easy periodontal disease control (elimination of pocket).
    - Correct abnormal gingiva and alveolar bone morphologic characteristics that interfere with plaque control.
    - Perform root-sectioning procedures or treatments to improve morphology for easier oral hygiene maintenance.
    - Create an easy to clean and proper embrasure space.
- Regeneration of periodontal apparatus destroyed by periodontal disease.
- Resolution of gingiva-alveolar mucosa problems.
- Preparation of periodontal environment suitable to restorative and prosthodontic treatment. Periodontal surgery serves as the therapy prior to prosthodontic treatment.
- Esthetic improvement.[3]

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GOALS:

- Pocket elimination has been the main objective of periodontal surgery. The removal of the pocket by surgical means served two purposes.
    1. The pocket which established an environment conductive to progression of periodontal disease was eliminated.
    2. The root surface was made accessible for scaling and for self-performed tooth cleaning after healing.
- Regeneration of the lost supporting tissues (bone, cementum, and periodontal ligament) by apical proliferation and migration of the epithelium must be prevented.
- The periodontal surgical procedures should be simple, predictable, and efficient.
- Impaired access for scaling and root planning.
- Correction of gross gingival abrasions.
- Shift of the gingival margin to a position apical to plaque-retaining restorations.[4]

INDICATIONS FOR PERIODONTAL SURGERY:

The following findings may indicate the need for a surgical phase of therapy:

- Areas with irregular bony contours, deep craters, and other defects usually require surgical approach.
- Pockets on teeth in which a complete removal of root irritants is not considered clinically possible may call for surgery. This occurs frequently in molar and premolar areas.
- In cases of furcation involvement of grade II or III, a surgical approach ensures the removal of irritants; any necessary root resection or hemisection also requires surgical intervention.
- Intrabony pockets on distal areas of last molars, frequently complicated by mucogingival problems, are usually unresponsive to nonsurgical methods.
- Persistent inflammation in areas with moderate to deep pockets may require a surgical approach. In areas with shallow pockets or normal sulci, persistent inflammation may point to the presence of a mucogingival problem that needs a surgical solution.[5]

CONTRAINDICATIONS FOR PERIODONTAL SURGERY:

- Patient cooperation.
- Cardiovascular disease.
    - Uncontrolled hypertension.
    - Angina pectoris.
    - Myocardial infarction.
    - Anticoagulant therapy.
    - Rheumatic endocarditis, congenital heart lesions, and heart vascular implants.
- Organ transplants.
- Blood disorders.
- Hormonal disorders.
    - Uncontrolled diabetes.
    - Adrenal dysfunction.

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- Hematologic disorders.
    - Multiple sclerosis and Parkinson's disease.
    - Epilepsy.
- Smoking—more a limiting factor than a contraindication.[6]

SURGICAL CONSIDERATIONS:

- Procedural selection should be based on the following:
    - Simplicity.
    - Predictability.
    - Efficiency.
    - Mucogingival considerations.
    - Underlying osseous topography.
    - Anatomic and physical limitations (eg, reduced mouth opening, gagging, mental foramen).
    - Age and systemic factors (eg, cardiac arrhythmias and murmurs, diabetes, history of radiation treatment, hypothyroidism, hyperthyroidism).
- All incisions should be clear, smooth, and definite. Improper incision usually results in uneven ragged flap edges, which requires more healing time.
- All flaps should be designed for maximum use and retention of keratinized gingival tissue so as to maintain a functional zone of attached keratinized gingiva and prevent needless secondary procedures.
- The flap design should allow for adequate access and visibility.
- Involvement of adjacent uninvolved areas should be avoided.
- The flap design should prevent unnecessary bone exposure, which might result in dehiscence or fenestration formation.
- Whenever possible, the surgical procedure should be carried out such that the postoperative healing takes place by primary intention rather than secondary intention.
- The base of a flap should be wider than the coronal aspect to allow for adequate vascularity.
- Tissue tags should be removed to allow for rapid healing and all the granulation tissue should be eliminated.
- Adequate flap stabilization is necessary to prevent displacement, unnecessary bleeding, hematoma formation, bone exposure, and possible infection.[7]

The proper selection of the numerous techniques must be based on the predictability of success that in turn is based on the following criteria.

- Plaque-free and calculus-free environment.
- Esthetic Demand.
- Adequate Blood Supply.
- Anatomy of the recipient and donor sites.
- Donor Tissue Availability.
- Graft Stability.
- Trauma.

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CLASSIFICATION OF SURGICAL PROCEDURES: CORRECTION OF SOFT TISSUE POCKETS: CLOSED PROCEDURES:

1. Curettage.
2. Excisional new attachment procedure (ENAP) and modified ENAP.
3. Modified Widman flap.
4. Apically positioned (repositioned) flap.
    a. Full thickness.
    b. Partial/full thickness.
    c. Partial thickness (supraperiosteal).
5. Palatal flap.
    a. Full thickness.
    b. Partial thickness.
6. Distal wedge procedure.
    a. Tuberosity.
    b. Retromolar area.

OPEN PROCEDURES:

1. Gingivectomy.
2. Gingivoplasty.

SURGERY FOR CORRECTION OF OSSEOUS DEFORMITIES AND OSSEOUS ENHANCEMENT PROCEDURES: CLOSED PROCEDURES:

1. Full- or partial-thickness flap.
    a. Apically positioned flap.
    b. Unpositioned flap.
    c. Modified flap.
    d. Modified Widman flap.
2. Distal wedge procedure.
3. Palatal flap.

OPEN PROCEDURES:

1. Gingivectomy.
    a. Rotary abrasives.
    b. Interproximal denudation.
    c. Intrabony pocket procedure.
2. Prichard procedure for osseous fill.

GUIDED TISSUE REGENERATION (GTR):
GUIDED BONE REGENERATION (GBR):

CORRECTION OF MUCOGINGIVAL PROBLEMS:
PRESERVATION OF EXISTING ATTACHED GINGIVA:

1. Apically positioned (repositioned) flap.
    a. Full thickness.
    b. Partial thickness.

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2. Frenectomy or frenotomy.
3. Modified Widman flap.

INCREASING DIMENSION OF EXISITING ATTACHED GINGIVA:

1. Mucosal stripping.
2. Periosteal separation.
3. Laterally positioned flap (pedicle).
    a. Full thickness.
    b. Partial thickness.
    c. Periosteally stimulated.
    d. Partial/full thickness.
4. Papillary flaps.
    a. Double papillae.
    b. Rotated papillae.
    c. Horizontal papillae.
5. Edlan-Mejchar, subperiosteal vestibular extension operation, or double lateral bridging flap.
6. Free soft tissue autografts.
    a. Partial thickness.
    b. Full thickness.
7. Connective tissue autograft.
8. Subepithelial connective tissue graft.

PROCEDURES COMMONLY USED FOR ROOT COVERAGE:

PEDICLE FLAPS (FULL OR PARTIAL THICKNESS):

1. Laterally positioned flaps.
2. Double-papillae flaps.
3. Coronally positioned flaps.
4. Periosteally stimulated flaps.
5. Semilunar flap.
6. Rotated or transpositional pedicle flap.

FREE SOFT TISSUE AUTOGRAFTS:

1. Full thickness.
2. Partial thickness.

SUBEPITHELIAL CONNECTIVE TISSUE GRAFT:

ACELLULAR DERMAL MATRIX GRAFTS:

GUIDED TISSUE REGENERATION:

1. Non resorbable.
2. Resorbable.

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PROCEDURE COMMONLY USED FOR RIDGE AUGMENTATION:
CONNECTIVE TISSUE GRAFT:

1. Pouch procedure.
2. Connective tissue graft/coronally positioned flap.
3. Pedunculated connective tissue graft.
4. Onlay interpositional graft.
5. Interpositional graft.
6. Papilla preservation flap.

PROCEDURES COMMONLY USED FOR SOCKET PRESERVATION:

1. Basic procedure.
    a. Socket filler.
    b. Connective tissue graft.
2. Socket seal.
3. CollaPlug (Sulzer Medica, Carlsbad, California).
4. Prosthetic support.

PROCEDURES COMMONLY USED FOR PAPILLARY RECONSTRUCTION:

1. Connective tissue grafts.
2. Bone graft/connective tissue graft.[8]

SURGICAL BASICS: BASIC INCISIONS: CURETTAGE: The removal of the inner epithelial lining, epithelial attachment, and underlying inflamed connective tissue on the inner aspect of the pocket. This is a closed surgical procedure.

GINGIVECTOMY: The excisional removal of tissue for treatment of suprabony pockets. This procedure is indicated where bone loss is horizontal and there is an adequate zone of attached keratinized gingiva. This type of incision may also be indicated in areas with asymmetrical or unesthetic gingival topography.

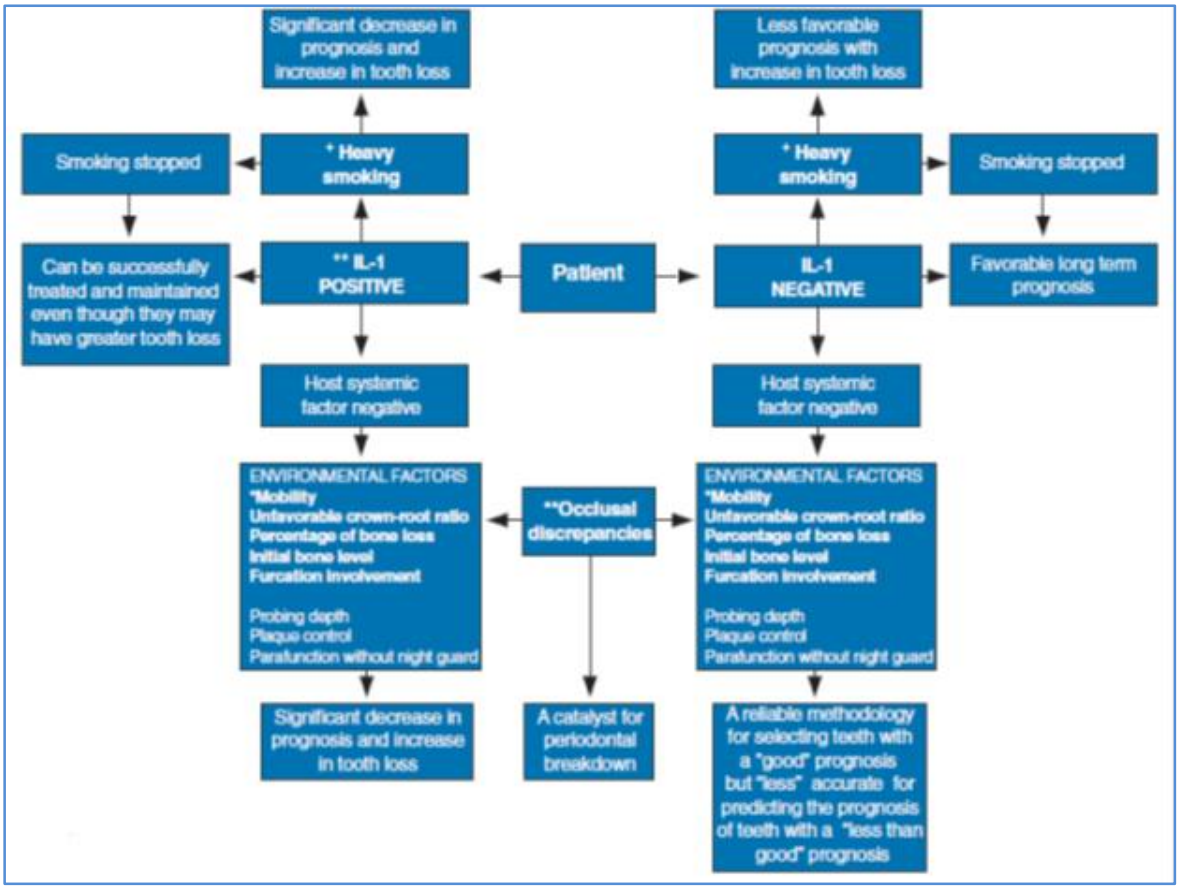
FULL-THICKNESS (MUCOPERIOSTEAL) FLAP: This type of flap is designed to gain access and visibility for osseous surgery, relocation of the frenulum, maintenance of the attached tissue, and pocket elimination and regeneration procedures. The incision for this procedure can be sulcular, crestal, or inverse bevel, depending on the amount of attached tissue present.

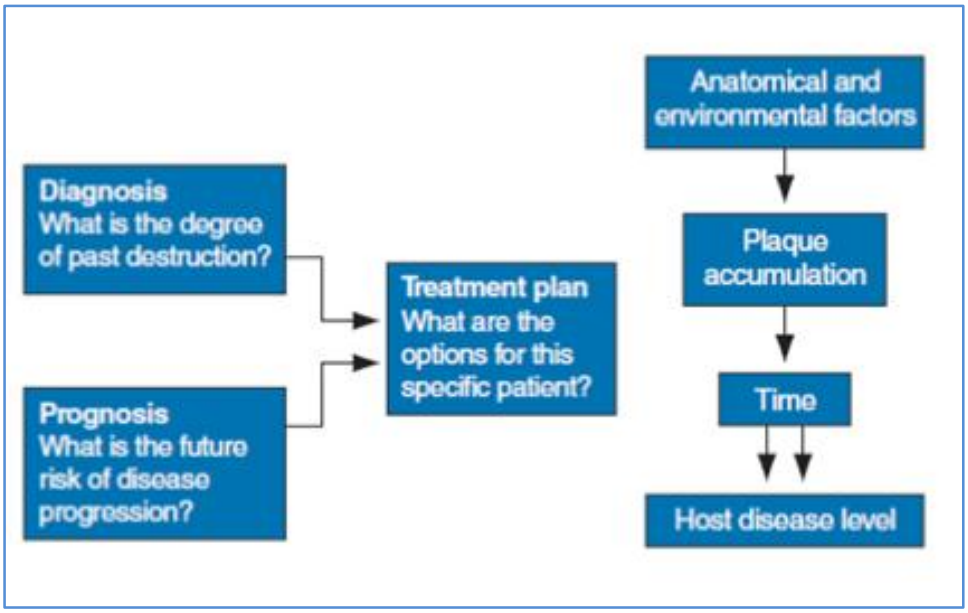
PARTIAL- OR SPLIT-THICKNESS (MUCOSAL) FLAP: A flap designed to retain and maintain the periosteal covering over the bone. A sharp or supraperiosteal dissection technique parallel to the bone is used in this procedure. It is indicated mostly in areas of thin bony plates and for mucogingival procedures.

MODIFIED FULL-THICKNESS (MUCOPERIOSTEAL) FLAP: A flap for which a first-stage gingivectomy incision is used for pocket reduction or elimination, followed by a secondary inverse beveled incision to the crest of bone. This technique requires an adequate zone of attached keratinized gingiva and is used primarily on the palate, on enlarged tissue, or in areas in which limited access may prevent a primary inverse-beveled incision.[8]

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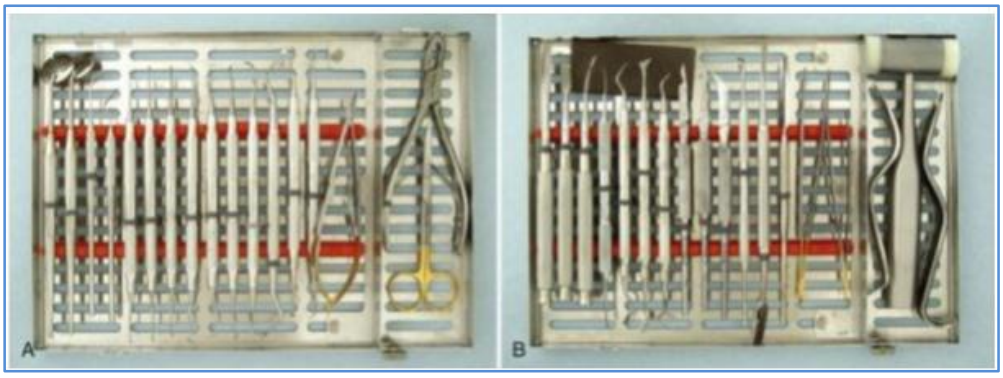
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ARMAMENTARIUM:

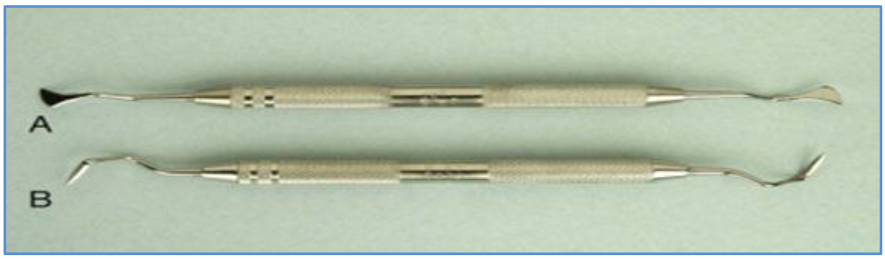


Periodontal surgery is accomplished with numerous instruments.

Periodontal surgical instruments are classified as follows:

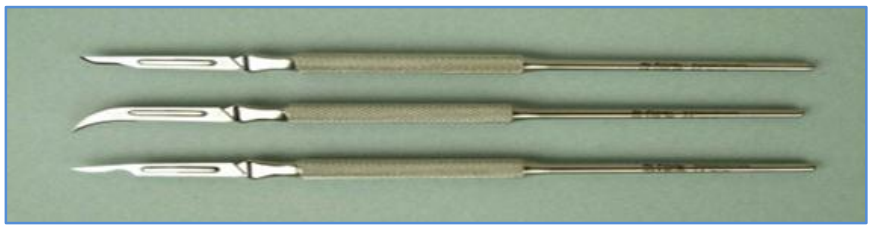
1. Excisional and incisional instruments.
2. Surgical curettes and sickles.
3. Periosteal elevators.
4. Surgical chisels.
5. Surgical files.
6. Scissors.
7. Hemostats and tissue forceps.[9]

EXCISIONAL AND INCISIONAL INSTRUMENTS: Periodontal Knives (Gingivectomy Knives)



Gingivectomy knives. A, Kirkland knife. B, Orban interdental knife.

SURGICAL BLADES



Surgical blades. Top to bottom, #15, #12D, and #15C.

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SURGICAL CURETTES AND SICKLES:



Prichard surgical curette.

PERIOSTEAL ELEVATORS:

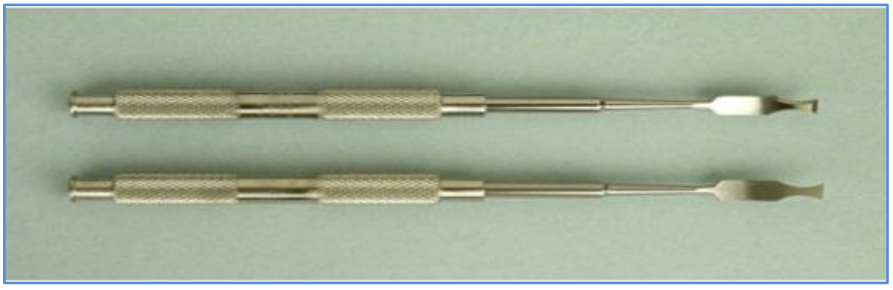


Woodson periosteal elevator.

SURGICAL CHISELS:



Back-action chisel:



Ochsenbein chisels.

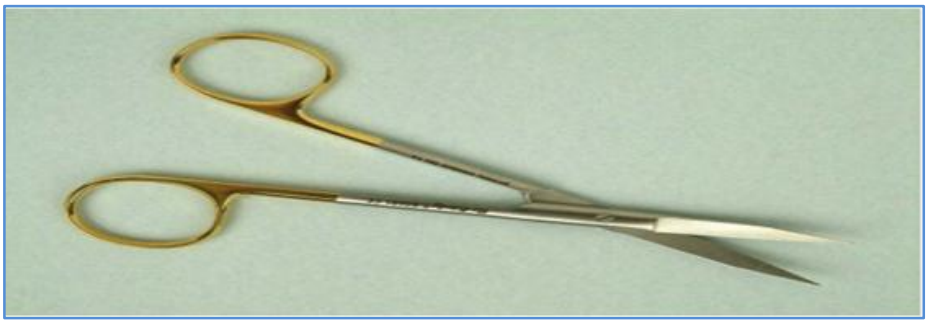
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TISSUE FORCEPS:



DeBakey tissue forceps.

SCISSORS AND NIPPERS:

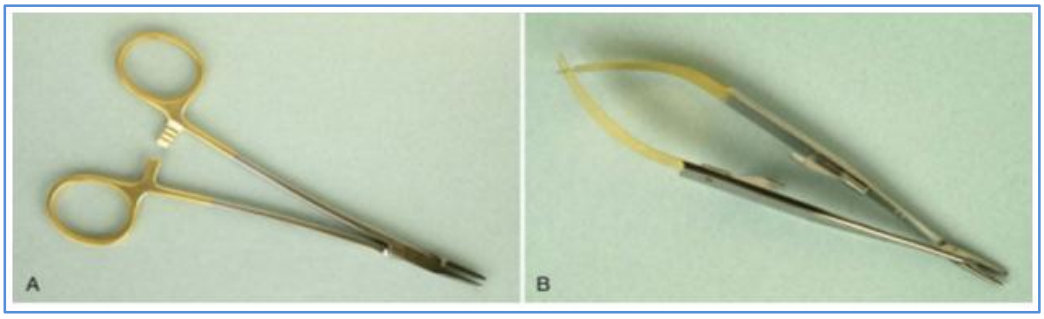


Goldman-Fox scissors.

NEEDLE HOLDERS:

TYPES:

1 Conventional
2 Castroviejo



A, Conventional needle holder. B, Castroviejo needle holder.

HEALING AFTER FLAP SURGERY:

- Immediately after suturing (0 to 24 hours), established by a blood clot, which consists of a fibrin reticulum with many polymorphonu clear leukocytes, erythrocytes, debris of injured cells, and capillaries at the edge of the wound.

- One to 3 days after flap surgery, the space between the flap and the tooth or bone is thinner, and epithelial cells migrate over the border of the flap.
- One week after surgery- The blood clot is replaced by granulation tissue derived from the gingival connective tissue, the bone marrow, and the periodontal ligament.
    - Two weeks after surgery, collagen fibers begin to appear parallel to the tooth surface. Union of the flap to the tooth is still weak, owing to the presence of immature collagen fibers, although the clinical aspect may be almost normal.
    - One month after surgery, a fully epithelialized gingival crevice with a well-defined epithelial attachment is present. There is a beginning functional arrangement of the supracrestal fibers.[10]

CONCLUSION: The main objective of periodontal surgery is to obtain a healthy and functionally esthetic periodontium. The goal is to eliminate the pathologic changes in the pocket walls, to create a stable, easily maintainable state and if possible to promote periodontal regeneration.

All these surgical techniques increase accessibility to root surface, making it possible to remove all irritants, reduce or eliminate pocket depth, and reshape soft and hard tissues to attain harmonious topography. Each of those techniques has its own indications and contraindications, so proper planning is needed before performing these procedures.

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AUTHORS:

1. Krishna Kripal
2. Chandrashekar B. M.
3. Anuroopa P.
4. Senthil Rajan
5. Syed Sirajuddin
6. Sandeep S. Prabhu
7. Kumuda M. N.
8. Ashwini Apine

PARTICULARS OF CONTRIBUTORS:

1. Professor, Department of Periodontology, Rajarajeswari Dental College & Hospital, Mysore Road, Bangalore.
2. Post Graduate Student, Department of Periodontology, Rajarajeswari Dental College & Hospital, Mysore Road, Bangalore.
3. Reader, Department of Periodontology, Rajarajeswari Dental College & Hospital, Mysore Road, Bangalore.
4. Reader, Department of Periodontology, Rajarajeswari Dental College & Hospital, Mysore Road, Bangalore.
5. Post Graduate Student, Department of Periodontology, Rajarajeswari Dental College & Hospital, Mysore Road, Bangalore.
6. Post Graduate Student, Department of Periodontology, Rajarajeswari Dental College & Hospital, Mysore Road, Bangalore.
7. Post Graduate Student, Department of Periodontology, Rajarajeswari Dental College & Hospital, Mysore Road, Bangalore.
8. Post Graduate Student, Department of Periodontology, Rajarajeswari Dental College & Hospital, Mysore Road, Bangalore.

NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Krishna Kripal,
Professor, Department of Periodontology,
Rajarajeswari Dental College & Hospital,
Mysore Road, Bangalore-560074,
Karnataka, India.
Email: kripalkrishna@yahoo.com

Date of Submission: 01/09/2014.
Date of Peer Review: 02/09/2014.
Date of Acceptance: 25/11/2014.
Date of Publishing: 01/12/2014.