



## REVIEW ARTICLE

### SUBEPITHELIAL CONNECTIVE TISSUE GRAFT HARVESTING TECHNIQUE

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#### ABSTRACT

The connective tissue graft is an indispensable therapeutic tool in mucogingival periodontal surgery and implantology from the functional and aesthetic point of view. The harvesting technique as well as the field of application have change and further developed since the first description of free connective tissue grafts three decades ago. Therefore the purpose of this article is to describe various subepithelial connective tissue grafts harvesting technique in detail.

## INTRODUCTION

The connective tissue graft is an indispensable therapeutic tool in mucogingival periodontal surgery and implantology from the functional and aesthetic point of view. The use of free connective tissue for root coverage was introduced by Edel 1974 but it didn't receive wide approval. Later technique was presented by Langer and Calagna 1980. In 1985 Langer and Langer reported SCTG for root coverage procedure .the SCTG procedure is considered to be gold standard procedure in the treatment of various esthetic surgeries. However harvesting a connective tissue graft of adequate thickness can be difficult because of anatomic variation in size and shape of hard palate. These anatomic variations can increase complications at donor site (Reiser *et al.*, 1996). Various techniques have been tried for harvesting connective tissue graft. The harvesting technique as well as fields of application are changed and further developed.

#### Advantages of Subepithelial connective tissue graft

- Esthetics
- Predictability
- One-step procedure

- Minimum palatal trauma
- Multiple recession coverage
- Increased graft vascularity

#### Disadvantages

- High degree of technical skill

#### Indications of Subepithelial connective tissue graft

- In Millers Class I and class II recession
- Coverage of single and multiple teeth

#### Contraindications of Subepithelial connective tissue graft

- Broad shallow palates

#### Anatomical Consideration for Harvesting Subepithelial connective tissue graft

The ideal site for harvesting SCTG extends from distal of canine to mid-palatal region of first molar. It should not be anterior to canine to avoid injury to terminal branch of greater palatine artery which drops inferiorly decreasing the distance from the artery to CEJ of anterior teeth. The tissue anterior to canine also contains irregular area due to prominence of palatal rugae and fatty tissue in the submucosa.

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One should not go beyond midpalatal region of first molar as it may damage greater palatine nerves and vessels emerging from greater palatine foramen located distal to first molar. Moreover palatal tissue distal to 1<sup>st</sup> molar contains lot of glandular tissue in submucosa. Prior to making an incision in palate surgeon should attempt to palpate bony groove. Dimension of palatal vault.

### Classification of incision to harvest Subepithelial connective tissue graft (Liu and Weisgold, 2002)

- **Class I:** one incision line
- **Class II:** two incision lines (L Shape)
- **Class III:** three incision lines (U shape)
- Subclassification (horizontal incision)

**Type A:** one horizontal incision

**Type B:** two horizontal incisions

### Different Harvesting Techniques

1. Edel 1974<sup>3</sup> presented three different harvesting techniques for connective tissue graft.

A. The palate using a TRAPDOOR INCISION

B. From the underside of mucoperiosteal flap

C. From the crestal area of an edentulous maxilla –mandible saddle.

### Trap Door Flap Design

A 15 no blade is used to make a partial thickness horizontal incision with a bevel about 3mm apical to gingival margin of ist premolar extending towards first molar two vertical incisions were made mesiodistally tissue forceps are used to lift the prepared palatal flap edge. It is reflected toward the center of palate and the underlying connective tissue is exposed. An incision perpendicular to bone is made around edge of connective tissue facilitating its reflection from bone. A small periosteal elevator and kirkland knife were used to reflect the CT and harvest it. After harvesting the graft ,the wound is closed using 4-0 Black Silk Suture.

### Advantage

- Ability to obtain a graft size similar to incision design.
- Greater visibility.
- Easier execution.

### Disadvantage

- It involves more incision line.
- It requires more suture

### Parallel Incision Technique

**Given by –Harris 1992** Technique –Pair of parallel incisions were made in palate staying atleast 2mm away from gingival margin. Goal of incision is to bisect the distance between surface epithelium and bone of palate while staying 1 to 1.5 mm apart and extended 10 to 12 mm medially into the palate. To aid in making these incisions uniform throughout entire depth of the incision a scalpel with parallel blade was used. Mesiodistal dimension is extended to result in a piece of tissue between parallel incisions adequate to cover recipient site.

Vertical releasing incision was used when necessary to provide greater access when removing the graft and graft is removed by incising medial mesial and distal edges between parallel incision resulting uniform thickness piece of tissue was composed of predominantly connective tissue and epithelial border was then removed and discarded and pressure is applied with a wet gauge.

### Bruno technique

#### Given by Bruno 1994

The first incision on palate is made perpendicular to long axis of teeth approx 2to 3 mm apical to gingival margin of maxillary teeth. Mesiodistal length of incision is determined by length of graft that is necessary for recipient site. The second incision is made parallel to long axis of teeth 1 to 2mm apical to first incision depending on the thickness of graft that is required. Incision is carried far enough apically to provide sufficient height of connective tissue to cover the denuded root and adjacent periosteum of recipient site. Small periosteal elevator is used to raise a full thickness CTG. The donor tissue is removed as atraumatically as possible using only periosteal elevator. Tissue is not removed with tissue plier a hemostat or any other instrument that could compress or injure the donor tissue and suturing is done.

### Advantage

- Prevents lifting of mucosal flap
- Minimizes post-operative complications
- Promotes rapid healing.

### Disadvantage

- Avoiding use of vertical incision increases difficulty of procedure.

### Single Incision Technique

#### Given by Hurzeler and Weng 1999

Technique – start from single incision along the gingival margin to a layer thickness of 1-1.5 mm and undermining to sharply separate the connective tissue layer from each other after preparation deep- lying connective tissue is separated from its surrounding by incision reaching to bone and is detached from bone with a periosteal elevator after removal harvesting site is closed with horizontal compression suture.

### Advantage

- Optimal vascularization of the cover flap
- A small no of sutures
- No necessity for additional haemostatic or compression measures
- Painless wound healing
- The possibility of obtaining grafts of variable dimension

### Alternative Technique to Harvest Connective Tissue Graft From A Thin Palate

#### Given by bosco and bosco 2007

**Technique:** An incision approx 1.5mm deep is made with a no.15 blade following outline of template then template is

removed. Split thickness is raised from edges of the incision. Graft is harvested and graft is bisected with new no.15 blade resulting 2 separate grafts epithelium with a thin layer of subjacent connective tissue and connective tissue only.

### Modified single incision technique

Given by Kumar 2013

Technique - A single incision was made just 2 mm apical to the gingival margin. The blade was placed approximately parallel to the long axis of the palate to give this first incision. The important point to be noted here was that the first incision was aimed at raising a partial thickness flap and this incision was dissimilar to the first incision advocated by Hurzeler who had proposed that the first incision be given at 90 degrees to the long axis of the tooth and directly to the bone. The partial thickness flap was raised as far apically as required, in accordance with the graft size, as measured by the template. The thickness of the flap was sufficient to reduce the probability of tearing and sloughing.

Following this, the blade was angled perpendicular to the palate through the same incision and continued to the bone. The order of incisions had been reversed when compared to Hurzeler's single incision technique. After the incision to the bone, the connective tissue was elevated from the underlying bone with a periosteal elevator. We could visualize the connective tissue at this stage. Then two vertical incisions on the mesial and distal ends of the graft and one horizontal medial incision is made (under the partial thickness flap), to release it from the surrounding tissue. The placement of the medial incision determines the width of the graft. This incision is also made apically under the partial thickness flap and is difficult to visualize. An instrument has been envisaged by us, which must have a long thin handle, a terminal shank angled at 100 degrees, with a smooth outer surface, and a cutting edge at the terminal end, perpendicular to the long axis of the instrument. The long thin handle is required to increase the reach of the instrument apically to the depth of partial thickness flap on the palate. The angulation is required for the placement of the incision under the flap, as the medial incision does not have a direct and straight approach. A smooth outer surface of the shank is required so that the instrument does not damage the overlying partial thickness flap. A cutting edge at the terminal end, perpendicular to long axis of the instrument, will make it easy for the operators to make an incision at the medial end of the graft under the flap. Medially the graft was separated using this new instrument. This instrument has been named by us as the 'AVS blade' (initial alphabets of names of the first three authors) and is crafted to overcome the difficulties faced by operators in making medial incisions. The graft was harvested through that single incision.

### Advantages

- Minimal Bleeding
- Sufficient thickness of flap reducing the probability of tearing and sloughing
- Better visibility

### Conclusion

Connective tissue grafts are versatile treatment methods in periodontal plastic surgery and periimplant soft tissue plastic surgery. Their strength is ease of handling and good prospects of success. Harvesting techniques that are minimally traumatic but aimed at maximizing tissue volume ensure multipurpose usability of connective tissue grafts. Taking underlying wound healing mechanism into consideration, this is a predictable treatment method. A long term goal would be to avoid the need for a harvesting site by need for a harvesting site by the use of methods derived from tissue engineering.

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