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Original Research Article

Comparison of Three Crown Lengthening Procedures - A Clinical Study

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Abstract: The purpose of clinical crown lengthening is to increase the extent of supragingival tooth structure for restorative or esthetic purposes. The present article aims at comparing three different crown lengthening techniques. This study was conducted in department of periodontics. It included 30 patients, 15 males and 15 females. Patients were equally and randomly divided into three groups. Group I: It included 10 patients treated with gingivectomy. Group II: It included 10 patients treated with apically repositioned flap. Group III: It included 10 patients treated with surgical extrusion using periotome. Length of clinical crown, width of attached gingival and interdental papilla height was recorded preoperatively and postoperatively. There was no change in the width of attached gingiva and minimal change in the interdental papilla height between pre-operative and post-operative measurements in the crown lengthening procedure done by surgical extrusion using periotome when compared to the other conventional surgical procedures. The difference among three techniques was significant (p-0.01). Author concluded that crown lengthening using surgical extrusion technique is effective in grossly fractured teeth and in area where crown structure is less.

Keywords: apically repositioned flap, clinical crown lengthening, gingivectomy, periotome, supragingival.

INTRODUCTION

The need for crown lengthening arises when the clinical crown is insufficient for the placement of crown [1]. A short clinical crown may lead to poor retention form thereby leading to improper tooth preparation. Surgical crown lengthening procedure is done to increase the clinical crown length without violating the biologic width. The indications for crown lengthening are restorative needs, to increase clinical crown height lost due to caries, fracture or wear, to access subgingival caries, to produce a ferrule for restoration, to access a perforation in the coronal third of the root, to relocate margins of restorations that are impinging on biological width, esthetics, short teeth, uneven gingival contour and gummy smile. Contra-indications are inadequate crown to root ratio, non restorability of caries or root fracture, esthetic compromise, high furcation, inadequate predictability, tooth arch relationship inadequacy, compromise adjacent periodontium or esthetics and insufficient restorative space [2].

Several techniques have been proposed for clinical crown lengthening which includes gingivectomy, apically displaced flap with or without resective osseous surgery, and surgical extrusion using periotome [3].

Gingivectomy technique is generally performed when there is sufficient sulcular depth and keratinized tissue so that the incision does not violate the biologic width or cause exposure of the bone. It can be performed with the help of scalpel or a Kirkland knife (conventional), lasers or electrocautery [4].

The surgical technique developed by Nabers [5] was originally denoted "repositioning of attached gingiva" and was later modified by Ariaudo & Tyrrell [6]. In 1962 Friedman [7] proposed the term apically repositioned flap to more appropriately describe the surgical technique introduced by Nabers. The apically positioned flap technique with bone recontouring (resection) may be used to expose sound tooth structure. As a general rule, at least 4 mm of sound tooth structure must be exposed at time of surgery. During healing the supracrestal soft tissues will proliferate coronally to cover 2-3 mm of the root19, 20, thereby leaving only 1-2 mm of supragingivally located sound tooth structure.

In cases of deep subgingival carious lesion, subgingival tooth fractures and in cases where extensive osseous resective surgeries are contraindicated, the periotome. Surgical extrusion by periotome technique also avoids the consequences of extensive resective surgery and orthodontic extrusion like uneven gingival margins, loss of interdental papilla, relapse and several fiberotomy sessions [8]. The present article compares the three techniques in crown lengthening procedures.

MATERIALS & METHODS

This study was conducted in the department of periodontics in 2015. It included 30 patients, 15 males and 15 females. Patients were divided into three groups.

Group I: It included 10 patients treated with gingivectomy
Group II: It included 10 patients treated with apically repositioned flap.
Group III: It included 10 patients treated with surgical extrusion using periotome.

Length of clinical crown, width of attached gingival and interdental papilla height was recorded preoperatively and postoperatively.

Width of attached gingiva is measured using Williams periodontal probe. It is obtained by subtracting the probing depth from the total length from marginal gingiva to mucogingival junction.

Interdental papilla height is obtained by measuring the length from the tip of the interdental papilla to the line connecting the gingival zenith of the adjacent teeth on both the mesial and distal aspect. The mean value is calculated for both mesial and distal aspect of the interdental papilla. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

In present study, we included 30 patients, which included 15 males and 15 females (Figure-1). Figure-2 shows that we distributed patients in 3 groups. Group I (Gingivectomy), group II (Apically repositioned flap) and group III (Periotome) contained 10 patients each.

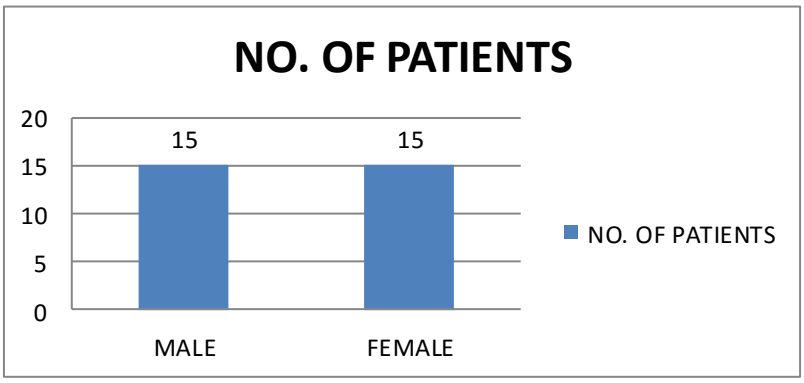

Fig-1: Distribution Of Patients

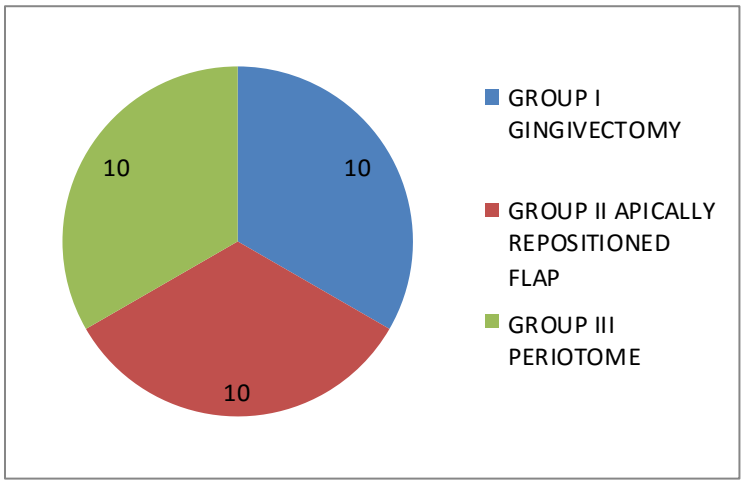

Fig-2: Distribution Of Patients In Groups

Table 1 shows that there was no change in the width of attached gingiva and minimal change in the interdental papilla height between pre-operative and post-operative measurements in the crown lengthening procedure done by surgical extrusion using periotome when compared to the other conventional surgical procedures. The difference among three techniques was significant (p-0.01).

Table 1: Comparison of Parameters in All Groups

	Clinical crown length (mean)		Width of attached gingival (mean)		Interdental papilla (mean)	
mm	**Preop**	**Postop**	**Preop**	**Postop**	**Preop**	**Postop**
Gingivectomy	0.6mm	2.7mm	5mm	2.5mm	4mm	3mm
Apically repositioned flap	2.5mm	6.5mm	6.5mm	3.0mm	4mm	3mm
Surgical extrusion with Periotome	3.8mm	5.0mm	3.6mm	3.6mm	3.6mm	3.4mm

DISCUSSION

There are various methods for crown lengthening. It includes crown lengthening surgery using external bevel gingivectomy, crown lengthening surgery using internal bevel gingivectomy with or without ostectomy (undisplaced flap), flap surgery without osseous surgery, flap surgery with osseous surgery, apically positioned flap with or without ostectomy [9].

In gingivectomy, incisions are started apical to the point of tissue that is desired to be removed. The incisions are directed coronally. Discontinuous or continuous incisions may be used. The incision should be bevelled approximately 45 degrees to the tooth surface and should recreate, as far as possible, the normal festooned pattern of the gingiva. Then the excised tissue should be removed. Carefully granulation tissue should be curetted out and any remaining calculus or necrotic cementum should be removed so as to leave a smooth clean surface. Finally the area should be covered with a periodontal pack [10].

In present study, we included 30 patients, which included 15 males and 15 females. Patients were equally and randomly divided into three groups. Group I which included 10 patients treated with gingivectomy. Group II which included 10 patients treated with apically repositioned flap. Group III included 10 patients treated with surgical extrusion using periotome.

We recorded length of clinical crown, width of attached gingival and interdental papilla height preoperatively and postoperatively. There was no change in the width of attached gingiva and minimal change in the interdental papilla height between pre-operative and post-operative measurements in the crown lengthening procedure done by surgical extrusion using periotome when compared to the other conventional surgical procedures.

Several authors such as Diniz *et al*. [11] and Hempton *et al*. [12] have demonstrated the clinical feasibility of surgical extrusion with short and long term results.

The clinical finding presented here suggest that clinical crown lengthening by surgical extrusion using periotome offers several advantages over the other conventional surgical approaches such as there was no change in the width of attached gingiva, interdental papilla height in pre- and post-operative measurements. This technique can be used to successfully treat a tooth with poor retention form and grossly damaged crown structure as a result of tooth fracture, dental caries and iatrogenic factors especially in the anterior region, where esthetics is of great concern when compared with other conventional surgical techniques such as gingivectomy and apically repositioned flap with or without respective osseous surgery.

CONCLUSION

Author concluded that crown lengthening using surgical extrusion technique is effective in grossly fractured teeth and in area where crown structure is less.

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