Three different surgical techniques of crown lengthening: A comparative study

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ABSTRACT

Introduction: 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. 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. **Objective:** The aim of this paper is to compare clinically the three different surgical techniques of crown lengthening procedures. **Materials and Methods:** Fifteen patients who reported to the department of Periodontology, were included in the study. Patients were randomly divided into three groups, which include patients who underwent gingivectomy (Group A), apically repositioned flap (Group B) and surgical extrusion using periotome (Group C). Clinical measurements such as clinical crown length, gingival zenith, interdental papilla height were taken at baseline and at 3rd month post-operatively. **Results:** Clinical and radiographic evaluation at 3rd month suggest that surgical extrusion technique offers several advantages over the other conventional surgical techniques such as preservation of the interproximal papilla, gingival margin position and no marginal bone loss. **Conclusions:** This technique can be used to successfully treat a 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.

KEY WORDS: Biologic width, gingival zenith, gingivectomy, periotome

A short clinical crown occurs as a result of, deep subgingival caries, tooth fracture, iatrogenic factors may lead to poor retention form which allow for proper tooth preparation. Surgical crown lengthening procedure is done to increase the clinical crown length without violating the biologic width.[1,2]

Several techniques such as gingivectomy, apically repositioned flap with or without respective osseous surgery, and orthodontic forced eruption with or without fibrotomy have been proposed for clinical crown lengthening.[2] The selection of one technique over another depends on several patient related factors such as esthetics, clinical crown to root ratio, root proximity, root morphology, furcation location, individual tooth position, collective tooth position and ability to restore the teeth.[3-5]

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Objectives for Crown Lengthening

1. Exposure of sufficient sound tooth structure in case of deep subgingival tooth fracture and carious lesion
2. To enhance retention of restoration
3. Correct placement of margins of restorations without violating the biologic width
4. Improved esthetics in patients with uneven gingival margin and excessive gingival display.[1]

Aim

The aim of this study is to evaluate clinically the three different surgical techniques of crown lengthening procedures.

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Materials and Methods

Sample size

- 15 patients (nine males and six females) reported to the Department of Periodontology, Vivekanandha Dental College for Women, Thiruchengode were included in the study
- Patients were equally and randomly divided into three groups.

Group A: Gingivectomy
Group B: Apically repositioned flap
Group C: Surgical extrusion using periotome

Clinical measurements

Pre-operative and post-operative measurements of the following clinical criteria were taken:
- Length of the clinical crown
- Width of attached gingiva
- Gingival zenith
- Interdental papilla height

Surgical extrusion using periotome

Surgical procedure

Following local anaesthesia, the blade of the periotome was placed into the periodontal ligament space and manipulated in walking motion to luxate the tooth without inducing surgical trauma. Figure 1 shows one of our patient pre-operative picture showing the tooth prior to crown lengthening. Figure 2 is same patient immediate post-operative picture. Teeth was extruded to the desired clinical position using a hemostat.[1,6] Simple interrupted sutures placed for stability. Periodontal pack given. Suture removal done after 10 days. Final restoration placed after 2 months.

Results

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.

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.

Clinical and radiographic evaluation at 3rd month suggest that surgical extrusion technique offers several advantages such as preservation of the interproximal papilla, gingival margin position and no marginal bone loss compared with the other conventional surgical techniques.

Discussion

Clinically stable mobility of the extruded teeth was observed in 1 month and maintained during the observation period. There was radiographic evidence of periapical bone formation as early as 2 month post-operatively. No endodontic complication was observed. Several authors such as Kanhberg *et al*. 1996 and Kim *et al*. 2004 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 and gingival zenith level in pre- and post-operative measurements. This technique can be used to successfully treat a tooth with poor



Figure 1: Pre-operative photograph



Figure 2: immediate post-operative

Table 1: Preoperative and postoperative measurements of three different surgical techniques

	Mean clinical crown length		Mean width of attached gingiva		Mean inter dental papilla	
	Pre-operative	Post-operative	Pre-operative	Post-operative	Pre-operative	Post-operative
Gingivectomy	0.5 mm	2.5 mm	4 mm	2 mm	3 mm	2 mm
Apically displaced flap	2 mm	6 mm	6 mm	3 mm	3 mm	2 mm
Surgical extrusion	3.6 mm	4.8 mm	3.5 mm	3.5 mm	3.6 mm	3.5 mm

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. Further studies with larger sample size are needed to confirm this clinical evaluation.

Conclusion

Surgical extrusion technique using periotome can be used to successfully treat a 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.

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