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Case Report

# An unusual endodontic complication following crown lengthening surgery: A Case Report.

## Una complicación endodóntica inusual después de una cirugía de alargamiento coronal: Reporte de un Caso .

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**Abstract:** A gummy smile is a form of excessive gingival display when smiling. The excessive gingival display due to altered eruption is likely to benefit from crown lengthening surgery in order to restore the esthetic smile. **Case Report:** The potential complications of the crown lengthening surgery include possible esthetic deformities, dentine hypersensitivity, transient mobility, and root resorption. The present case report reveals a rare complication happened after an esthetic crown lengthening surgery which was performed to correct the gummy smile of a 37-year-old female. The patient experienced dull throbbing pain and mild tender to percussion on tooth 11, 3 weeks after the surgery, and the symptoms did not improve after the composite restorations were placed at the cervical regions. Instead, the tooth was tender to percussion and palpation with a sign of coronal discoloration. Pulp necrosis was confirmed with the clinical tests. A cone-beam computed tomography was taken after the root canal treatment, and apical fenestration on tooth 11 was noted. Therefore, this case report shows the possible correlation between crown lengthening surgery on a tooth with apical fenestration and pulp necrosis, if the apical vasculature is severed accidentally during the procedure. **Conclusion:** A cone-beam computed tomography should be considered *prior* to the surgery and extra precaution during the surgery may reduce the risk of severing the apical vasculature if apical fenestration is evidenced.

***Keywords:*** *Crown lengthening; dental pulp necrosis; tooth discoloration; cone-beam computed tomography; esthetics, dental; gingiva.*

**Resumen:** Una sonrisa gingival es una forma de exhibición gingival excesiva al sonreír. Es probable que el despliegue gingival excesivo debido a una erupción alterada se beneficie de la cirugía de alargamiento de la corona para restaurar la sonrisa estética. **Reporte de Caso:** Las posibles complicaciones de la cirugía de alargamiento coronal incluyen posibles deformidades estéticas, hipersensibilidad de la dentina, movilidad transitoria y reabsorción radicular. El presente reporte de caso revela una rara complicación ocurrida luego de una cirugía estética de alargamiento coronal que fue realizada para corregir la sonrisa gingival de una mujer de 37 años. El paciente experimentó un dolor sordo pulsátil y leve sensibilidad a la percusión en el diente 11, tres semanas después de la cirugía, y los síntomas no mejoran después de que se colocaron las restauraciones de composite en las regiones cervicales. En cambio, el diente presentaba sensibilidad a la percusión y la palpación con signos

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de decoloración coronal. La necrosis pulpar se confirmó con pruebas clínicas. Se tomó una tomografía computarizada de haz cónico después del tratamiento del conducto radicular y se observó una fenestración apical en el diente 11. Por lo tanto, este reporte de caso muestra la posible correlación entre la cirugía de alargamiento de corona en un diente con fenestración apical y necrosis pulpar, si la vasculatura apical se corta accidentalmente durante el procedimiento. **Conclusión:** Se debe considerar una tomografía computarizada de haz cónico antes de la cirugía y una precaución adicional durante la cirugía puede reducir el riesgo de seccionar la vasculatura apical si se evidencia una fenestración apical.

***Palabra Clave:*** Alargamiento de corona; necrosis de la pulpa dental; decoloración de dientes; tomografía computarizada de haz cónico; estética dental; encía.

## INTRODUCTION.

The excessive maxillary gingival display or gummy smile is an important dictating factor in smile esthetics. The gingival excess may be associated with pseudopockets caused by periodontal diseases, drug-induced gingival enlargement, altered eruption, dentoalveolar extrusion, and vertical maxillary excess.[1,2] The level of gingival display more than 4 mm is often perceived as unesthetic, and thus, more likely to benefit from treatment.

The excessive gingival display result from the altered eruption may be managed by esthetic crown lengthening surgery (CLS) either a gingivectomy or a periodontal flap, with or without osseous resective surgery.[3] Esthetic CLS is a method to rectify this condition where the clinician will reposition the gingival level with a possible certain degree of osseous resection in order to restore the ideal tooth proportion and to reduce the amount of gingival display, and thus improving the smile esthetics.[4,5]

Dentin hypersensitivity is a common complication following CLS, especially if osseous resection is involved.[6] The dentin hypersensitivity is mainly due to the exposure of the dentinal tubules, and it is usually temporary, and could be relieved by the application of desensitizing toothpaste or varnish.[7] Apart from dentin hypersensitivity, other reported complications following crown lengthening surgery are pain and swelling, infection on the surgical site, increase the mobility of the tooth, esthetic deformities (long clinical crowns or open embrasures), root resorption, and gingival bleeding or hemorrhage.[8] However, the authors are unaware of a clinical study reporting pulp necrosis following CLS.

The objective of this case report was to present a case detailing pulp necrosis on one of the anterior teeth following an esthetic CLS procedure. A cone-beam computed tomography (CBCT) was taken after the root canal treatment (RCT) to elucidate the reason for pulp necrosis.

## CASE REPORT.

A 37-year-old female presented at the dental clinic with the chief complaint of anxiety over her appearance due to a gummy smile which affected her quality of life. She requested a smile makeover to reduce the severity of her gummy smile. Her medical, dental, and social histories were unremarkable.

Upon examination, the patient presented with a Class II skeletal pattern with a convex profile on a normal vertical proportion. She showed incompetent lips while at rest and a high smile line with an excessive gingival display of gingiva about 4mm-5mm. Intra-orally, all her teeth were sound, good periodontal health with probing depth ranged from 2mm-3mm, and an adequate amount of attached keratinized gingiva. However, the tooth shape and dimension appeared to be a perfect square, disproportionate in relation to the surrounding gingival, and a diagnosis of an altered passive eruption was established (Figure 1). Periapical radiograph revealed no widening of the periodontal ligament space and no evidence of periapical radiolucency. Cold test and electrical pulp test showed positive responses to all maxillary anterior teeth. The occlusal analysis showed that the incisal relationship was Class II division 2 and deep complete overbite with a sign of dentoalveolar compensation on the mandibular anterior segment.

During the treatment planning stage, a diagnostic wax-up was performed on a semi-adjustable articulator (Denar® Mark II system; Water Pik, Inc.) to establish the correct gingival levels with ideal tooth ratio and followed by a diagnostic mock-up using temporization


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material (ProtempTM Plus, 3M ESPE).[9] Patient consented for the periodontics and restorative treatment after the mock-up. CLS was performed from the tooth 14 to 24. The labial flap was designed by creating submarginal parabolic incisions, followed by flap elevation using a split-full-split-thickness approach, being split-thickness at the papillae, full-thickness at the buccal aspect to verify the cementoenamel junction and bone crest, and a split-thickness apically to the full thickness flap (Figure 2).

The bone levels were relocated with osteotomy using surgical burs under copious irrigation with sterile water, followed by handheld chisels to refine the bone surface. The distance about 2mm-3mm between the newly planned gingival margin and the bone crest was established by using a surgical stent.

Post-operatively, the advice was given to the patient concerning the possible sensitivity and pain that might appear temporarily after the surgery. During the first week of the healing period, the patient revealed no pain or discomfort. However, three weeks after the surgery she started to experience dull throbbing pain on tooth 11. A periapical radiograph was taken and showed no abnormalities. Therefore, the treatment plan was changed from delayed to early restorations, with composite resin restorations placed on the cervical region of the anterior teeth at 1-month follow-up.

However, the pain on tooth 11 did not show

**Figure 1.** **Labial view of short maxillary teeth.**

**Figure 2.** **Flap elevation using split-full-split-thickness approach.**

**Figure 3. Periapical radiograph and cone beam computed tomography images showing apical fenestration in tooth # 11.**


**A.** Periapical radiograph after root canal treatment. **B.** Sagittal view. **C.** Coronal view. **D.** Axial view.

improvement after the restorative treatment. Instead, the tooth was tender to percussion and palpation with slight grayish coronal discoloration detected. When tested with both cold and electrical pulp tests, tooth 11 revealed negative responses. Therefore, the tooth was diagnosed as pulp necrosis with symptomatic apical periodontitis.

Root canal treatment was initiated under rubber dam isolation and necrotic tissue was found in the canal. The canal was obturated with iRoot SP (Innovative BioCreamix Inc., Vancouver, Canada) sealer and single cone gutta-percha after signs and symptoms resolved a month later. Internal bleaching was performed using sodium perborate mixed with sterile water. The shade of the tooth improved after two weeks. A final periapical radiograph was taken to confirm good coronal restoration and the patient was happy with the final treatment outcome (Figure 3A).

A CBCT was taken after the RCT was completed, and the images showed apical fenestration on tooth 11 (Figure 3B, Figure 3C and Figure 3D).

## DISCUSSION.

Pulp necrosis is often associated with the presence of deep caries, extensive restoration or tooth preparation, history of dental trauma and perioendo lesion.[10,13] It is unlikely, if not impossible, that the pulp is necrosed following a very conservative procedure. In this case report, the patient experienced spontaneous mild-to-moderate throbbing pain, tender to percussion and palpation with a sign of tooth discoloration on tooth 11 after the CLS. The tooth was diagnosed as pulp necrosis with symptomatic apical periodontitis after the clinical and radiographic investigations. RCT followed by internal bleaching were performed, and the patient's symptoms and tooth discoloration resolved. The patient was still pleased with the new esthetic smile after the unusual complication, indicating the importance of taking informed consent prior to any dental procedure.

The signs and symptoms presented on tooth 11 were rather similar to how a tooth with dental trauma would present.[14] However, given to the absence possible etiology of pulp necrosis, including no history of dental trauma, no caries and restoration, no trauma during CLS, the exposed cervical dentine were restored without tooth preparation, and no periodontal disease; it was intriguing to understand tooth 11 presented with pulp necrosis after the CLS. A CBCT was taken after the endodontic treatment to rule out the other abnormalities. There was no pathology or abnormality detected except apical fenestration was found on tooth 11. The presence of apical fenestration explained the reason for undetected periapical radiolucency in the periapical radiograph.

In the event of apical fenestration, the pulp of a tooth is likely to obtain nutrition from the periodontal tissue or periosteum.[15] It was suggested that the full-thickness flap on a tooth with apical fenestration could cut off the blood supply or vasculature of the tooth.[16,17] Therefore, it is recommended for a split-thickness flap during the periodontal surgery if apical fenestration is suspected.[16,17] In this case report, during the CLS, even without the knowledge of apical fenestration prior to the surgery, a split-full-split thickness approach was adopted. The split-thickness flap was performed apically to the full thickness flap to facilitate the apical anchorage of the flap.[18] Although this approach may reduce the risk of severing the apical vasculature in the


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tooth with apical fenestration compared with the full-thickness flap elevation, split-thickness dissection is a blind procedure and it could still compromise the apical vasculature without the knowledge of the clinician. In this case report, the fact that the patient presented with no other potential etiology for pulp necrosis, it was postulated that the necrosis of the pulp on tooth 11 was due to the severing the apical vasculature during the split-thickness flap technique.

This case report in no circumstances concluded that the CLS is causing the pulp necrosis on a tooth with apical fenestration. However, it suggests the possibility of the correlation between the two and that extra precaution may be necessary during the CLS if apical fenestration is evidenced. Therefore, more studies should be carried out to confirm this hypothesis.

## CONCLUSION.

CLS of excessive gingival display in the present case report resulted in an esthetic change in the patient's appearance and smile. However, the pulp necrosis of a tooth with apical fenestration could happen from CLS if the apical vasculature is severed accidentally during the procedure.

Therefore, a CBCT should be considered during the treatment planning of esthetic CLS. In addition, all patients should be informed of this rare complication prior to the surgery to avoid possible medico-legal issues.

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