Histological evaluation of two central incisors 5 years after replantation and surgical extrusion

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Introduction

The success of replanted avulsed teeth depends on maintaining PDL viability.[1] However, PDL healing in replanted teeth has not been clearly demonstrated histologically in humans. The aim of this investigation was to evaluate the PDL healing histologically in a replanted avulsed tooth and in a surgically extruded crown-root fractured tooth, and then compare the healing results from two different treatment procedures.

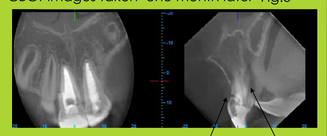
The day after first aid

Fig.1-He received first aid at other dentist's offices. He went to my office on the next day.

After the first treatment

Fig.2

CBCT images taken one month later Fig.3



Surgically extruded tooth#8

Fig.4

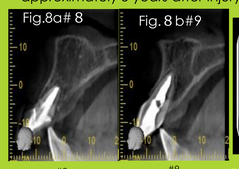
Fracture line in the root of tooth #8

7 days after surgery Fig.5

Fig.6

Approximately 3 years after injury Fig.7

CBCT images taken on approximately 5 years after injury



Radiographic image 5 years after injury

extraction

Two central incisors after extraction

Materials and Methods : A

10 year-old boy suffered impact trauma to teeth #8 and #9. The emergency other dentist a complicated crown fracture #8 and subluxation #9. The traumatized teeth were splinted with wire to adjacent teeth, the pulps were extirpated . (Fig.1) The next day he visited our clinic during splint removal for endodontic retreatment, #9 was avulsed. The tooth was immediately replanted and re-splinted. (Fig.2)Three weeks later tooth #9 was obturated with gutta-percha/sealer and restored with composite. [1] One month later, a CBCT revealed a crown-root fracture #8. It was decided to surgically reposition and an apicoectomy was performed.[1] (Fig.3.4.5.6)Three weeks later #8 was restored with a composite crown.[1] (Fig.7)A 5-year follow-up examination showed excellent healing clinically and radiographically.(Fig.8ab.9) However, the patient decided on orthodontic treatment to correct maxillary protrusion. The orthodontist recommended extraction of #8 and #9 instead of premolars. (Fig.10.11.12)The patient agreed to the extractions and the removal of 2 mm of attached facial bone plate for the purpose of histological examination.

Results

The expedient extraction of teeth #8 and #9 were performed 5 years after injury. Macroscopically both teeth showed no signs of root resorption and the result of the repair of the periodontal ligament was verified histologically .

Tooth #9: Replanted

Fig.13 shows cementum, periodontal ligament, and alveolar bone were aligned continuously .[3](Fig.13ab)
The periodontal ligament was observed and functional alignment of Sharpey's fibers were observed between the thickened cementum and alveolar bone. (Fig.13ab.14ab)

Tooth #8: Surgical extrusion

Fig15 shows the area where an interlamellar layer was observed in the thickened cellular cementum. (Fig.15ab.16ab)On the buccal aspect, thickened cellular cementum, periodontal ligament fibroblasts, and fibers were observed at the apex.[13](Fig17.ab)

Discussion

The thickening of the cementum of the replanted #9 is thought to reflect the enhanced repair mechanism of the periodontal ligament, which might have been activated due to the damage to the periodontal ligament.
Near the root apex of the surgically extruded #8, cellular cementum is involved in the resorption of cementum and the maintenance of homeostasis and plays an important role in the repair of cementum, such as the closure of the apex after external resorption, root fracture, and apicoectomy. Because of the root fracture, replantation with intention of surgical extrusion, and apicoectomy, the cementum of tooth #8was thickened significantly compared with that of tooth #9. The apposition and thickening of the cellular cementum is considered to be related with the distance between the tooth and alveolar bone after replantation.[2]

9 :Replanted Fig.13a

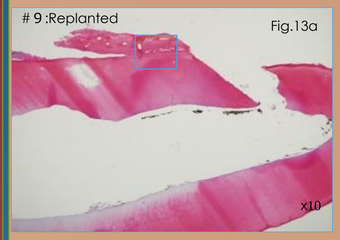


Fig.13b

9 :Replanted Fig.14a

Fig.14b

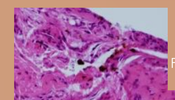
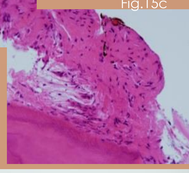


Fig.15c



Tooth #8: Surgical extrusion Fig.15a

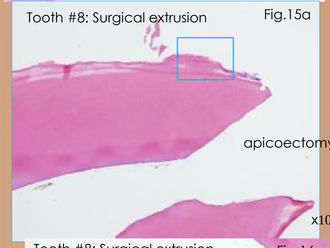
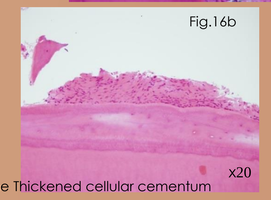
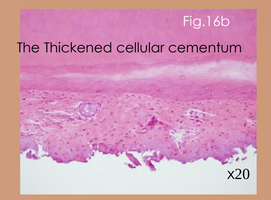


Fig.16b



Tooth #8: Surgical extrusion Fig.16a

Fig.16b



Tooth #8: Surgical extrusion Fig.17a

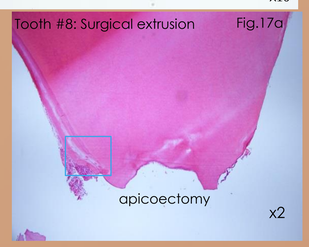
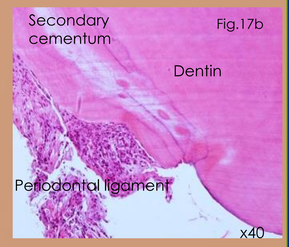


Fig.17b



Conclusion

The injury to the attachment apparatus created by a treatment procedure (surgical extrusion) and an impact trauma (avulsion) were similar.
Whether a tooth is out of the socket and replanted or repositioned while in the socket does not alter the progression and quality of PDL healing.

The authors report no conflicts of interest related to this study.
Explained a purpose of this study to subjects in a document, and obtained its consent.

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