THREE YEARS FOLLOW UP REPLANTATION IN HEAVY SMOKER PATIENT: CASE REPORT (*TINDAK LANJUT REPLANTASI TAHUN KETIGA PADA PASIEN PEROKOK BERAT: LAPORAN KASUS*)

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ABSTRACT

Tooth avulsion is different from all other dental injuries due to the extracorporeal situation with varying duration and degree of contamination of the teeth and the patient's systemic conditions. In a heavy-smoker patient, wound healing could be interrupted. Extra-alveolar handling, good replantation, and educating the patient could be the key to successful treatment of tooth avulsion, especially in a heavy smoker. The aim of this study is to discuss an avulsed tooth case that has been successfully treated by replantation in a heavy smoker. A 39-year-old femalepatient was refered to Siloam Hospital due to a dental trauma injury. The patient was in good general health, but she was a heavy smoker. Intraoral examination revealed that the maxillary left permanent central incisor was avulsed after the patient fell off in her bathroom. Replantation is a treatment of choice in this case. The avulsed tooth was stored in a saline solution. On one visit, root canal treatment was done on the avulsed tooth extra orally soon after the patient was refered to the

AE departmentaSiloam Hospital. The avulsed tooth was replanted and fixed using an Erich arch bar to the previous position by finger pressure. Fix the Erich bar as far as possible to the distal and mesial of the avulsed tooth using circumferential wire in every single tooth. We decided to put the Erich bar from 15 to 25. The following oral hygiene cleaning, dietary instructions, and education to reduce or stop smoking during the healing process were given. Extra-alveolar handling, good replantation, good fixation, and adequate oral hygiene education are the keys to treating a tooth avulsion, even in a heavy smoker.

Keywords: heavy smoker; replantation; tooth avulsion

ABSTRAK

Avulsi gigi berbeda dari cedera gigi lainnya karena situasi ekstrakorporeal dengan durasi dan tingkat kontaminasi gigi yang bervariasi serta kondisi sistemik pasien. Pada pasien perokok berat, penyembuhan luka mungkin terganggu. Penanganan ekstra alveolar, replantasi yang baik dan memberikan edukasi kepada pasien bisa menjadi kunci keberhasilan perawatan avulsi gigi terutama pada perokok berat. Tujuan dari penelitian ini adalah membahas kasus gigi avulsi yang berhasil dirawat dengan replantasi pada perokok berat. Seorang pasien wanita berusia 39 tahun dirujuk ke Rumah Sakit Siloam karena cedera trauma gigi. Pasien dalam kesehatan umum yang baik tetapi dia adalah perokok berat. Pemeriksaan intraoral mengungkapkan bahwa gigi insisivus sentral permanen kiri rahang atas avulsi setelah pasien jatuh di kamar mandinya. Replantasi adalah pengobatan pilihan dalam kasus ini. Gigi yang avulsi disimpan dalam larutan garam. Perawatan saluran akar satu kali kunjungan dilakukan pada gigi yang avulsi secara ekstraoral segera setelah pasien dirujuk ke bagian AE Rumah Sakit Siloam. Gigi yang avulsi ditanam kembali dan difiksasi menggunakan arch bar Erich ke posisi sebelumnya dengan tekanan jari. Erich bar dipasang sejauh mungkin pada bagian distal dan mesial gigi avulsi menggunakan kawat melingkar pada setiap gigi.

Kami memutuskan untuk meletakkan batang Erich dari 15 menjadi 25. Kebersihan mulut, instruksi diet dan edukasi untuk mengurangi atau berhenti merokok selama proses penyembuhan diberikan. Penanganan ekstra alveolar, replantasi yang baik, fiksasi yang baik dan edukasi oral hygiene yang adekuat merupakan kunci keberhasilan perawatan gigi avulsi bahkan pada perokok berat sekalipun.

***Kata kunci**: avulsi gigi; perokok berat; replantasi*

INTRODUCTION

An avulsion is a condition in which a tooth is completely displaced from its socket.[1] These injuries involve teeth or teeth wholly dislodged from the socket for some time. It causes damage to its periodontium, vascularization and nerve innervation.[2] Avulsion of permanent teeth is one of the most severe dental injuries. It is about 0.5%–16% of all dentalinjuries. According to dental trauma studies in different populations, it is more frequentbetween 9 and 10 years of age, in the young dentition, where root development is still incomplete and the periodontium very resilient.[1,3] These injuries usually involve a single tooth,with the maxillary central incisor being the most often at risk due to the relative instabilityof the periodontal ligament during the progressive eruption of these teeth. Trauma with a high risk of tooth injury and avulsion includes motor vehicle accidents, contact sports, increased overjet and severe malocclusion.[2]

These injuries require special attention due to the higher risk of aspiration, supporting structure damage, or actual physical loss of the tooth. Proper treatment must be done immediately. Treatment of an avulsed tooth is influenced by factors such as type of extraoral storage, time of extraoral storage, the condition of the periodontal ligament seriously damaged or not, and the stage of root development (open or closed apex).[4]

In most situations, replantation is the treatment of choice. Still, it cannot always be carried out immediately and splinting to support and protect the traumatized tooth and avoid damageto the neurovascular bundles and surrounding periodontium. Immediate replantation is advisable; if not, a storage media could be used for implantation later. Although

replantation may save the tooth, it is essential to realize that some replanted teeth have low probability of long-term survival and may be lost or should be extracted later. Before replanting, root canal treatment is always indicated to be done in avulsed teeth with closed apex. The essential requirement for optimal healing is that the tooth is out of its socket for as short as possible. The outcome of an eventual replantation procedure almost entirely depends upon the extra alveolar period and extra alveolar handling.[2, 3, 5] The prognosis depends on the actions taken at the place of the accident, promptly following the avulsion and the systemic conditions of the patient.[3]

The challenge in this case is the local condition of the patient with a bad habit of heavy smoking. In severe smoker patients, wound healing can be interrupted by tissue hypoxia. Wound healing is a complex process divided into at least three continuous but overlapping stages: an inflammatory stage, a proliferative stage leading to tissue restoration, and a tissue remodelling stage. Wound healing is regulated by a synergistic interplay among multiple cell types, cytokines, and growth factors at the wound site. Normal tissue oxygen pressures are necessary for the entire reparative process, including cell migration to wound sites, bacterial defence, and collagen synthesis. The healing trajectory can be interrupted at any stage by tissue hypoxia. Tissue hypoxia is a fundamental mechanism through which cigarette smoking disrupts acute wound healing.[6]

This study aims to report a case of the avulsed tooth successfully treated by replantation in heavy smoker patients.

CASE

A 39-year-old female patient was referred to Siloam Hospital due to a dental traumatic injury on June 16, 2018. The trauma happened in a house when she accidentally fell on the bathroom floor, causing the tooth's avulsion. The patient arrived at the Emergency Room within 2 hours. The avulsed tooth #21 was stored in a saline solution. The patient was in good generalhealth, but she was a heavy smoker, and it can be seen from the avulsed teeth that she carried with brownish staining due to the discolouration of nicotine (Figure 1). We provided oral health education to the patient during the treatment, hoping she could reduce or stop smoking during the healing process.

The intraoral examination showed that the maxillary left permanent central incisor (tooth #21) was avulsed (Figure 1). An uncomplicated crown fracture, with dentin involvement, of the upper right permanent central incisor (tooth #11) was

detected. Examination of the avulsed tooth showed that the root had a closed apex. Panoramic radiographs revealed no alveolar bone fracture or other hard tissue injuries (Figure 1).

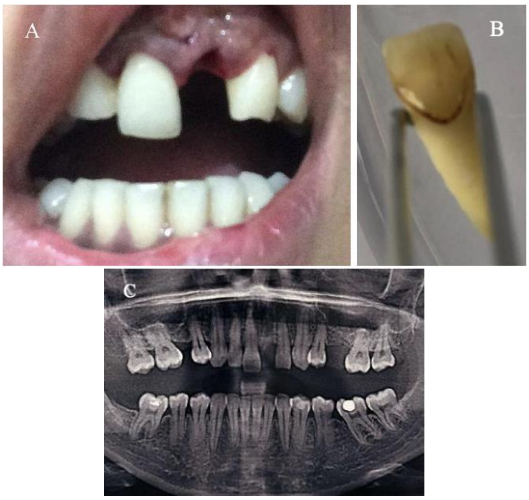

Figure 1. (a) Avulsion of the left upper incisor, (b) Avulsed tooth #21 looked brownish due to the nicotine staining, (c) Initial panoramic radiograph revealed no alveolar bone wall fracture or other hard tissue injuries.

CASE MANAGEMENT

After consenting the patient about any possible risks, one visit for root canal treatment and permanent filling with composite resin was done on the avulsed tooth extra orally (Figure 2). After local anaesthetic administration, the tooth socket was gently rinsed with saline solution and cleaned from blood and necrotic tissues. The avulsed tooth was reimplanted by finger pressure to the previous position and fixed with an Erich bar from #15 to #25 with circumferentialwire for each tooth element. Especially for tooth #21, a two-way circumferential wire was carried out, as the binding wires were crossed with each other to obtain maximum stability. The following oral hygiene and dietary instructions were given according to the dental trauma guidelines: soft food diet for up to 2 weeks, teeth brushing with a soft or ultra-soft toothbrush after each meal. Analgesics and antibiotics were prescribed.

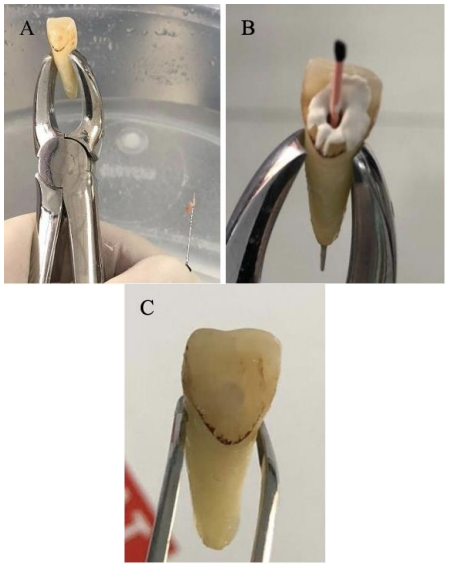

Figure 2. (a)Extirpation of the avulsed tooth #21 during one-visit root canal treatment, (b)Obturation of the avulsed teeth using a *single-cone* gutta-percha, (c)Avulsed tooth afterroot canal treatment and permanent filling with composite

Figure 3. (a)Reimplantation of avulsed tooth #21 under local anesthesia (b)Fixation of the avulsed tooth with rigid Erich splint (arch bar) from #15 to #25

Four days later (June 20, 2018) the patient was recalled due to further treatment and oral hygiene checking. The clinical examination, tooth #15 to #25 were splinted by rigid metal splint (arch bar) (Figure 4). The control panoramic radiographic image showed interdental fixation and obturated tooth #21 without any sign of resorption.

Figure 4. (a) Labial view, four days after fixation with arch bar (b) Panoramic radiographshowed interdental fixation and obturated tooth #21 without any sign of resorption.

After the next four months (October 15, 2018), the patient called for a follow-up and had no complaints. No clinical or radiological evidence of pathological changes was detected. Interdental wiring (arch bar) was removed at this appointment (Figure 5). The patient is askedto avoid using heavy bites on the avulsed tooth until it is entirely stable.

Figure 5. Labial view, 4 months after accident the interdental wiring (arch bar) was removed

During the 3-year follow-up (September 1, 2021), clinical and radiographic examinations showed satisfactory functional and esthetic values for the avulsed tooth, but therewas gingival recession within moderate normal limitation.

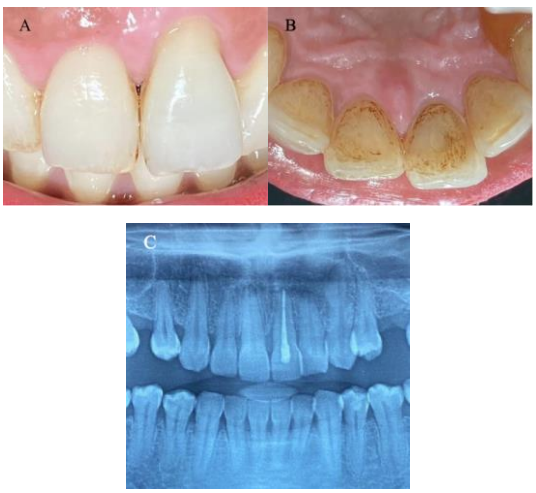

Figure 5. (a)Labial view, 4 months after trauma, clinical examinations showed satisfactory functional and esthetic values (b)Palatal view after 4 months (c)Panoramic radiograph after 4 months

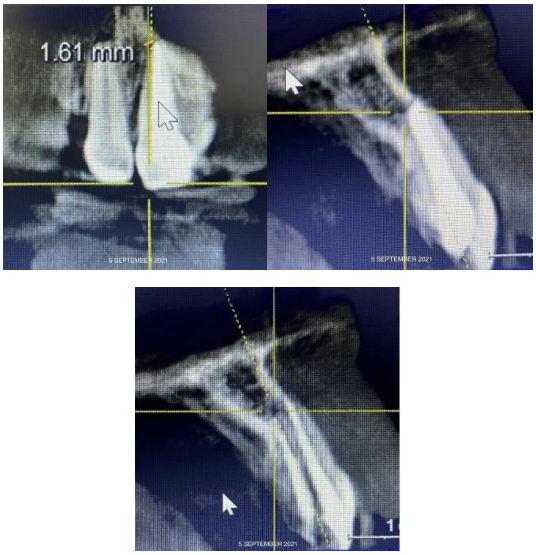

Figure 6. CBCT radiograph, four months after trauma

On CBCT radiograph, the mesial filling of the root canal begins to show slight internal resorption (Figure 6). The periapical area began to show radiolucent lesions within normal limits. The next follow-up visit was scheduled after one year.

DISCUSSION

Tooth avulsion is quite different from all other dental injuries due to the extracorporeal situation with varying duration and degree of contamination of the teeth and the local systemicconditions of the patient. Furthermore, the stage of root development is decisive for treatment and prognosis. The principal treatment in tooth avulsion is to prevent further damage (collapse of the socket due to bone resorption) and to pave the way for subsequent treatment. However,one out of five teeth replanted after avulsion will heal and serve the patient for many years. Forthat reason, replantation should be, as a rule, treated, at least for psychological reasons and for gaining time in decision-making for definitive treatment.[4]

Treatment of an avulsed tooth is influenced by factors such as type of extraoral storage, time of extraoral storage, the condition of the periodontal ligament seriously damaged or not, and the stage of root development (open or closed apex). Combining a dry tooth and more than 2 hours of extraoral storage affects the tooth's long-term survival prognosis.[4] In this case, replantation was done within 2 hours after the accident. The avulsed tooth #21 was stored in a saline solution. Saline has physiological osmolality and pH, but it does not contain essential ions and glucose, which are fundamental for the cells, and this reason has been suggested as an interim storage medium for up to 4 hours.[7] Moreira-Neto et al. evaluated the viability of cultured cells and found 55% of living cells after four h storage and Pileggi et al. evaluated the PDL cells viability when maintained in this medium for 45 min and resulted in only 20% mortality.[7,8]

One visit for root canal treatment and permanent filling with composite resin was done on the avulsed tooth, extra orally

(Figure 2). Many guidelines offer canal treatment in closed apex avulsed teeth to avoid root resorption and periapical lesions.[1,4] After local anaesthetic administration, the tooth socket was gently rinsed with saline solution cleaned from blood and necrotic tissues. Flores et al. recommended removing the coagulum from the socket with a stream of saline, examining the alveolar socket, if there is a socket wall fracture, and repositioning it with a suitable instrument.[9] Recent investigations suggest that a coagulum in the socket at the time of replantation can enhance ankylosis.[5] After that, the avulsed tooth was reimplanted and fixed with a rigid metal splint by finger pressure, then splinted using an arch bar from #15 to #25 with circumferential wire for each element. Especially for tooth #21, a two-way circumferential wirewas carried out, as the binding wires were crossed with each other to obtain maximum stability. Splint is a device used to support, protect or immobilize to avoid possible damage to the pulp and periodontal tissue, which retards the repair of neurovascular bundle and reintegration of periodontal fibres broken by trauma. Stabilization was believed to help the periodontal ligament to have better repair conditions. However, those devices should be the least traumatic as possible.[10]

The following oral hygiene and dietary instructions were given according to the dental trauma guidelines: soft food diet for up to 2 weeks, teeth brushing with a soft or ultra-soft toothbrush after each meal. Analgesics and antibiotics were prescribed. Because the patient is a heavy smoker, during the treatment, the patient was provided education to reduce or stop smoking during the healing process. In heavy smoker patients, wound healing can be interrupted by tissue hypoxia. Normal tissue oxygen pressures are necessary for the entire reparative approach, including cell migration to wound sites, bacterial defence, and collagen synthesis.[6] When cigarette smoke is inhaled into the lungs, many of its toxic constituents, including nicotine, are of a particulate size that can either directly poison the cilia or pass the cilia barrier, undergo tissue absorption, enter the bloodstream, and gain access to other parts of the body. Nicotine exerts several specific effects that can influence wound healing. First, the proliferation of red blood cells, fibroblasts, and macrophages is diminished. Fibroblasts and macrophages transport healing substances to the wound area and produce scarring. Fibroblasts must be present to lay down collagen, and the collagen must be hydroxylated so it can form strands and weave a healthy scar. Second, nicotine has been associated with increased platelet

adhesiveness, which causes microclots and decreases microperfusion. Diminished microperfusion leads to thrombotic microvascular occlusion and, eventually, tissue ischemia. Third, nicotine produces cutaneous vasoconstriction even while the tissue is deprived of oxygen and blood flow. This vasoconstriction results from the release of adrenal and peripheral catecholamines, increasing heart rate, blood pressure, and oxygen demand.[11]

Control was done after four days, four months and three years. Clinical and radiographic examinations showed satisfactory functional and esthetic values for the avulsed tooth, but the gingival recession was within moderate normal limits. On CBCT radiograph, the mesial filling of the root canal began to show internal resorption (Figure 6). The periapical area began to show radiolucent lesions within normal limits. Andreasen et al. said that some favourable outcomes could be examined in following the patient, such as asymptomatic, normal mobility, normal percussion sound, no radiographic evidence of resorption or peri-radicular osteitis, and the lamina dura appears normal.[3]

CONCLUSION

Extra-alveolar handling, good replantation, good fixation and adequate oral hygiene education are the keys to success in treating a tooth avulsion, even in a heavy smoker.

CONFLICT OF INTEREST

There is no conflict of interest in writing this case report.

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