



Management of Laryngoscope-Induced Iatrogenic Dental Injury: A Case Series

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ABSTRACT

Dental injury is a common anesthesia-related adverse event, with a high incidence of damage to teeth and surrounding tissues during oro-endotracheal intubation. Poor oral hygiene, compromised periodontium, faulty or loose prosthesis, proclined maxillary incisors along with increased difficulty level of airway management, improper use of laryngoscope, and use of maxillary anterior teeth as a fulcrum for achieving accessibility to the airway are all risk factors for iatrogenic dental injury. This type of injury provides additional physical and psychological trauma to patients who have already undergone medical surgical procedures. The consequences of such mishaps might potentially result in medico-legal suits and financial claims.

The present case series described three cases of managing iatrogenic dental lesions during oro-endotracheal intubation, after obtaining written informed consent, as well as methods for preventing such accidental injuries. This study emphasized the importance of collaboration between medical and dental professionals in preventing and successfully managing accidental dental injuries.

Keywords: Dental injury, Anesthesia, Laryngoscope, Children.

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Introduction

Supraglottic Airway Devices (SAD), such as laryngoscopes, are used to induce general anesthesia [1]. These devices are necessary for oro-endotracheal intubation, which is a preferred procedure for general anesthesia due to its ease of access and more patient compliance [2]. A high incidence of damage to the teeth and surrounding tissues during oro-endotracheal intubation has been

reported [2]. The reported incidence in the US ranged from 0.17 to 12.1% [3]. According to Newland MC *et al.*, 1 out of 2,073 patients experienced the incidence of dental trauma while under anesthesia, specifically in maxillary incisors [4]. Besides, Hoffmann and colleagues reported a high incidence of laryngoscope-induced crown-root fractures (44.8%), followed by partial luxation (20.8%), and avulsions (20.8%) [5].

Peri-operative dental damage is therefore one of the most common anesthesia-related adverse events,

accounting for the highest number of malpractice claims against anesthesiologists [6]. Even when conducted by trained specialists, trauma, due to excessive force or inappropriate use of the laryngoscope can cause laryngeal edema, bleeding, dental, and soft tissue damage [7]. This can lead to hypoxia, regurgitation, aspiration, and even dental injury [8].

The incidence of dental trauma during orotracheal intubation is caused by several factors, such as poor oral hygiene, compromised periodontium, loose prosthesis, proclined maxillary incisors, retruded maxilla or mandible, severe malocclusion, and other syndromic anomalies. The most frequently associated risk factor is poor oral hygiene and instrument impingement against the dental arch [9]. Accidental dental trauma might also increase the risk of tooth or fragment aspiration, particularly in cases of cusp or incisal edge fractures, the presence of root fragments, or tooth mobility [8]. Difficult intubations necessitate extra force on the laryngoscope blade as glottis cannot be directly visualized, and the anesthesiologist might sometimes utilize the upper teeth as a fulcrum to position the laryngoscope [8]. This considerably increases the risk of traumatic dental injury during laryngoscopy [10].

The present case series consisted of three cases, reported to the Emergency Department of Pediatric and Preventive Dentistry, in which the patient's teeth were either luxated or avulsed during intubation for ENT surgical procedures.

Case Presentation

This report delineates a series of three cases presented to the Department of Pediatric and

Preventive Dentistry due to an iatrogenic traumatic dental injury sustained during a surgical procedure while general anesthesia was being induced. Each patient was thoroughly examined, counseled, and treated for their injuries. Prior to dental management, written informed consent was obtained from their parents or their legal guardians.

Case 1: Management of Iatrogenic Avulsion of Maxillary Left Central Incisor After Adenoidectomy Procedure

A 10-year-old female patient was reported with mobility of an iatrogenically avulsed upper incisor that was immediately reimplanted on-site during an adenoidectomy procedure. The patient was referred immediately after the surgical procedure. During the surgical procedure, the permanent maxillary left central incisor was avulsed and relocated with a finger pressure in the operating room [Figures 1a, 1d]. When the parents were informed about the mistake, they were extremely nervous. The clinical examination revealed no extra-oral injuries. Intra-oral examination showed mixed dentition with upper incisor proclination, a narrow arched palate, and upper and lower anterior crowding. The maxillary left central incisor showed Miller's Grade II mobility. [Figures 1b and 1e].

The tooth was firmly repositioned into the socket with finger pressure and splinted for 4 weeks using semi-rigid fixation with 26-gauge SS wire and composite resin [Figures 1c and 1f] [11]. The patient was followed up after 1 week, 4 weeks, 3 months, and 6 months. After 3 months, the teeth showed a good prognosis, with healthy, asymptomatic periodontium, and showed no signs of periapical infection.

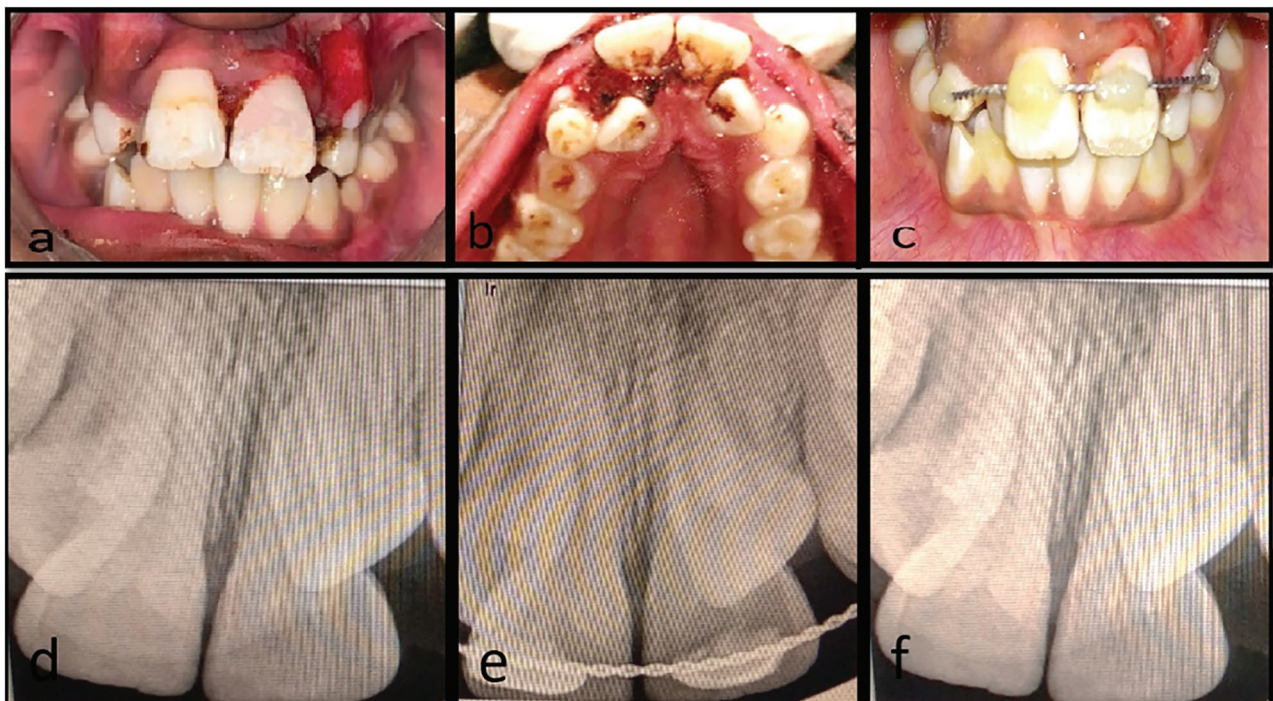


Fig. 1. a. Pre-operative frontal view showing reimplanted #21; b. Pre-operative maxillary occlusal view showing traumatic injury to maxillary incisors; c. Post-operative frontal view showing flexible splint; d. Pre-operative radiograph; e. Post-operative radiograph; f. Radiograph after 3 months follow-up

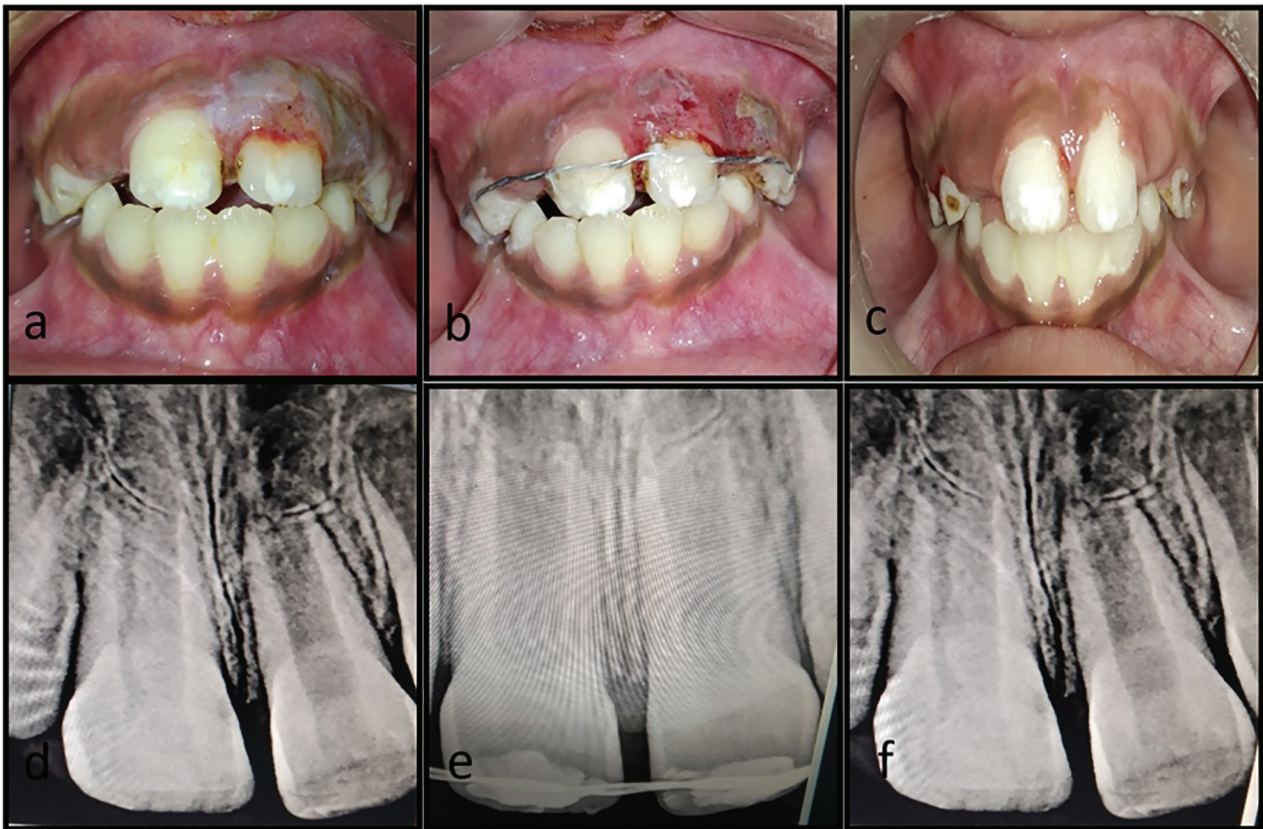


Fig. 2. a. Pre-operative frontal view showing reimplanted #21; b. Post-operative frontal view showing flexible splint; c. Frontal view at 3 months follow up; d. Pre-operative radiograph showing immature roots of #11 and #21; e. Immediate post-operative radiograph; f. Radiograph after 3 months follow-up

Case 2: Management of Iatrogenic Avulsion of Maxillary Left Central Incisor after Tonsillectomy Procedure

An 8-year-old female patient was presented with mobility of the upper front permanent tooth. The parents gave a history of mobility of the tooth after the tonsillectomy procedure under general anesthesia, and the same was mentioned in the discharge summary. During the tonsillectomy procedure, the maxillary left central incisor (#21) was avulsed and repositioned under finger pressure. The patient was crying and tensed co-operative. There were no significant extra-oral findings. On intra-oral examination, mixed dentition was present with Grade II mobility in #21 [Figures 2a and 2d].

The tooth was stabilized using a flexible splint for 4 weeks [Figures 2b and 2e]. After 4 weeks and 3 months of follow-up, the teeth showed a clinical and radiographic favorable prognosis [Figures 2c and 2f].

Case 3: Management of Iatrogenic Luxation of Maxillary Central Incisors after Surgical Procedure

A 9-year-old male patient reported extreme mobility of the upper front permanent teeth. The parents reported toothmobility following a surgical procedure under general anesthesia. Intra-oral examination revealed a mixed dentition stage with upper anterior teeth proclination and anterior open bite. Grade III mobility was presented in both

maxillary central incisors [Figures 3a and 3d]. The tooth was stabilized with semi-rigid fixation and then followed up. At one and three months follow-up, the teeth were clinically and radiographically asymptomatic [Figures 3b, 3c, 3e, and 3f].

Discussion

Dental injury caused by endotracheal intubation during general anesthesia is a common complication [12]. Dental injuries can include crown fracture, subluxation, luxation, avulsion, crown and root fracture, and damage to dental restorations, and prostheses [9]. Newland *et al.*, reported that maxillary incisors were the most frequently injured teeth, with the risk being approximately 20 times higher in patients with poor hygiene or reconstructive prosthesis [4]. In the present case series, two cases were reported with avulsion of one maxillary central incisor and one with luxation of both maxillary central incisors.

Darawade DA *et al.*, found that predisposing factors such as poor hygiene, periodontal disease, skeletal deformities, TMJ disorders, loosened prosthesis, maxillary proclination, and other syndromic anomalies were associated with a high risk of such incidents [13]. Besides, decreased mouth opening could inadvertently cause the anesthetist to utilize maxillary central incisors as a fulcrum for laryngoscope positioning to obtain a

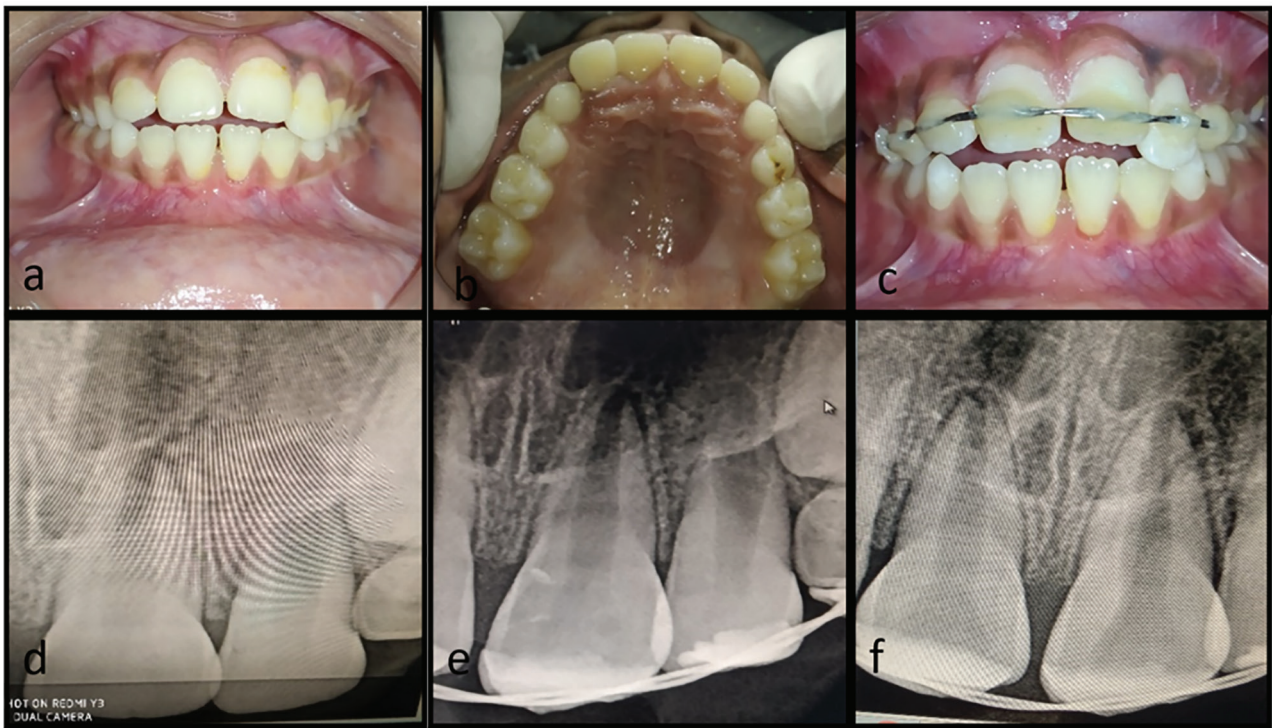


Fig. 3. a. Pre-operative frontal view; b. Pret-operative maxillary occlusal view; c. Post-operative frontal view showing flexible splint; d. Pre-operative radiograph showing immature roots of #11 and #21; e. Immediate post-operative radiograph

satisfactory view of the glottis. In the present case series, all the cases showed features of maxillary incisor proclination. Two cases had narrow arched palates and crowded dentition, and one case had a constricted maxillary arch and anterior open bite, which could have been predisposing factors in the present condition.

The maxillary anterior sextant is the most typically implicated region, with maxillary left central incisors being more susceptible than the right. This might be due to excessive force on the left side by the majority of right-handed anesthesiologists [9, 10]. Similarly, the left maxillary central incisor was involved in all the cases of the present study.

As per IADT guidelines, an extra oral dry time of less than 60 minutes, for an avulsed tooth, favors a more positive outcome [14]. The patients in the present study underwent replantation of permanent incisors within a few seconds after avulsion during the surgical procedure. Appropriate emergency management plays a significant role in determining the positive prognosis of dental treatment. Contrastingly, Surekha *et al.*, reported that successful replantation of permanent teeth even after a dry storage of 1 week yielded productive results [15].

Conclusively, the dental status of patients undergoing general anesthesia should be evaluated preoperatively as part of the pre-anesthetic evaluation. This will help in the identification of potential risk factors that may reduce iatrogenic dental injuries during laryngoscopy. The pre-anesthetic evaluation should include a dental history, an oral examination, and a discussion with the patient about any existing dentures or crowns. The dental examination must

include an assessment of the patient's upper incisors, which are the most likely to be injured, for any pre-existing damage. In addition, anesthesiologists must take adequate intra-procedure precautions to prevent/minimize iatrogenic dental injury [6]. An appropriate selection of equipment during surgery can significantly reduce the chances of an accident. The flange of the Macintosh blade is frequently responsible for dental injuries. Angulated blades, such as the McCoy and Belscope blades, were reported to provide greater tooth-blade distances and better visibility than regular curved or straight blades. Therefore, using these blades should often be done to prevent laryngoscopic mishaps. The use of protective dental splints during surgery significantly decreases the force transmitted to maxillary teeth during laryngoscope application [3].

Perioperative traumatic dental injuries are one of the most common adverse effects of endotracheal intubation accidents, resulting in expensive dental treatment and medico-legal claims. To avoid such injuries in children and adults, the dentist, anesthetist, ENT surgeons, and pediatric surgical team should collaborate and commit to working together. Understanding and recognizing the multiple associated risk factors helps to prevent dental complications; thus, avoiding legal suits. Psychological trauma to patients, especially school-aged children and parents, should be prioritized and counseling with reassurance must be provided. Awareness of iatrogenic risk factors, as well as developing a standard protocol for managing dental trauma, would lead to more satisfactory patient outcomes. A good collaborative rapport between

the dental and medical teams can significantly reduce the effect of iatrogenic errors in medical practice.

Declaration

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