

Case Series: Successful Resuscitation of Severe Facial Injuries Caused by a Chainsaw

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The treatment outcome remains poor of severe facial injuries because of the high risk of compromised airway or massive bleeding. We experienced two successful treatment cases of severe facial injury by the chainsaw. A 52-year-old male had his face injured by the chainsaw during his work. He was transferred to the Level I trauma center using the Doctor-Helicopter. During his flight, bleeding control was tried and the information was given to the trauma surgeons before his arrival. His consciousness was alert and the vital signs were stable. The crushing wound, mandible open fracture, deep laceration of tongue, lip, neck and arterial bleeding were noted around his mandible. Nasotracheal intubation was performed under the bronchoscope-guided. Emergency operation (open reduction & internal fixation, primary repair with neuroorrhaphy) was performed. At 30 hospital days, he was discharged with facial palsy on left mandibular area. A 30-year-old male had his face injured by the chainsaw. He was transferred to our Level I trauma center from the local hospital. The deep-multiple lacerations on right upper eyelid and forehead with the bony exposure were noted. The vital signs were stable and emergency operation was performed. He was discharged at 20 hospital days. Bone loss or tissue loss were not devastating than we expected even though the injury was occurred by the chainsaw. Aggressive treatment including airway manipulation or bleeding control and maximal opportunity of therapy are absolutely needed.

Keywords: Facial injuries; Crush injuries; Emergency treatment

INTRODUCTION

Chainsaw, a mechanical saw widely used by individuals at homes and construction industry fields, can cause various devastating injuries to multiple body parts. Despite few reported studies, little is known about the incidence and characteristics of chain-

saw-related injuries [1-5]. Emergency physicians (EPs) often encounter patients with chainsaw-related injuries in emergency department (ED) in South Korea. In this study, we report two cases of severe facial injuries caused by a chainsaw that were successfully treated with initial systematic emergency care and definitive surgery.

CASE REPORT

Case 1

A 52-year-old male patient severely injured his face with a chainsaw during his logging work. He had cut branches without facial shield. The blade of chainsaw hit his face through unintentional body motion due to slip. He was transferred to the Level I trauma center by a doctor-helicopter. He was conscious, and the airway was secured despite massive facial injury. During scene inspection, EP noted crushing wound with open mandibular fracture; deep lacerations of the tongue, lip, and neck; and arterial bleeding around his mandible. The patient's blood pressure and heart rate were 135/80 mmHg and 100 beats/min, respectively. He leaned against the seat and raised his head to maintain the airway patency during helicopter transportation. The wounds were compressed with hemostatic gauzes. Trauma team activation was performed before helicopter arrival through social network system hotline. Bronchoscope-guided nasotracheal intubation was performed after ED arrival. Facial crushing wounds, open mandibular fracture, and partial tongue laceration were noted, and neurovascular injury was highly suspected based on the physical examinations performed after intubation (Fig. 1). Moreover, mild metabolic acidosis was noted (pH 7.3, PaO₂ 90 mmHg, PaCO₂ 30 mmHg, bicarbonate 15 mEq/L, base excess -4.1 mEq/L), and hemoglobin level was 9 g/dL. For the first time, a successful primary repair was not expected due to massive bone and tissue loss. Emergency operation (open reduction and internal fixation and primary repair with neuroorrhaphy) was performed by the trauma team, and the patient was discharged with facial palsy on the left mandibular area at 30 days postoperatively (Fig. 2).

Case 2

A 30-year-old male patient injured his face with a chainsaw. He was transferred to our Level I trauma center from a local hospital. Multiple deep lacerations on the right upper eyelid and forehead with bony exposure were noted. He was conscious, and the vital signs were stable. Emergency operation was performed by the trauma team, and he was discharged at 20 days postoperatively (Fig. 3).

DISCUSSION

In case of chainsaw-related injuries, experienced EPs are aware of the potential risk of treatment in patient. However, little is known about the incidence and characteristics of these injuries. Studies reported on chainsaw-related injuries are mostly case reports. The annual number of patients with chainsaw-related injuries was reported to be 23,000 in the United States [6]. Most of the patients were

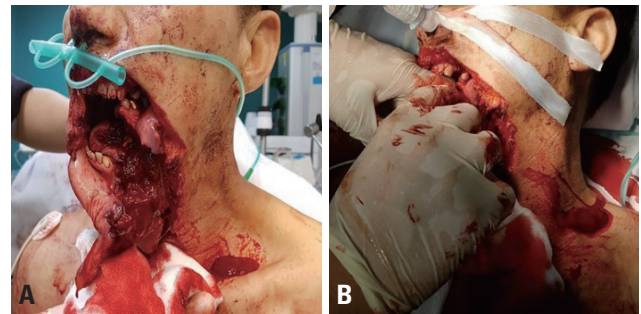


Fig. 1. Facial crushing injuries caused by a chainsaw (A) before and (B) after nasotracheal intubation, which was performed at the resuscitation room at the trauma center.



Fig. 2. (A) Primary repair with emergency open reduction without graft surgery of bone and skin. (B) Neuronal palsy was remained after surgery.

male (95%), and the injuries most frequently occurred in the age group of 30–59 (57%). Although, there is no defined index to estimate the incidence of chainsaw-related injuries in South Korea, the frequency can be estimated according to the Korean government reports on the accidents in industrial fields. According to the report of the Occupational Safety and Health Research Institute in Korea, the number of patients who experienced amputation, cut, or stab injuries was 3,680 (8%) during 2013–2017 [7]. Additionally, the Ministry of Employment and Labor in Korea reported that there were 8,752 patients with amputation, cut, and stab injuries in 2017, and this constituted 10% of the total industrial accidents [8].

In the United States, 58% of the injuries occur at home [6], whereas in Europe, most of the accidents occur at industrial fields [9]. This difference is based on different cultural techniques in using these tools. This factor should be considered while collecting data in South Korea. In the United States, the most frequent type of chainsaw-related injury is laceration (81%), which most frequently injures hands (28.8%), knees (17.6%), and calves (12.5%) [6]. The injury pattern in the United States is different from that in the Europe. Injuries caused by fallen objects while operating a chainsaw are more frequently observed (47.7%) than direct injuries caused by a chainsaw itself (39.3%). In the case of injuries caused by fallen objects,

heads (34.8%), torsos (25.0%), and legs (16.8%) are commonly injured [9].

The basic treatment concept for chainsaw-related injuries is not different from that for other types of injuries. Patients with superficial wounds can be discharged from ED after primary repair and can visit the outpatient clinic for follow-up purposes. Only 3.6% of the total patients with chainsaw-related injuries are hospitalized for care [6]. Initial emergency care including airway patency is paramount in the cases of facial injury due to the possibility of the compromised airway or vascular injury. In the case 1, the patient was transported by a doctor-helicopter. In South Korea, board-certificated EPs are usually present on such helicopters. Therefore, initial advanced airway maneuver such as nasotracheal intubation is performed on patient by the EP on board. In this case, the patient was conscious and the airway patency was maintained despite the crushing wound, and thus nasotracheal intubation was not performed at the scene or in the helicopter. However, we focused on the bleeding control. Moreover, aspiration of blood from the oral cavity is possible in supine position; he thus leaned against the seat in head-up position to prevent the aspiration. Thereafter, active bleeding was not observed during the transportation to hospital. After ED arrival, bronchoscope-guided nasotracheal intubation was performed to minimize the additional injury to the perioral area. Emergency internal fixation surgery without skin graft was successfully performed by the trauma team.

To prevent any chainsaw-related injuries, it is necessary to wear protective equipment and to be familiar with properly handling the tool. In most countries, statutory guidance on using a chainsaw is inadequate; however, accidents are believed to occur despite cautious use.

Trauma team members do not frequently encounter patients with chainsaw-related injuries. According to the Advanced Trauma Life Support guidelines, the basic concept of airway–breathing–circulation is paramount in emergency care. Maintaining airway patency is the priority after facial injuries. In this study, although injuries were caused by a chainsaw, bone or tissue loss was not as devastated as expected and the primary repair was thus possible. Once the airway patency and stabilization of the vital signs have been achieved, it is possible for patients to



Fig. 3. (A) Multiple deep lacerations on the right upper eyelid and forehead with bony exposure were noted on emergency department arrival. (B) Primary closure was performed without complications.

resume their daily life. Hence, we suggest that aggressive treatment, including airway manipulation or bleeding control and maximal therapeutic opportunity, is required in cases of severe facial injuries related to chainsaw.

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