

Case report

Pediatric facial trauma management: Emergency case in a toddler

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ABSTRACT

Background: Facial soft tissue trauma cases are often encountered in the emergency room. Soft tissue trauma, especially to the face, is rarely life threatening. It varies in shape, size, and depth and can also affect surrounding organs. The treatment of soft tissue trauma can be complicated and may have a significant impact on facial function and, especially, facial aesthetics. Children are easily injured due to their active nature. Soft tissue trauma to the faces of toddlers is challenging even for experienced surgeons; however, wound debridement and suture management under general anesthesia should be considered. **Purpose:** The aim of this article is to deliver a thorough overview of the evaluation and treatment of soft tissue injuries in children, covering initial assessments, physical examinations, the application of antimicrobial therapies, and preparation for surgical procedures. **Case:** An 11-month-old girl went to the emergency department of Hasan Sadikin General Hospital, Bandung, with injuries to her left cheek and upper left lip sustained when she fell, and her face hit the edge of a cement pot at home. There was no history of unconsciousness, nausea and vomiting. The injury was diagnosed as vulnus laceratum of the left face and upper lip region. **Case management:** Emergency management was carried out by triage, Tetagam injection, and early wound debridement and suture under general anesthesia because the patient was uncooperative. Wounds on the face and lips were primarily sutured layer by layer, returning the wound edges to their normal anatomical position. **Conclusion:** The management of facial soft tissue injuries in toddlers requires general anesthesia for adequate and accurate wound debridement and suture, so that functional and aesthetic effects can be satisfactorily obtained.

Keywords: Face; general anesthesia; toddler; trauma; soft tissue

Article history: Received 8 August 2023; Revised 31 March 2024; Accepted 30 April 2024; Published 1 December 2024

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INTRODUCTION

Trauma is a significant cause of both morbidity and mortality in children within the United States, with the head being the most frequently involved part of the body in cases of child trauma.¹ Facial trauma can encompass injuries to soft tissues, bones, and neurovascular structures, resulting from trauma to areas such as the eyes, nose, mouth, bones, and skin. The patterns and treatment of these injuries in adolescents are generally comparable to those in young adults. Although facial injuries are often isolated, it is crucial to assess for potential concurrent head or neck trauma. While facial injuries themselves are typically not life-threatening, complications such as

fractures, bleeding, oropharyngeal damage, and burns can pose significant risks, particularly to the airway.² Most cases of trauma in children are limited to soft tissue and dentoalveolar trauma.³ Soft tissue trauma to the face is a common injury seen in the emergency department.⁴ Functional and aesthetic problems after facial soft tissue trauma are a challenge in the repair of any facial soft tissue injury.⁵

Early definition of the free tissue injury is important for addressing the complexities involved in managing such an injury and obtaining improved functional outcomes. Addressing both aesthetic and functional aspects improves patient outcomes significantly.⁶ The relatively larger skull size in infants and young children predisposes them to

different injury patterns compared to adults.² In addition, the active nature of toddlers results in them being easily injured. The cause of facial tissue trauma in children is closely related to age, with falls being the most common among infants and toddlers. Due to their relative size and surface area to volume ratio, children are at a higher risk for multisystem injuries, with a potential for rapid decompensation caused by hypovolemia and hypothermia. As children grow older, the frequency and severity of injuries tend to increase, with boys being more commonly affected than girls.¹ Soft tissue trauma to the face of toddlers is challenging even for experienced surgeons; however, debridement and suturing management under general anesthesia should be considered.⁷

The management of maxillofacial trauma in children must be carefully planned, taking into consideration that, unlike adults, children are still growing and developing. Improper management can lead to complications such as growth disturbances. Therefore, a thorough understanding of the characteristics of pediatric maxillofacial trauma is essential for clinicians to make accurate diagnoses and select appropriate treatment methods.⁸ The head and neck examination should be methodical, thorough, and appropriate. In certain cases, a patient's age may limit their ability to comply with examination, making sedation or general anesthesia necessary for a comprehensive assessment. All abrasions, lacerations, and contusions should be examined, with any obstructions such as bandages and secretions removed. Lacerations should be evaluated

for tissue loss, viability, and depth, with consideration given to the possibility of using these wounds as surgical access points for fracture repair. Additionally, facial motor and sensory nerve functions should be documented whenever possible before any surgical intervention for wound treatment.¹ Digital photography is essential for documentation and can aid in counseling families about aesthetic concerns, as well as supporting multidisciplinary surgical planning. Radiological imaging should minimize radiation exposure in pediatric patients to reduce associated risks while ensuring that the diagnostic imaging is both effective and reliable.⁹

The purpose of this case report is to describe a comprehensive approach to the evaluation, management, and surgical repair of facial soft tissue injuries in a pediatric (toddler) patient, emphasizing the utilization of general anesthesia for uncooperative patients. This case report aims to detail the diagnostic challenges, treatment strategies, and outcomes of managing such injuries in toddlers, drawing attention to the importance of a multidisciplinary approach and the careful consideration of pediatric anatomical and physiological characteristics to achieve optimal functional and aesthetic results. Through the presentation of this case, the report seeks to contribute to the existing body of knowledge on pediatric facial trauma management, offering insights that can assist clinicians in making informed decisions when faced with similar cases, thereby enhancing patient care in pediatric maxillofacial trauma.



Figure 1. Clinical picture of patient: A. Extra-oral, B. Intra-oral.

CASE

An 11-month-old female patient was brought by her mother with complaints of bleeding from the face and mouth. Four hours prior to admission, the mother slipped and fell while carrying the patient. As the mother fell, the patient's face and lips hit the sharp corner of a cement flowerpot. Three hours prior to admission, the patient was taken to the public hospital in the Ujung Berung area, but nothing was done there. She was referred to the public dental hospital in the Riau area where, two hours prior to admission, wound debridement was performed and the wound closed with gauze. She was then referred to the emergency department at Hasan Sadikin General Hospital for further treatment. There was no history of unconsciousness, nausea, and

vomiting in the patient. There was a history of bleeding from the mouth and face. There was no history of bleeding from the nose and ears.

The initial examination followed the principles of Advanced Trauma Life Support (ATLS), including both a primary and secondary survey. The primary survey found Airway: Clear. Figure 1A shows the findings of the extra-oral examination: edema and hematoma in the left facial region and left upper lip, lacerations on the left face with a size of 5x3x1 cm and left upper lip with a size of 1x0.5x0.5 cm, irregular edges, muscle-based, abrasive wound on the patient's left face. Intra-oral examination found a laceration on the left upper lip with a size of 2x2x1 cm, irregular edges with a muscle-based wound, as seen in Figure 1B.

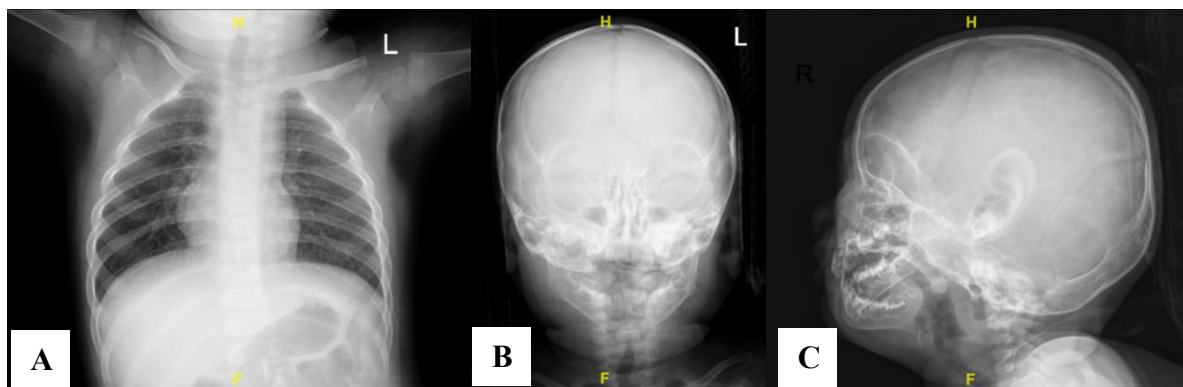


Figure 2. Patient's x-ray: **A.** Chest x-ray, **B, C.** Skull AP and lateral x-rays.



Figure 3. Intraoperative photo: **A.** Wound debridement, **B.** Post suturing.



Figure 4. Patient evaluation, A. Post operative day (POD) I, B. POD II, C. POD III, D. POD IV, E. POD VI, F. POD VII.

Covid-19 antigen was negative, and complete blood test was performed with result Hb: 11.7 g/dL; Ht: 35.6 g/dL; leukocytes: 18.61/mm³; erythrocytes: 4.90 million/uL; GDS: 109 mg/dL; Na/K: 139/4.7 mEq/dL. Chest and skull AP and lateral x-rays were performed with normal results, as seen in Figure 2A–C.

CASE MANAGEMENT

Informed consent was obtained from the patient's family regarding diagnosis and treatment plans. The patient was diagnosed with a lacerated wound at left face and upper lip region based on previous examinations. Treatment included injections of anti-tetanus agent (intramuscular), broad-spectrum antibiotic (ampicillin 175 mg, intravenous), analgesic (paracetamol 175 mg, intravenous), re-debridement, and covering the wound with gauze and plaster to stop bleeding and keep the wound from being exposed to contaminants. The patient was referred to the anesthesia department for definitive treatment involving suturing the intra- and extra-oral wounds in the operating room under general anesthesia.

Definitive treatment began with sedation followed by adrenaline injection and intubation to secure the airway. Asepsis for extra- and intra-oral areas to reduce the risk of microbial contamination was performed using 10% povidone-iodine, followed by draping the operating area with a sterile drape. Prophylactic antibiotics were given before the suturing procedure, using an ampicillin injection 500 mg by intravenous drip. Local anesthesia using Pehacain was performed in the intra- and extra-oral wounds; the wound edges were then trimmed using Metzenbaum scissors, and this was followed by tissue dissection and wound cleaning using 0.9% NaCl and chlorhexidine. This process of wound debridement can be seen in Figure 3A, and the suturing result can be seen in Figure 3B.

Suturing the wound started from the intra-oral area using Silk 5-0 and continued with muscle suturing using Vicryl 4-0. Suturing the extra-oral laceration was performed after all intra-oral and muscle suturing was complete, using Nylon 6-0 to suture the cutaneous area. After all lacerated areas were sutured, the operating areas were cleaned, followed by removal of the sterile drape and extubation. The patient was observed in recovery room for one hour until she regained consciousness. She was then moved to the ward for further observation for 2 days, whereafter she was discharged and scheduled for routine check-ups every day for seven days.

Routine evaluation of the patient carried out at Hasan Sadikin General Hospital Oral and Maxillofacial Surgery Department for seven days, involving cleaning the sutured area and wound care using tulle, gauze, and plaster, can be seen in Figure 4A–E, with one image for each day. Intra- and extra-oral sutures were removed after seven days of evaluation, and the result can be seen in Figure 4F.

DISCUSSION

The initial management of children with facial soft tissue trauma uses ATLS principles to stabilize the patient's general condition before establishing the diagnosis and treatment plan. The rapid initial assessment and diagnostic workup guided by the ATLS protocol enables the identification and management of potentially life-threatening injuries in a prioritized sequence, utilizing a standardized and internationally validated checklist.¹⁰ This approach, adopted in our case, underlines the necessity of managing pediatric trauma with a systematic protocol which can significantly influence outcomes in pediatric emergency care. Initial management for this patient was performed according to ATLS principles, namely with a primary and secondary survey.⁶ This approach ensures that potentially life-threatening injuries are promptly identified and managed, underscoring its importance in pediatric emergency care settings.⁶

The ATLS principles offer a systematic and internationally validated checklist for the initial assessment and diagnostic workup, which is essential for identifying and managing potentially life-threatening injuries in a prioritized sequence. This standardized approach ensures that all critical aspects of trauma care are addressed efficiently and effectively, which is especially important in pediatric cases where manifestations of trauma can be subtle and patients may be unable to clearly communicate their symptoms or the extent of their injuries.¹¹ The primary survey of the patient was followed by a secondary survey with clear results; there were no injuries in other parts that required emergency treatment to stabilize the general condition. The primary and secondary survey findings in our case—clear airway despite edema and hematoma in the left face and upper lip region, along with specific lacerations—underscore the critical importance of a detailed and methodical examination process. Our findings echo the need for emergency departments to be adept at employing ATLS protocols in young children, a practice that could be universally beneficial across similar cases.

An anamnesis (medical history taking) and physical examination were conducted after the initial ATLS assessment to understand how the injury occurred in the patient. Since the patient was just 11 months old and couldn't describe what happened, the medical team gathered this information from the patient's family, a process known as alloanamnesis. This essential step ensures that the medical team understands the exact nature of the trauma to provide the best possible care. A physical examination of the face is carried out by paying attention to signs of surface injury, the possibility of a penetrating wound, the presence of a foreign body in the wound, and the presence of avulsed or missing tissue. In this patient, lacerations were found on the lips, with irregular wound edges, several foreign bodies in the wound, and no avulsed tissue.

Traumatic injury occurs due to mechanical trauma, such as accidental bites, impacts, or injuries from objects, and can also result from falls during play.¹² Trauma to soft tissues generally does not require special diagnostic tools, but radiographic evaluation is necessary to determine whether there is a fracture in the area of the facial bones and orbits. Chest and skull AP and lateral x-rays were performed as supporting examinations: the chest x-ray to assess whether there was an injury in the thoracic area and cardiopulmonary assessment of the patient for general anesthesia, and the skull AP and lateral x-rays to assess whether there was an injury in the facial bones and their supports. This adoption of this standardized approach in similar cases can improve the quality of care for pediatric patients with facial traumas. Pediatric emergency care protocols could benefit from incorporating these specific insights into their management strategies. Emphasizing the use of ATLS principles, understanding the unique challenges posed by pediatric patients, and ensuring a thorough diagnostic workup could enhance the care of pediatric patients with facial soft tissue trauma. A Covid-19 antigen swab examination and complete blood laboratory were performed on this patient as preparation for general anesthesia and to assess the risk of blood loss and infection in the patient, taking into account hemoglobin and leukocyte parameters. The leukocyte value was elevated (18.61 uL) was found, while other parameters were within normal limits. This case serves as a pertinent reminder of the complexities involved in pediatric trauma care and the necessity of adopting a nuanced approach to treatment that addresses both medical and psychological needs.

Management of facial soft tissue trauma must be carried out immediately even though this condition is not life-threatening, as prompt management of facial injuries can be associated with increased aesthetic results and postoperative function. It was decided to treat this patient immediately treated under general anesthesia, due to patient's uncooperative behavior.⁴ This case exemplifies the broader implication that pediatric emergency care must be adapted to the specific behavioral and physiological needs of children, and a multidisciplinary approach, involving anesthesiologists and maxillofacial surgeons to manage complex pediatric traumas, may be required to ensure the delivery of appropriate and effective treatment. Definitive treatment for this patient was conducted in the operating room under general anesthesia. In cases of traumatic wounds, immediate cleaning of blood and debris must be performed using moistened gauze, irrigation, or suction.¹² Wound debridement uses saline water and povidone-iodine to clean intra- and extra-oral wounds.⁷ Debridement was performed to remove foreign bodies adhering to the wound, the edges of the wound were trimmed, and dissection was performed using Metzenbaum to obtain regular wound edges so that the approximation of the wound obtained maximum aesthetic results.⁷

The primary goals of suturing are to achieve wound edge apposition, provide adequate tension, maintain hemostasis,

aid in wound healing, prevent infection, and create an aesthetically pleasing scar by accurately approximating the skin edges.¹³ Proper wound closure is crucial in determining the overall surgical outcome. Suturing is the most common method for closing intra-oral wounds.¹⁴ Conventional suture materials like silk and vicryl necessitate knots to secure tissue approximation and prevent suture loosening.¹⁴ Primary suturing was performed in the intra-oral area using Silk 5-0, and then muscle suturing was performed using absorbable materials (Vicryl 5-0).⁷ Silk sutures, being natural and non-resorbable, have demonstrated greater reliability compared to synthetic and resorbable PGA threads, making them recommended for intra-oral sutures where high reliability is essential.¹³ Absorbable antibacterial Vicryl Plus (Ethicon Inc, Somerville, NJ, USA) sutures are a new type of biotechnological material widely used for surgical incisions. Due to their features, such as being absorbable in the body, non-irritating to tissues, and having antibacterial properties, they can enhance wound healing. Additionally, they do not require removal which can be painful or unpleasant for the patient, nor do they necessitate an additional postoperative appointment for suture removal.¹⁵ The careful management of soft tissue injuries in this case, with attention to both functional and aesthetic outcomes, highlights the need for meticulous surgical techniques in pediatric facial trauma care, encouraging the adoption of best practices that prioritize long-term outcomes for pediatric patients.

Suturing the extra-oral laceration was performed after all intra-oral and muscle suturing had been done, using Nylon 6-0. Nylon has the highest tensile load due to its high elongation rate.¹⁶ Nylon sutures can be both monofilamentous and braided. Nylon sutures are synthetic polyamide polymer fibers that are biocompatible and present low inflammatory response in infected wounds.¹⁷ Nylon, a non-absorbable material, minimizes inflammation and is recommended for contaminated cutaneous wounds.⁷ After completing the definitive treatment, the patient was admitted to the hospital and followed up routinely for seven days.

The patient was reported to be in good condition on the seventh day post operation; there were no significant complaints, and the suture wound appeared intact but left a scar. There were no functional disorders such as speech, eating, or facial expression disorders. To ensure comprehensive, holistic oral, dental, and facial aesthetic care for the patient in the future, it is crucial to adopt a multidisciplinary approach involving pediatric dentistry and maxillofacial surgery. Regular follow-ups are essential to monitor the patient's development and address any emerging issues promptly. Additionally, incorporating psychological support can help address any emotional or psychological impacts, ensuring that the patient's overall well-being is cared for alongside their physical recovery.

The broader applicability of these insights to all pediatric facial trauma cases may be limited due to variations in injury types, patient responses to treatment,

and other unique case factors. The absence of a comparative analysis with similar cases or a broader review of pediatric facial trauma management practices further narrows the scope of conclusions that can be drawn from this report. Acknowledging these limitations is crucial for readers, and future research that includes a larger cohort of patients, comparative studies, and longitudinal follow-up would be invaluable in validating and expanding upon the insights gained from this case report.

This case report on the management of emergency facial soft tissue trauma in a toddler has elucidated several key insights and lessons that hold significant implications for wider clinical practice, particularly in the field of pediatric emergency care and maxillofacial surgery. The successful management of the patient, despite the challenges posed by the patient's age and the nature of the injury, underscores the importance of a multidisciplinary approach and the need for specific strategies in suturing pediatric patients. A broader implication for pediatric emergency care is advocating for protocols that are both comprehensive and adaptable to the unique needs of pediatric patients. This case, therefore, not only contributes to the clinical understanding of pediatric facial trauma management but also underscores the need for ongoing education and protocol development in pediatric emergency care settings. Lastly, this case highlights areas for future research, including the development of guidelines for anesthesia management in pediatric facial trauma and studies on the long-term outcomes of different surgical techniques in young children.

In conclusion, treating pediatric facial trauma requires a multidisciplinary approach to ensure precise and effective care, with initial evaluations like ATLS being crucial for guiding the treatment process. Post-surgery, regular check-ups are vital to monitor healing and address any developmental concerns, highlighting the need for a comprehensive and careful approach in pediatric facial trauma management.

ACKNOWLEDGEMENTS

The author would like to thank supervisors, patients and families, all parties who have helped in writing this case report.

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