

Management of Mandibular Fracture and Lacerated Wound due to Machete Trauma in Children: Case Report

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Abstract

Introduction: The facial fractures in pediatric patients are rare, and they need an immediate treatment to recover the function and aesthetic to the young patients. Anatomic reduction along with rigid skeletal stabilization is mandatory until bone union has occurred. Special consideration about variation in anatomy and physiology of pediatric patients, as well as the particular stage of growth and dental development should be preferred.

Case report: We present a case of 5 year old girl patient with fractures of the parasymphiseal and left angle of mandible horizontally and vertically unfavourable, with significant displacement and huge lacerated wound of the face caused by machete slashed. We successfully managed the pediatric complex mandible fractures by performing open reduction internal fixation using resorbable miniplates and gunning splint as intermaxillary fixation.

Conclusion: Pediatric mandible fractures requiring ORIF are rare. The combination of intermaxillary fixation and resorbable fixation system is needed postoperatively because of the extensive fractures for adequate fixation and good outcomes.

Keywords: management, mandibular fracture, lacerated wound, children

Introduction

Mandibular fracture is the most common of all facial fractures in children. The most common locations for mandibular fractures in children are the condylar, symphysis/parasymphysis, angulus, and corpus. The condition of mandibular fractures is characterized by the presence of mandibular bone discontinuity caused by facial trauma or pathological conditions. In children, this case is a particular concern because the mandibular and teeth are still in their infancy and can cause stunted mandibular growth.

Diagnosis in mandibular fracture patients can be made from clinical examination, palpation of the suspected fracture area, and panoramic x-ray as the main modality for evaluating mandibular fractures. The incidence of mandibular fracture in children is less than 15% of the total number of fracture cases and mostly occurs in boys. The main etiology of mandibular fractures can vary from country to country. Traffic accidents, sports injury, and falls are the most common causes. Mandibular fractures are also found in cases of child abuse.

Some cases of child abuse can cause lacerations (*vulnus laceratum*). The clinical condition of *vulnus laceratum* looks like an irregular or ragged wound. In patients with *vulnus laceratum*, wound care should be performed. The impact or consequence of not doing wound care is the occurrence of hematomas, soft tissue necrosis, keloids, scars, and infections.

The management of mandibular fractures in children is generally same from adults, but the growth and development of the facial bones in children is a separate consideration. The principles of mandibular fracture management include recognition, reduction, stabilization, and fixation. All of these principles must be applied to consider the impact that will occur in the future on the growth and development of children. Open reduction internal fixation (ORIF) is one of the treatments carried out by performing resorbable fixation and intermaxillary fixation as a stabilization process after ORIF.

This case reports aims to explain the management of mandibular fractures and *vulnus laceratum* caused by sharp objects that occurs in children. The management requires optimal action by a specialist in oral and maxillofacial surgery.

Case Report

A 5 year old female patient was brought to RSUP dr. Hasan Sadikin Bandung with complaints of bleeding from the face and fracture in lower jaw. While the patient was asleep, suddenly someone with a sharp object slashed the patient's face and hands. The patient was then taken to the ER department of RSU Pangandaran and performed

temporary suturing of the face and hands, anti-tetanus injection, chest x-ray, head x-ray, hand x-ray, blood analysis, electrolyte infusion, 200 cc blood transfusion, injection of drugs (ceftriaxone, ketorolac, tranexamic acid, omeprazole). There was no history of fainting, nausea and vomiting, bleeding from the ears and nose. The patient was then referred to the ER department of RSUP dr. Hasan Sadikin Bandung. Immunization history has been done.

On the primary survey found A: clear, B: symmetrical chest shape and movement, respiration 28 breaths per minute, C: pulse rate 110 beats per minute, D: GCS assessment 15 (E₄M₆V₅), round pupil isochorous with 3 mm diameter of the left equal to the right, no disturbance of light reflex. Secondary survey show post situational suturing on the patient's right arm and left hand.

General examination of the patient found positive skin turgor, facial head asymmetry, edema and post situational suturing on the face and lips. Anemic conjunctival examination, showed there is non-icteric sclera. Examination of the neck showed that the jugular venous pressure (JVP) was not elevated, the submandibular lymph nodes were not palpable and painless. Examination of the thorax, lungs, heart, abdomen, and liver were within normal limits. The extremities were warm, the capillary refill time was less than 2 seconds, and there was post situational suturing on the right arm and left hand.



Figure 1: Secondary survey, post situational suturing at right arm and left hand

the left region. Abdominal USG and FAST examination were within normal limits. X-ray examination of the left manus showed a

discontinuity in the left metacarpal and right humerus x-ray also showed a discontinuity in the proximal third of the right humerus.

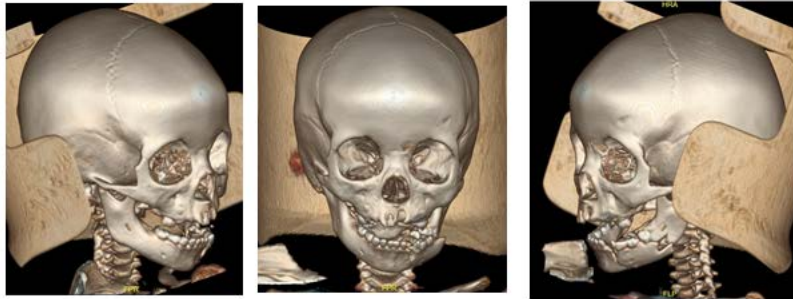


Figure 5: D CT-scan, discontinuity in parasymphysis and angulus of mandible at left region

The diagnosis of maxillofacial area in this case was left mandibular parasymphysis fracture, left mandibular angulus fracture, dentoalveolar fracture of teeth 73 and 75 with half crown fracture on teeth 73 and 75, multiple vulnus laceratum on facialis, superior labii, inferior labii, glossus, sublingual area, gingival region 61-64, and left buccal mucosa region 73.

The management of this case are drugs administration such as Ceftriaxone inj 500mg IV and Paracetamol inf 150 mg IV, also consult to pediatric, anesthesiology, orthopedic, and

traumatology department. The patient underwent wound debridement, resuturing at intra oral region, and ORIF with resorbable plat fixation under general anesthesia. After that, resuturing at extra oral region have been done. Management of fracture fixation in this case used the combination between resorbable fixation on ORIF and intermaxillary fixation with gunning splint postoperatively that maintained for 6 weeks, then the patient was scheduled to control on 14 days and 60 days after operation. On 60 days control after operation, aff gunning splint also performed.



Figure 6: Post debridement (A) right lateral, (B) anterior aspect, (C) left lateral

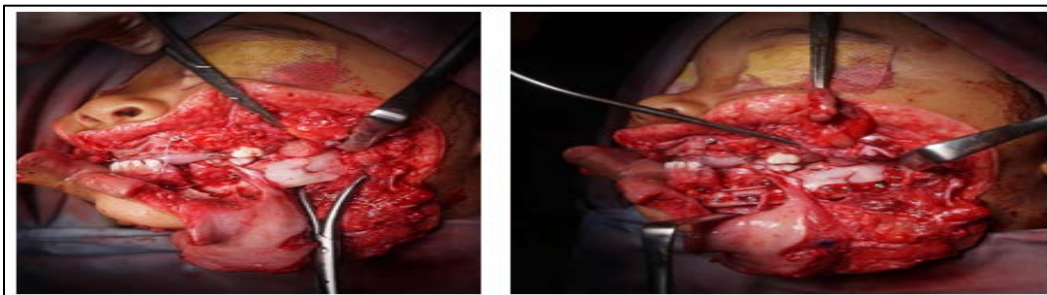


Figure 7: Intraoperative



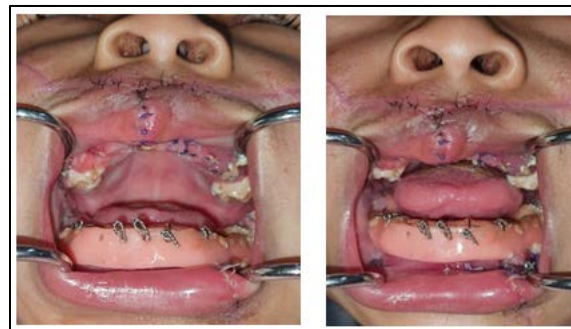
Figure 8: Post ORIF and teeth extraction



Figure 9: Post suturing (A) right lateral, (B) anterior aspect, (C) left lateral



A



B

Figure 10: Post POD XIV (A) extra oral (B) intra oral

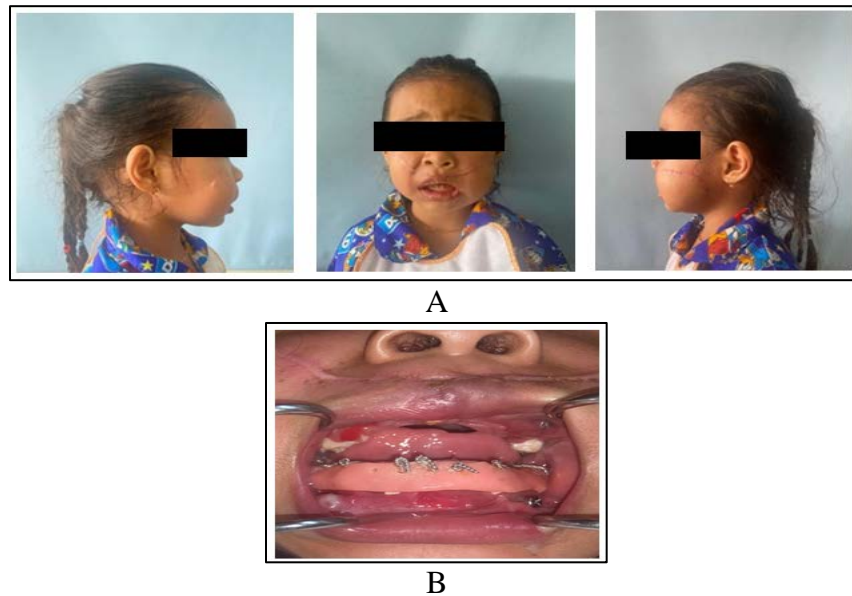


Figure 11: Post POD LX (A) extra oral (B) intra oral



Figure 12: Aff gunning splint, post POD LX

Discussion

Management of trauma in children must be achieved accordance with the Advanced Trauma Life Support (ALTS) protocol as in adult patients, which are performing primary survey and secondary survey. The considerations for management of trauma in pediatric patients are maintain airway, fluid, electrolyte balance, and nutrition during treatment.⁴

The main principle of trauma management is to handle the wound of soft tissue that consist of

bleeding control, wound irrigation, debridement of necrotic tissue, and foreign objects removal before suturing.⁷ Hemostasis can be achieved during and after irrigation and debridement. Irrigation was performed using saline solution into large syringe with 18-gauge needle to increase the pressure of irrigation. Then debridement of necrotic tissue was conducted conservatively with proper incisive armamentarium and maintain soft tissue as well as possible specifically at facial region. Prior to suturing, evaluation of bone trauma should also

performed to determine the further treatment plan.⁸

Evaluation of trauma in mandible comprises the examination of TMJ, bone continuity on posterior and inferior border of mandible, teeth alignment, dental occlusion, and involved soft tissue. In order to have a proper diagnosis in patient with suspect of mandible fracture, radiographic image should be taken with some combinations of radiographic technique or using 3D CT-scan.⁶ As in the case above, 3D CT-scan was performed to ensure the diagnosis.

Management of mandible fracture in children depends on the type of fracture and development stage of skeletal and dental in patients. Mandibular growth and development of tooth alignment in children are the major concern. Restoration of mandible continuity after fracture is essential for continuing the development of craniofacial, not simply for temporary function. Management of mandible fracture in children is different with adult. In adult, absolute reduction and fixation are needed, meanwhile minimal invasive management in children is recommended.^{9,10}

There are several approaches to do the management of parasymphysis and angulus mandible fracture in children such as open reduction and closed reduction according to the type of fracture. Evaluating mobility and continuity of the bone should be done before determine the treatment plan. If there was no mobility and radiographic image have shown a greenstick fracture, soft diet and follow up are the choices for fracture treatment. Risdon cable or arch bar can be used in short term duration (2-3 weeks) as the management for angulus and parasymphysis fracture with minimal displacement.¹¹

Although the management of fracture in pediatric patients have to do minimal as possible, Open Reduction Internal Fixation (ORIF) is a standard treatment of fracture with displacement, especially in severe displacement.^{10, 11} ORIF

provides stable three dimensional reconstruction, promotes primary bone healing, and shortens duration of treatment.¹⁰ Operator should know the anatomical differences in development stage in children, so that the placement of plates and screws could be done safely. In management of parasymphysis and angulus mandible fracture, the placement of single miniplat on inferior mandible or other appliances must be placed carefully so not traumatized the tooth germ within the bone, also the plat and screw only placed on the outer cortex.^{3, 11, 12}

The indications of fracture management with open reduction are when there was a significant skeletal displacement and causing malocclusion, movement limitation, functional resistance, and possibility of airway impairment.¹¹ In this case, ORIF is required because there was an extensive laceration, facilitate visualization of operator, limited range of patient's movement, functional resistance, also unfavorable fracture and severe displacement.

ORIF in children requires some considerations because of several things such as it can cause growth disturbance, allergic reaction to metal that leads to inflammation, corrosion, and release of metal ions, so there is needed to remove the fixation devices. However, there have been recent advances in ORIF to manage fracture in pediatric patients using resorbable osteosynthetic plates and screws. These biodegradable materials do not interfere radiodiagnostic technique, sufficiently rigid and stable, eventually degrade, resorb, and are eliminated from the body.¹⁰

In fracture management, after reduction then fixation and immobilization are required. Gunning splint can be used as intermaxillary fixation accordance with operator evaluation and patient's need.¹³ The first indication for gunning splint is for patient with edentulous condition, mainly in elder patients, because there was absence of the reference that usually obtained from dental occlusion for fracture reduction and fixation.¹⁴ Other than that, gunning splint also can be used for children who experienced jaw

fracture, because there was presence of permanent teeth that have not erupted yet and primary teeth that have been extracted from the jaw, so gunning splint is required for intermaxillary fixation. The use of gunning splint is maintained for 4-6 weeks when the immobilization period occur for mandible.¹⁵

After the management of trauma have been done and patient in a stable condition, then closure of the wound should optimally performed within 12 hours after trauma to minimize the risk of infection, improve aesthetic, and avoid swelling. Permanent sutures on facial trauma are removed within 5 days to avoid and minimize the occurrence of scars on the wound.⁸

Conclusion

Pediatric mandible fractures requiring ORIF are rare. The combination of intermaxillary fixation and resorbable fixation system is needed postoperatively because of the extensive fractures for adequate fixation and good outcomes.

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