International Journal of Healthcare Sciences ISSN 2348-5728 (Online)
Vol. 6, Issue 1, pp: (341-352), Month: April - September 2018, Available at: www.researchpublish.com

The Management and complications of mandible Fracture in children

Hanadi Ahmed Al-Nashri

Abstract: **Successful treatment of mandible fractures represents an anatomic bony union with repair of typical occlusion and function. Mandibular fractures might be either dealt with conservatively or with open decrease and internal fixation. The concepts of management of mandibular fractures differ in children. While in adults, absolute reduction and fixation of fractures is suggested, minimal adjustment of facial skeleton is mandated in children. The objective of fracture management is to restore the underlying bony architecture to preinjury position, in a stable style, as noninvasively as possible, with minimal recurring esthetic and functional disability. Mandibular fractures are reasonably less regular in children when compared with adults, which might be because of the child's safeguarded anatomic features and irregular exposure of children to alcohol associated traffic mishaps. The primary goal of this review is to discuss the management and problems of mandible fractures in children.**

Keywords: **Pediatric Mandible Fractures, children. Treatment, typical occlusion.**

1. INTRODUCTIONS

When identifying the optimum treatment method for a pediatric mandible fracture, planning must consider the patient's age, anatomy, stage of dental development, fracture website, and ability to cooperate with the suggested treatment strategy. Mindful factor to consider needs to be offered to the possibility of long-term development disruptions secondary to numerous fracture locations and kinds of treatment. As such, the management of a pediatric mandible fracture is considerably various from that of the adult injury.[1-3] This post examines the present concepts of the management of pediatric mandibular fractures.

2. EPIDEMIOLOGY

Pediatric mandible fractures represent 32.7% of all facial fractures, followed by nasal bone fractures (30.2%) and midface/zygoma fractures (28.6%).[4] Mandible fractures are uncommon in the children younger than 5 years.[1-6] The condyle is the most com- mon fracture website in pediatric patients, representing 40% to 70% of mandibular fractures. Unilateral condylar fractures are more common than bilateral condylar fractures, with bilateral fractures seen approximately 20% of the time.[7-10] Symphyseal fractures represent around 2% to 30% of all mandible fractures. Fractures of the body, angle, and ramus represent the remainder of the fracture locations.[1-5] Symphyseal and parasymphyseal fractures happen more often in children than in adults, which may be partially discussed by the existence of developing canine tooth buds resulting in a tension point at the inferior border of the mandible[9]. Following eruption of the dog, bone fills this susceptible place, making it more durable. On reaching teenage years, fracture-location patterns become similar to those of an adult, with a boost in fractures of the body of the mandible. Several fracture websites take place in approximately 40% to 60% of cases and are more regular in teen children.[11-13]

Motor vehicle mishaps and falls are responsible for most pediatric mandibular fractures. As children age, a higher percentage of their injuries are associated with sporting mishaps. As teens (and likewise adults), more fractures are a result of assault.[11,13] Overall, mandible fractures may have a high rate of associated injuries that typically impact the head, face, and spinal column. When taking a look at a patient, the physician ought to thoroughly assess for associated injuries. Research studies have actually shown that greater than 75% of patients with mandibular fracture had extra injuries, including 8% with associated midface fractures.[12,13] Associated midface fractures are more common in

adolescent-aged children than in younger children. Whether evaluated scientifically or with additional imaging, careful assessment of the cervical spinal column is a required part of the evaluation of a pediatric patient with a terrible mandible injury.

3. DEVELOPMENT

Facial Skeleton:

Drastic modifications in the proportions of the facial skeleton can be seen as the kid ages. At birth, the face-to-cranium ratio is 1:8, compared with a ratio of 1:2 in an adult.[14] There is significant growth in the facial skeleton in relation to the remainder of the head as the kid ages. Vertical development of the mandible is achieved through bony remodeling together with the development of alveolar procedure and eruption of the dentition. The posterior borders of the condyle and ramus are particularly active in bone development with brand-new bone deposition and renovation, while the anterior surface undergoes bone resorption. There are minimal changes in the body or symphysis of the mandible, with substantial growth and redesigning at the ramus and condyle.[15] This procedure leads to a translation forward and downward of the mandible as it grows par excellence and posteriorly, keeping condylar contact with the glenoid fossa.

The pediatric facial skeleton throughout early development has many protective functions that make it more resistant to endure distressing forces. The bones are resistant to fracture because of poor pneumatization, greater elasticity, high ratio of cancellous to cortical bone, and reasonably more thick surrounding soft tissue and adipose coverings. The mandible and maxilla also gain from lying in a relatively more secured position, with extra stability provided by the unerupted dentition. These aspects decrease the likelihood of fractures of the mandible and explain why greenstick and condylar fractures are more common in children than in adults.[16].

As the child develops from a baby to an adolescent, the anatomic relationships of key structures change. The inferior alveolar nerve (IAN) takes a trip adjacent to the linguistic cortical surface close to the inferior border of the mandible in younger children. As a child ages and the mandible grows, the nerve progressively becomes more remarkable in location. This anatomic finding is an essential consideration in avoiding injury when positioning plate-and-screw fixation.

Dentition:

Teeth begin to appear in a child at around 6 months of age. Milk teeth gradually erupt up until a full enhance of 20 primary teeth is seen, at around age 2 years. The primary teeth are fairly stable up until age 6, when exfoliation begins to take place and the roots are resorbed. Root resorption causes the crowns of deciduous dentition to loosen up and eventually fall out. At around the same time, irreversible dentition eruption begins with the preliminary eruption of main incisors and very first molars. Eruption of secondary (long-term) dentition continues through age 12. Children older than 12 years usually have a healthy enhance of long-term teeth. The wisdom teeth typically emerge around early their adult years.[17].

Throughout this transition from edentulous phase to blended dentition stage to long-term dentition stage, the ratio of tooth to bone shifts from high to low. The area of unerupted irreversible tooth hair follicles as an important consideration in regards to where to place plate-and-screw fixation throughout operative repair of pediatric mandible fractures. Care ought to be required to not interrupt the tooth buds. In addition, fractures can occur through the establishing tooth crypts, owing to the unerupted teeth having only a really thin cortex overlying this area. If a crypt is fractured or interfered with, devitalization and maldevelopment of the permanent teeth may occur.

4. PRESENTATION AND WORKUP

Initial Assessment:

Initial examination of a hurt kid in whom a facial fracture is presumed starts with a methodical technique and close adherence to Advance Injury Life Support principles. The primary and secondary trauma studies must be carried out routinely on all patients. A systematic and detailed physical exam is carried out to avoid missing any associated injuries.

Based on the system and force of injury, a kid with a distressing mandibular injury is at threat for associated air passage compromise, cervical spinal injury, and neurologic injury. Causes of airway blockage consist of direct injury, swelling, hematoma, or foreign bodies (including aspirated teeth and bone pieces). Often airway obstruction can be handled with patient repositioning, however one has to remain familiar with cervical spine precautions. Suctioning or a finger-sweep method to eliminate blood and debris within the oropharynx may likewise be required. Manual anterior traction of the

mandibular symphysis or placement of a traction sew on the tongue may alleviate air passage blockage, particularly in cases where the mandible is displaced posteriorly. Orotracheal intubation or positioning of an emerging surgical air passage may have to be performed. A spinal injury must be assumed up until left out medically and/or radiographically. The majority of patients with facial injury will undergo computed tomography (CT) scanning to evaluate the facial skeletal injury. Extra CT imaging of cervical spine or head and a customized Glasgow Coma Scale evaluatement for babies and children to assess neurologic status may be needed, depending upon mechanism of injury.[18].

Once the patient is steady and an injury examination is total, a comprehensive history must be acquired. The patient's allergic reactions, medications, medical and surgical history, timing of last meal, and events surrounding the accident needs to be obtained. Information relating to the mechanism of injury might assist guide the inspector regarding the degree of injury. Additionally, evidence of abuse should be believed if the story of the caregiver's account of the injury does not match the degree and pattern of the injuries.

Physical Examination:

When the injury examination is completed and an open air passage is protected, a more concentrated assessment of the injury can be undertaken. An extensive evaluation of the head and neck must be performed, evaluating the skin, soft tissue, neurovascular structures, and bone. One must begin with an assessment of the face and make note of any gross visual asymmetry. Ecchymosis and soft-tissue swelling may be indicators of underlying fracture areas. Lacerations might also provide ideas to fracture areas. A chin laceration frequently indicates a forward fall with a midline force dispersed superiorly, which may cause injury to the condyles; this might lead to a crush-type injury or displacement of the condyle.

The inspector needs to then carefully evaluate the patient for neurologic deficits. Evaluation of the cranial nerves should be tried. Specific attention ought to be given to paresthesias in the forehead, cheek, and lower lip along with any deficits in facial nerve function. A fracture of the body of the mandible might hurt the ipsilateral IAN, resulting in tingling of the chin and teeth. Injuries to the lingual and long buccal nerve have been reported in displaced fractures. Lingual and long buccal nerve injuries result in sensory deficits of the anterior tongue and lip and cheek mucosa, respectively. Nerve injuries that are not carefully recorded during the preoperative assessment might be later attributed to an iatrogenic issue.

The patient needs to be asked about how his or her bite feels and about pain, especially with mandible excursions on mouth opening. Patients are capable of subjectively examining minute modifications in their occlusion and intercuspation. Analyzing the patient during mouth opening and closure can be rather revealing regarding the existence of a fracture and its location. The patient's jaw might deviate or have limited movement, with reduced maximal incisor opening. Translational movement of the condyle need to also be evaluated by examining lateral excursive motions of the mandible. In addition, drooling and trismus may be seen in association with mandible fractures. Trismus is frequently the outcome of considerable muscle spasm and pain seen after fracture.

Palpation of facial skeleton may expose step-offs or structural instability. The whole mandible ought to be palpated intraorally and extraorally. The authors suggest bimanual assessment of the mandible, as discrepancies in symmetry can expose under- lying injuries. The insertion of the median pterygoid muscle on the median mandibular surface, and the insertion of the temporalis muscle on the coronoid process, ought to also be evaluated for tenderness and mobility. Palpation of the temporomandibular joints while the patient opens and closes the mouth enables assessment of condyle symmetry, condylar head rotation, and translation of the condyle down the articular eminence. In addition, palpation of the external acoustic canal during jaw movement might divulge a displaced condylar head or crepitation. More evaluation of the ear may provide evidence for condylar fracture, as these fractures can trigger bleeding or ecchymosis of the anterior wall of the external auditory canal.

Evaluation of the oral cavity is important, and the patient must be checked for loose teeth, bone pieces, and foreign bodies. The intraoral assessment consists of assessment of the whole mouth consisting of teeth, floor of the mouth, tongue, buccal mucosa, vestibular mucosa, and the tough and soft taste buds. Depending upon the patient's age, loose long-term teeth may recommend a fracture along the tooth orientation.

Intraoral evaluation might be exposing if one is aware of the child's prefracture occlusion status. Evaluation of the occlusion in a pediatric patient can be challenging, especially in a child with mixed dentition. Attention to use aspects, preinjury oral records, and adult input can be handy in anticipating the preinjury occlusion. Minor displacement of the mandible can cause significant changes in occlusion. Evidence of an anterior open bite indicates bilateral condylar fractures. A unilateral condylar fracture will lead to a contralateral posterior open bite. Intraoral assessment might

likewise expose lacerations or hematomas. Antibiotic therapy with suitable coverage for oral and cutaneous pathogens need to be administered if intraoral or through-and-through cutaneous lacerations exist. Any mandible fracture through a tooth-bearing region is considered an "open" fracture, and requires prophylactic antibiotic therapy.

Assessment of dental injuries is likewise essential. Children with irreversible dentition injuries require rapid treatment. If teeth are thought to be missing and unaccounted for, a chest radiograph should be obtained as a precautionary procedure to assess for aspiration. If an intraoral laceration overlying an unerupted tooth occurs, the laceration must be copiously irrigated, and an absorbable suture needs to be utilized to enjoy-proximate the mucosa. Every effort must be made to leave the unerupted irreversible teeth untouched.

Imaging:

When high clinical suspicion of a mandible fracture is present, further verification and characterization of the fracture type, place, and pattern should be performed with radiographic imaging. There are several techniques that can be used appropriately in varying situations. These modalities consist of plain radiographs, scenic radio-chart (orthopantomogram), and CT. Panorex was historically thought about to be the research study of choice, although this modality has several obvious constraints. A patient needs to be sufficiently cooperative and motionless for Panorex imaging.[11-13,19] Extraneous motions and incorrect patient position might cause motion artifact that might hide a fracture and prevent an accurate diagnosis. Another issue is that a Panorex can not constantly be taken with a patient in a supine position. A supine Panorex requires unique equipment. If this devices is not available and the patient has spinal precautions, another imaging modality need to be utilized. Often in these cases, a series of plain radiographs are taken. Plain radiographs can supply comparable timely details in the acute injury setting. A mandible series might be obtained, which includes a posteroanterior radiograph, a Townes view, bilateral obliques, lateral view, and often a submentovertex view.[20] In all cases, it is necessary to get numerous views from which a fracture can be pictured in a minimum of 2 airplanes. Fractures may not show up in 1 measurement alone. This principle likewise applies to CT, as axial, sagittal, and coronal cuts allow for more exact and precise diagnosis. Three-dimensional restoration of CT information is also vital in examining the pattern of injury, and is especially helpful in examining condylar injuries .[21] Total CT imaging is the most versatile and clinically helpful modality for imaging traumatic mandible injuries, permitting accurate diagnosis and detailed, targeted treatment planning.

Consults:

Based upon the presence of associated injuries after conclusion of detailed physical and imaging assessment, the inspector needs to involve speaking with specializeds such as Neurosurgery, Ophthalmology, and Dentistry in a timely style. Based on the authors' experience, the care of a kid with a distressing facial injury is best directed by a dedicated injury group. Existence of such a system ensures proper and comprehensive workup, along with recruitment of supplementary services such as Social Work and Child Life professionals to help in the care of the hurt kid.

Initial Management:

When taking care of these injuries, operative and nonoperative management along with inpatient or outpatient management ought to be identified. Some patients may benefit from a 24-hour over night observation to evaluate pain management and oral intake. Others can be managed strictly as outpatients till additional intervention is needed. These patients are handled conservatively with a soft diet and proper analgesics to maintain adequate nutrition and convenience. An oral mouthwash is also provided. If surgical intervention is required, it needs to be completed within the very first 7 days. Offered the quick recovery potential of children, a longer wait time might make getting surgical decrease harder, owing to callus formation at the fracture site.

5. TREATMENT

General Treatment Considerations:

Treatment of pediatric mandible fractures during the deciduous and blended dentitions has actually remained a topic of debate. Depending upon the type and pattern of injury, the dealing with surgeon might choose a conservative method with soft diet plan and observation versus an operative technique. An operative approach, in turn, might include a spectrum of strategies, such as closed reduction with maxillomandibular fixation (MMF), splinting methods, or formal open decrease and internal fixation (ORIF).

In all cases, the bypassing goal of treatment is remediation of function and preinjury occlusion and reestablishment of facial proportion, while decreasing disruption of regular mandible development and development. The type of treatment appropriate to accomplish these goals depends on a number of factors including the area of fracture, displacement of fracture pieces, existence of malocclusion, and phase of dental advancement.[9,14,22,23].

In general, many nondisplaced pediatric mandible fractures may be managed conservatively with close observation, soft diet plan, analgesics, and activity precautions.[16] Specific cases might need a short period of MMF for 7 to 2 Week to minimize pain and correct small malocclusions. Malocclusion or considerable displacement of fracture pieces needs a more involved technique. The type of treatment modality in these cases is further identified by 2 main considerations: area of fracture and status of dentition.

As a basic standard, intracapsular condylar fractures and subcondylar fractures without considerable malocclusion may be successfully managed with a soft diet plan and initiation of early variety of movement. Sometimes, a short period (no greater than 7-10 days) of temporary MMF may be appropriate to stabilize the fracture fragments, optimize patient comfort, and enable bony recovery. The issue for postinjury ankylosis dictates the brief period of MMF. Displaced fractures in other locations of the mandible might be handled successfully with a 2.0-mm miniplate put at the lower mandible border with monocortical screw fixation or acrylic lingual splinting. More in-depth management descriptions based upon the stage of dental advancement and fracture location are described here.

Management Considerations Based on Stage of Dental Development:

The developmental development of a kid must be thought about when handling a pediatric mandible fracture. Treatment of a pediatric mandibular fracture must be performed in a proper manner based upon the age and offered dentition. Among the biggest distinctions in treating a child's maxillofacial distressing injury is the variable dentition status.

Before age 2 years, children can be considered edentulous because the emerged teeth hardly ever offer appropriate assistance for fixation. An acrylic splint may be useful in these cases to assist paralyze the fracture with the addition of circum-mandibular wires. The splint may be fixated through either the piriform aperture or a paramedian palatal drill hole to incapacitate the jaw.[9,24] Following eruption of the milk teeth (age 2-5 years), the teeth may be used for fixation. The conical shape of these teeth is open to interdental electrical wiring. Risdon cables or mini-arch bars may be utilized to deal with nondisplaced fractures. Throughout blended dentition (age 6-12 years), the teeth ought to be examined for stability and strength. Baby tooth roots are being resorbed during this stage, which may result in existence of loose teeth that are not open to MMF use. Combinations of the MMF methods are utilized to paralyze the jaw for short durations throughout this mixed-dentition stage. Main molars and incisors might act as anchors for fixation throughout this time frame. After around age 9, children generally have the ability to endure arch-bar placement, because of the establish-ment of a bulk of their irreversible dentition. These children's mandibular injuries are treated with basic MMF with ORIF techniques, as required, much like those used in adult patients.

Management Considerations Based on Fracture Location:

Condylar Fractures:

In the pediatric patient population, the condyle is the most common site of fracture.[25] These fractures hardly ever require operative management. Children with condylar fractures generally have sufficient series of motion and occlusion. Certain cases may require a brief period of MMF for 7 to 14 days to minimize pain and proper minor malocclusions. Surgery should be reserved for those with seriously displaced fractures, substantial malocclusion, and cases with dislocation obstructing or restricting mandibular series of movement. In these few indicators, a submandibular or preauricular method to surgery must be performed, depending on the fracture height within the condyle.[26].

Condylar fractures are classified as intracapsular fractures, high condylar neck fractures, and subcondylar fractures. Intracapsular fractures and high condylar fractures are separated by involvement of the articular surface area. Intracapsular fractures can arise from chin effect that disperses force on the condyles, causing crush-type injuries to the articular disk. High condylar fractures have no articular participation however are located superior to the sigmoid notch. The force of effect that leads to high condylar fractures might also medially dislocate the condyle. High neck fractures demonstrate great regenerative potential and union with conservative management alone. Subcondylar fractures are more caudally situated and are the most typical kind of pediatric mandible fracture; they are usually greenstick fractures and do not need open surgical intervention.

When the surrounding edema has diminished, focus on aggressive physical therapy with early variety of motion at the temporomandibular joint (TMJ) is the mainstay of treatment. In more youthful children, range-of-motion exercises can be achieved with a big lollipop. In older children, making use of stacked popsicle sticks can be utilized with a stable increase in variety of sticks to increase the incisor opening. This action is required to prevent TMJ ankylosis and dysfunction. If ankylosis is permitted to happen, it is among the most hard complications to remedy. Patients at greater threat for post-traumatic ankylosis of the condyle are children below 3 years and those with an extended duration (typically greater than 3 weeks) of maxillomandibular immobilization.

A condylar fracture might trigger concern for disruption of regular mandibular growth. It is not uncommon to see restricted growth on the hurt side that results in ipsilateral chin variance and facial asymmetry.[1-3,5] This condition is more likely to be seen in cases of comminuted intracapsular fracture.[27] This interruption of typical mandibular growth can result in a malocclusion that did not exist right away following the traumatic injury or the operative treatment. The abnormal growth is often a result of residual poor mandibular function triggered by the fracture. When this poor development is kept in mind, the patient needs to be referred to an orthodontist.

In all cases of condylar fractures, long-lasting follow-up is very important. An orthodontist seek advice from can prove invaluable as an accessory for treatment, and preoperative planning and preparation.

Symphysis, parasymphysis, and body fractures:

Management of fractures in the body of the mandible varies from conservative management to ORIF, depending upon the level of the injury and amount of displacement of the fracture. Nondisplaced and greenstick fractures are managed conservatively. Manual closed reduction of displaced factures might be achieved with the patient under anesthesia followed by immobilization in MMF. ORIF is often required for fractures of the symphysis, body, and angle.

Focus on occlusion status is essential in these fractures, as several warping muscle forces might differentially act upon this part of the mandible. Occlusion may initially appear appropriate, however these injuries are prone to subsequent displacement owing to the submental muscular pull and masticatory stresses. For that reason, close follow-up with such patients is vital for their care, and any new findings ought to be completely investigated with reexamination and imaging.

Angle and ramus fractures:

Greenstick fractures prevail at the angle and can be handled conservatively. Immobilization of the fracture at the angle is a little more difficult, as it is not open to splints. However, if the angle is not considerably displaced, closed reduction with placement of the patient in MMF is typically adequate to deal with most fractures. ORIF is needed only in extremely comminuted fractures or when an appropriate decrease can not be attained with less invasive techniques. When plating the angle, the addition of an extraoral incision may be beneficial to accomplish appropriate direct exposure of fracture and to enable easier instrumentation.[28,29].

Ramus fractures may prove to be harder to plate relative to other fractures of the mandible. An external method or a combined intraoral and extraoral technique might be needed. Closed decrease with positioning of the patient in MMF or arch bars with elastics might sometimes suffice to care for these patients.

Dentoalveolar fractures:

Dentoalveolar fractures are common, although the true incidence is unidentified due to the fact that most of these injuries are unreported and dealt with in an office setting. The maxillary incisors are most commonly injured in the pediatric patient population.[30].

Extremely mobile long-term teeth found in the line of the fracture might need to be eliminated. Avulsed or luxated long-term teeth are considered oral emergency situations, as timely treatment is required. The hurt tooth has to be re-implanted within a 1- to 2-hour window from the time of the injury. Replacement of a primary tooth is un- needed. If an irreversible tooth is not avulsed but somewhat mobile, soft diet and immobilization with semirigid orthodontic wire can assist fixate the teeth for 10 days up until healing takes place. Splinting of the mobile deciduous or permanent teeth can likewise benefit the recovery procedure and restore the mobile tooth. Intruded baby teeth should be left alone. These teeth will eventually reerupt. Some dentoalveolar injuries can lead to malformation of the tooth. Follow-up with a pediatric dental expert experienced in treating oral trauma is suggested.

Fractures including the alveolar element of the mandible might be treated with open or closed decrease in comparable fashion to those in other regions of the mandible. Immobilization and restoration of occlusion with making use of splints or arch bars is important to restore alveolar-arch connection. Immobilization is restricted to 2 weeks in younger children and as much as 4 weeks in teenagers. These patients need to undergo long- term follow-up to identify if there has been any disruption of permanent dentition development.

Resorbable versus non-resorbable fixation systems

Use of resorbable fixation systems has become routine in numerous types of craniofacial restoration surgery. These materials supply short-term rigid fixation for bone healing to occur and deteriorate over time as the re-builded bone restores strength. These characteristics show especially perfect for the pediatric population, where bone development and turnover develops possible problems for non-resorbable, irreversible plates.

The ideal biodegradable plate is mechanically strong and goes through resorption within a foreseeable timespan. Variable chemical structures of these plates attempt to stabilize a practical deterioration process while decreasing local foreign-body inflammatory responses. Advantages of presently available resorbable polylactic and polyglycolic acid plates and screws are their radiolucency and removal of the have to return for hardware elimination. Typically their strength holds for 4 to 6 weeks while the complete degradation procedure might take 1 to 2 years. Nevertheless, the application of resorbable plates in pediatric facial fracture treatment, especially pediatric mandible fractures, is not presently prevalent. Data from future research studies would be needed to examine their energy in treating this patient group. Titanium miniplates are still extensively utilized in spite of the possible advantages of resorbable plates. Titanium plates show good long-term biocompatibility, have beneficial physical homes, can be quickly controlled intraoperatively to deal with the fracture, and have the benefit of numerous years of predictable use in facial fracture fixation.[31,32].

Some detectives have promoted for removal of nonresorbable plates following a 3- to 4-month healing duration. Others argue that carrying out an additional surgery may in fact cause more harm and disrupt the future advancement of the mandible. No clear answers are available to settle the debate of whether routine hardware elimination is required. The impacts on development inhibition are difficult to quantify. The requirement for hardware removal is primarily based on a specific surgeon's choice.

6. OPERATIVE TREATMENT

Patient Positioning:

Procedural treatment of pediatric mandible fractures is finest carried out in an operating room with suitable lighting and devices, and normally under basic anesthesia. For young children, even more basic interventions such as splint application or wiring may require some form of sedation.

The child is placed supine on the operating room table with the neck in small extension and the head resting in a horseshoe headrest in a smelling position. A nasotracheal tube protected with stitch to the membranous portion of nasal septum and sutured over a sponge at the hairline is preferred. This positioning allows for unimpeded access to the oral cavity and more precise assessment of occlusion, and facilitates positioning of MMF. The mouth and teeth are completely cleansed with chlorhexidine gluconate oral rinse, and a moistened throat pack is put. The surgical field is then sterilely ready extensively to include face, head, and neck, to account for intraoperative adjustment and repositioning of the head.

Placement of Maxillomandibular Fixation:

Lots of stabilization techniques are readily available to achieve MMF. Unlike in adults who can usually endure placement of MMF in an emergency room setting, pediatric patients need anesthesia and sedation.

MMF in a pediatric patient might be more tough based on the stage of dental development. Deciduous teeth or only partially emerged permanent teeth might not have the appropriate shape to permit circumdental wire retention. Fewer teeth and partially loose or exfoliating milk teeth during the mixed-dentition stage present additional obstacles. In general, in a child with stable primary dentition and in a kid in blended dentition with at least 2 or 3 stable teeth in each arch quadrant, arch-bar application and positioning of MMF is feasible.

The cosmetic surgeon's choice normally determines the kind of MMF that is positioned. Specific MMF techniques consist of rapid MMF screws, acrylic splints, circummandibular wires, transnasal wires, Risdon cable televisions, and a

combination of resorbable screw with stitch. Fast MMF screws are used by some centers; however, iatro-genic injury to the unerupted tooth hair follicles is a crucial concern with this method.

Acrylic splints are an acceptable form of MMF for edentulous children. Although they offer stability to the mandible, there are numerous drawbacks to this method. In a younger, uncooperative kid, splints might need numerous rounds of anesthesia for acquisition of impressions and for placement and elimination of the splint. Another alternative for mandible immobilization is a single-arch mandible splint secured with circum-mandibular wires. This strategy reduces patient pain, as it permits the patient to open the mouth. With this method the jaw swings freely while preserving stabilization [(23)]; nevertheless, particular know-how and proper products are needed to make these splints in a timely manner in the operating room.

Positioning of circum-mandibular wires makes use of a little, 3-mm submental stab cut through which a sharp awl is passed intraorally, securely hugging the linguistic cortex of mandible. A 26-gauge or 24-gauge wire is positioned through the opening in the idea of the awl, and the awl is partially withdrawn and passed over the anterior or buccal mandible cortex into the gingivobuccal sulcus. This action develops a wire loop around the mandible symphysis and parasymphysis. Care must be worked out in younger children in passing the awl, as portions of the symphysis might be cartilaginous, which may cause unintentional passing of the awl through, instead of around the cartilage. The circum-mandibular wire then might be connected to a transnasal wire put either at the piriform rim or through a paramedian palatal drill hole to incapacitate the mandible to the maxilla.[(24).]

Risdon cable televisions are produced from long 24-gauge circumdental stainless-steel wires that are twisted into an arch-bar substitute. Its advantages are that it is low profile, malleable, and can be formed to fit the brief round teeth of younger children. The cable television is protected to each tooth with 26-gauge circumdental wires likewise to how an arch bar would be repaired. This strategy can be controlled to incapacitate several fracture types.[(23).]

A combination of resorbable screw and suture has actually been utilized in several locations to paralyze the mandible. Utilizing screws positioned in each zygoma following the elevation of a little mucoperiosteal flap has actually been described. A 0 or 2-0 monofilament suture is gone through a hole in the screw head then passed around the mandible. The suture is then pulled tight and tied, which develops a sling to fixate the mandible. More medial placement of the screw in the maxilla has actually likewise been described . Care must be taken not to interrupt unerupted tooth buds if operating in this location. The screw and suture strategy allows for simple release of fixation, as one just needs to cut and eliminate the stitch. This technique may not be appropriate for older children, as the muscle forces put in on the mandible may conquer the strength of the suture.

Open Reduction and Internal Fixation:

Signs for official ORIF for pediatric mandible trauma are rare, and include complex, multipart fractures of the tooth-bearing areas of mandible, fracture-dislocations of condyle with dislocation into middle cranial fossa, and bilateral condylar fractures with an anterior open bite malocclusion that can not be reduced and immobilized with MMF alone. An intraoral approach is the preferred access to most fractures. A combined intraoral and extraoral, transfacial method may be required in some patients. Preauricular incisions extending into the hairline may be needed for displaced condylar injuries.

In general, an inferior-border 2.0-mm plate with monocortical screws is the preferred technique of fixation. Plating of the mandibular symphysis can normally be safely carried out in mixed-dentition stage after eruption of the main incisors. Plating at the parasymphysis might be securely performed after around age 9, following eruption of the permanent mandibular canines. With monocortical screw fixation using 4-mm screws, plating in the symphysis, parasymphysis, and body regions of the mandible may still be safely achieved even in patients in whom eruption of the incisors or dogs has not fully occurred. A single, lower-border plate is generally sufficient, particularly when combined with an arch bar working as an extra point of fixation. Care must be exercised to position the plate directly on the most inferior aspect of the anterior mandibular border to avoid injury to unerupted tooth roots and the low-lying IAN in a pediatric patient. In an older pediatric patient, these con- cerns minimize.[(14,23).]

After injection of the gingivobuccal sulcus cut with epinephrine-containing local anesthetic, a cut is made to maintain a submucosal and a muscle cuff on the part of the incision close to connected gingiva for ease of approximation throughout closure. The mandible is exposed in a subperiosteal aircraft extensively to permit ease of instrumentation.

Care is required to prevent injury to the psychological nerve as it emerges from the foramen; periodically, to permit ease of retraction, the periosteal sheath surrounding the nerve may need to be carefully incised and the nerve dissected without surrounding tissue.

When the fracture is exposed, watering is applied. Any fibrin clot or fracture hematoma within the fracture website is thoroughly debrided to enable segment mobilization and manipulation. Prior to decrease and fixation when numerous fractures exist, all fractures are exposed commonly with subperiosteal dissection.

Following fracture direct exposure, the patient is placed into MMF with mindful examination of wear elements on the occluding teeth and seating of mandible condyles within the glenoid fossae. The fracture pieces are minimized and plated just after the preinjury occlusion is developed. Bigonial pressure may have to be applied if significant splaying of mandible angles exists.

Reduction of the fractured sections might be challenging in a pediatric patient, as disturbance from tooth hair follicles might exist. Occasionally the fracture may have a greenstick part on the opposite (lingual) cortex, which might interfere with adequate reduction. Because of substantial anticipated postoperative bony remodeling and rapid recovery in children, if the preinjury occlusion is reestablished a little osseous gap at the fracture site may be tolerated and is normally not of any effect.

Miniplate fixation ought to be used after establishing preinjury occlusion in MMF. Making use of monocortical screws is necessary in circumstances when the dentition is in jeopardy. When positioning the drill holes, care needs to be taken to prevent more disturbance of the tooth buds.[33] The lateral bony cortex surrounding the tooth bud is approximately 1 mm in density, and screws can quickly hurt the hidden developing tooth hair follicles. If necessary, a longer plate can be utilized to prevent drill holes in locations of dentition. For all kinds of fractures no matter area, normally a minimum of 2 screws should be put on either side of the fracture for stable fixation.

After ORIF is applied, the MMF is released. Mandible expeditions, seating of the bilateral condyles, and occlusion at wear facets is reconsidered. If the occlusion is off or if the condyle is not appropriately seated, the fixation is gotten rid of and the series of actions is duplicated. If successful, MMF might be gotten rid of leaving just the arch bars in place. The arch bars serve as an extra point of fixation, just like a tension band on the mandible, and enable postoperative positioning of elastics if malocclusion or open bites are present. A bridle wire ligating the teeth around the fracture line can also serve as a tension band.8.

7. POSTOPERATIVE CARE CONSIDERATIONS

Although a kid's higher osteogenic and redesigning potential, and quick recovery reaction allow tolerance of small malocclusions and little spaces at the fracture website, all efforts ought to be made to reestablish preinjury occlusion, even if this needs renovating elimination of MMF and repeat of ORIF. When occlusion is thought about sufficient, the mouth needs to be copiously irrigated. The intraoral cut is closed with a combination of running or disturbed Vicryl stitch, with care to evert the mucosa at the cuts. For the symphyseal and parasymphyseal region, the mentalis muscle need to be resuspended with a buried muscle stitch, to prevent a secondary chin ptosis and a "witch's chin" deformity. The throat pack is gotten rid of, and the oropharynx and stomach are suctioned with a nasogastric tube.

The patient is normally extubated at the end of the operation. The patient is confessed to the health center for postoperative analgesia, intravenous prescription antibiotics for 24 Hr, and monitoring of oral consumption. If the patient is left in MMF, wire cutters ought to be left at the bedside, and the nursing personnel and the caretaker should be advised on the best ways to release the MMF wires to access to the patient's air passage in case of an emergency. If the patient who is left in MMF vomits after the operation, the patient need to be quickly switched on his/her side, and a suction catheter must be passed behind the maxillary tuberosity into the oropharynx.

If patient is left in MMF, once released from medical facility the patient and/or caretaker should have the wire cutters on hand at all times. Oral consumption for the patient who is left in MMF might be accomplished with passage of a straw through the space in between teeth if present, or with a right-angle straw passed behind the maxillary tuberosity. The parents and patients are counseled that some weight reduction (5-10 lb[2.27-4.53 kg] may result during the period of MMF. Calorie-dense foods such as milkshakes or protein shakes are suggested to allow for weight maintenance and appropriate nutrition for recovery at the fracture website.

After a brief duration of MMF (typically 7-2 Week) the arch bars and wires might be eliminated under short sedation in the operating room, usually without the need for a general anesthetic.

COMPLICATIONS:

Complications are uncommon in this patient population in comparison with adults.[14,16,29] Complications seen with mandibular fractures include:

-Infection

-Malunion

-Nonunion

-Malocclusion

-Facial asymmetry

-Mandibular growth disturbances Disruption of permanent teeth

-TMJ dysfunction

Because of issues for these problems, close postoperative short-term and long- term follow-up are recommended. These children typically require orthodontics and, sometimes, extra surgical intervention.[3,9] Patients who exhibit relentless malocclusion after unilateral or bilateral condylar fractures that have been treated with MMF can frequently further be treated non-surgically; however, some type of practical therapy is suggested to address the unusual occlusal relationship. This functional treatment can be as basic as elastics in conjunction with orthodontic home appliances or occlusal splints, or it might require an official functional device. There is a variety of practical devices, which are positioned by orthodontists, each with advantages and drawbacks, although the objectives of all such appliances are the same. Functional devices look for to mechanically reposition the jaw into proper occlusion and promote proper mandibular function. In growing children, over an amount of time, a practical device can correct a malocclusion brought on by a condylar fracture and help correct abnormal mandibular function.

Growth disturbances in the pediatric patient population have been completely studied. Although the injuries usually recover with considerable enhancement and function, patients and their parents should be cognizant of the possibility of long-lasting development restriction. These patients ought to be referred to an orthodontist as quickly as abnormal growth is noted. Irregular growth results in facial asymmetry and deviation of the chin, and may not emerge for numerous years. The cause of the actual development disturbances remains uncertain, as various outcomes occur with comparable fractures. It is possible that certain children might have lost growth stimuli or experience decreased local vascularity, leading to development restriction. Keeping suitable range of movement at the TMJ is very important in maintaining proper mandibular growth, in addition to avoiding ankylosis and TMJ dysfunction. In all cases, bring back facial symmetry is an extremely difficult obstacle in these patients, and might need extra interventions that might vary from fat grafting, to orthodontics, to integrated orthodontic-orthognathic surgery approaches.

Traumatic injuries to locations of active bony development and remodeling are more susceptible to growth disruptions causing facial asymmetry and malocclusion. Posttraumatic defects might need ultimate orthodontic or combined orthodontic-orthognathic treatment to fix facial asymmetry and malocclusion. As shown in a study by Demianczuk and associates, [3] traumatic mandible injuries in children younger than 4 years or older than 12 years hardly ever require orthognathic surgery to fix any resulting deformity. By contrast, 22% of children aged 4 to 7 years and 17% of children aged 8 to 11 years required combined orthodontic-orthognathic treatment at skeletal maturity to correct posttraumatic facial asymmetry and malocclusion.[3].

8. SUMMARY

Treatment of a pediatric patient with a traumatic mandible injury needs precise knowledge of mandibular anatomy, understanding of the effects of dentition on management, and technical proficiency in applying different technical strategies based upon fracture place and pattern. Treatment is aimed primarily at restoring preinjury occlusion and function. Repair of facial balance and mandible shape is the other crucial goal. The majority of fractures might be managed conservatively or with a minimally intrusive approach, with just a couple of requiring formal, definitive ORIF. Close brief-term and long-lasting postoperative follow-up is critical for early recognition of complications or secondary deformities.

REFERENCES

[1] Ferreira PC, Amarante JM, Silva PN, et al. Retrospective study of 1251 maxillofacial fractures in children and adolescents. Plast Reconstr Surg 2005;115:1500–8.

[2] Davison SP, Clifton MS, Davison MN, et al. Pediatric mandibular fractures: a free hand technique. Arch Facial Plast Surg 2001;3:185–9.

[3] Demianczuk AN, Verchere C, Phillips JH. The effect on facial growth of pediatric mandibular fractures. J Craniofac Surg 1999;10:323–8.

[4] Imahara SD, Hopper RA, Wang J, et al. Patterns and outcomes of pediatric facial fractures in the United States: a survey of the National Trauma Data Bank. J Am Coll Surg 2008;207(5):710–6.

[5] Schweinfurth JM, Koltai PJ. Pediatric mandibular fractures. Facial Plast Surg 1998;14:31–44.

[6] Lindahl L, Hollender L. Condylar fractures of the mandible. II. A radiographic study of remodeling processes in the temporomandibular joint. Int J Oral Surg 1977;6:153–65.

[7] Hurt TL, Fisher B, Peterson BM, et al. Mandibular fractures in association with chin trauma in pediatric patients. Pediatr Emerg Care 1988;4:121–3.

[8] Smartt JM Jr, Low DW, Bartlett SP. The pediatric mandible: II. Management of traumatic injury or fracture. Plast Reconstr Surg 2005;116:28e–41e.

[9] Goth S, Sawatari Y, Peleg M. Management of pediatric mandible fractures. J Craniofac Surg 2012;23(1):47–56.

[10] Norholt SE, Krishnan V, Sindet-Pedersen S, et al. Pediatric condylar fractures. J Oral Maxillofac Surg 1993;51:1302–10.

[11] Rowe NL. Fractures of the jaws in children. J Oral Surg 1969;27(7):497–507.

[12] Thoren H, Iizuka T, Hallikainen D. Different patterns of mandibular fractures in children. An analysis of 220 fractures in 157 patients. J Craniomaxillofac Surg 1992;20(7):292–6.

[13] Kaban LB, Mulliken JB, Murray JE. Facial fractures in children: an analysis of 122 fractures in 109 patients. Plast Reconstr Surg 1977;59(1):15–20.

[14] Cole P, Kaufman Y, Izaddoost S, et al. Principles of pediatric mandibular fracture management. Plast Reconstr Surg 2009;123(3):1022–4.

[15] Proffit WR, Fields HW, Sarver DM. Contemporary orthodontics. 4th edition. St Louis (MO): Mosby Inc; 2007.

[16] Siy RW, Brown RH, Koshy JC, et al. General management considerations in pe- diatric facial fractures. J Craniofac Surg 2011;22(4):1190–5.

[17] Smartt JM Jr, Low DW, Bartlett SP. The pediatric mandible: I. A primer on growth and development. Plast Reconstr Surg 2005;116:14e–23e.

[18] Morray JP, Tyler DC, Jones TK, et al. Coma scale for use in brain-injured children. Crit Care Med 1984;12:1018–20.

[19] MacLennan WD. Fractures of the mandible in children under the age of six years. Br J Plast Surg 1956;9:125–8.

[20] Ellis E III, Miles BA. Fractures of the mandible: a technical perspective. Plast Re- constr Surg 2007;120(7):76s–89s.

[21] Chacon GE, Dawson KH, Myall RW, et al. A comparative study of 2 imaging tech- niques for the diagnosis of condylar fractures in children. J Oral Maxillofac Surg 2003;61:668–72.

[22] Myall RW. Management of mandibular fractures in children. Oral Maxillofac Surg Clin North Am 2009;21(2):197–201.

[23] Kushner GM, Tiwana PS. Fractures of the growing mandible. Atlas Oral Maxillofac Surg Clin North Am 2009;17(1):81–91.

[24] McNichols CH, Hatef DA, Cole PD, et al. Optimizing pediatric interdental fixation by use of a paramedian palatal fixation site. J Craniofac Surg 2012;23:605–7.

[25] MacLennan WD. Consideration of 180 cases of typical fractures of the mandib- ular condylar process. Br J Plast Surg 1952;5:122–8.

[26] Zide MF. Open reduction of mandibular condyle fractures: indications and tech- nique. Clin Plast Surg 1989;16:69–76.

[27] Lund K. Mandibular growth and remodeling processes after condylar fracture: a longitudinal roentgenographic-cephalometric study. Acta Odontol Scand Suppl 1974;32(64):64–71.

[28] Zimmermann CE, Troulis MJ, Kaban LB. Pediatric facial fractures: recent ad- vances in prevention, diagnosis and management. Int J Oral Maxillofac Surg 2005;34:823–33.

[29] Luhr HG. Fractures of the mandible in children. Oper Techn Plast Reconstr Surg 1998;5(4):357–61.

[30] Wilson S, Smith GA, Preisch J, et al. Epidemiology of dental trauma treated in an urban pediatric emergency department. Pediatr Emerg Care 1997;13:12–5.

[31] Bell RB, Kindsfater CS. The use of biodegradable plates and screws to stabilize facial fractures. J Oral Maxillofac Surg 2006;64:31–9.

[32] Bos RR. Treatment of pediatric facial fractures: the case for metallic fixation. J Oral Maxillofac Surg 2005;63:382–4.

[33] Landes CA, Day K, Glasl B, et al. Prospective evaluation of closed treatment of nondisplaced and nondislocated mandibular condyle fractures versus open reposition and rigid fixation of displaced and dislocated fractures in children. J Oral Maxillofac Surg 2008;66(6):1184–93.