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Case Report

MANAGEMENT OF MANDIBULAR FRACTURE IN A 2 YEAR OLD PATIENT: A CASE REPORT

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ABSTRACT:
Background: Various treatment modalities of managing mandibular fractures are available, such as intermaxillary fixation with arch bars, eyelet wiring, Open reduction and internal fixation, Open reduction and osteosynthesis with titanium plates and screws, Open reduction and resorbable osteosynthesis plates and capsplints. Not all treatments are suitable for a very young child. Several studies have recommended the use of prefabricated acrylic splints as a treatment for pediatric mandibular fractures. **Objective:** The purpose of this paper is to provide an insight on management of mandibular symphysis and condylar fractures in a very young patient by means of a case report. **Method:** A 2 year old patient was referred to the department of Pediatric dentistrywith a history of fall from a building 4 days back. On clinical and radiographic examination the patient was found to have a marked step deformity wrt the symphyseal region and a displaced condylar fracture with medially displaced condylar head on the right side and undisplaced condylar fracture on the left side. Impressions of the patient were made during the first visit under sedation and an open cap splint was fabricated. Cap splint placement with circum mandibular wiring was done under GA in the next visit. The management of condylar fracture was done conservatively. **Results:** In the 6 months follow-up, this minimally invasive treatment of using cap splint had proven quite effective, restoring masticatory function and allowinga satisfactory mouth opening (31mm).

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INTRODUCTION

Facial fractures are daunting injuries especially in the challenging pediatric population. The incidence of facial fractures is very rare in children younger than five years of age. It is estimated to be only 1% of

facial fractures. (1) Approximately half of all Pediatric facial fractures involve the Mandible and boys are more commonly affected than girls by a ratio of 2:1 (2), (3). The condyle is the most common site of mandibular fractures in pediatric patients, followed by the symphysis. Symphysis and parasymphysis fractures occur more commonly in children compared with adults. This may be due to the presence of developing canine tooth buds approximating the inferior border of the mandible, creating a stress point susceptible to fracture in this location.

Once the canine erupts, this weak point is reinforced with bone and is no longer any weaker than other regions of the body of the mandible. Overall condyle fractures account for 40% to 70% of cases in children, followed by symphyseal fractures (2% to 30% of cases). Body fractures make up 0% to 20% of cases, angle fractures make up 3% to 17%, and ramus fractures make up 3% to 10 %.(4-6)

In young children (less than 5 years of age), the face is in a more retruded position relative to the "protective" skull, therefore, there is a lower incidence of mandibular fractures. (7) Moreover, the high elasticity of young bones, a thick layer of the adipose tissue covering them, a high cancellous-to-cortical bone ratio and flexible suture lines are some of the reasons contributing to the low incidence of these fractures. (8), (9)

The management of pediatric mandible fractures is substantially different from that of adults. This is primarily due to the presence of multiple tooth buds throughout the mandible, as well as due to the potential impedance to future growth. Although these issues complicate the management of pediatric mandible fractures, these younger patients also have the potential for restitutional remodeling, as opposed to the sclerotic, and functional remodeling seen in adults, which must be taken into consideration for treatment of these injuries. (10-12)

Because the incidence of mandibular fractures is low in young children and management is different from adults, therefore the practising dentists may not be as familiar with the protocol for their management.

So, the purpose of this paper is to provide an insight on management of mandibular symphysis and condylar fractures in a very young patient by means of a case report.

CASE HISTORY

A 2 year old child came to the Department of Pediatric and Preventive dentistry with a history of trauma. History dated back to 14 days, when the patient fell from the 1st floor of the building. Patient was taken to a hospital in conscious state and was admitted there for 4 days for observation. Patient was referred to our hospital for further treatment. Detailed history of the patient was recorded and examination was done.

Patient reported with pain in the jaw, which was continuous and difficulty in chewing food. (Figure 1)

Extra oral examination of the patient was done by palpating the mandible. There was a breach in continuity of the mandible felt at its lower border and tenderness observed in the condylar region.

Intra orally a marked step deformity was seen in the mandibular anterior region between the two primary incisors. Derangement of occlusion along with drooling and inability to establish occlusal contact on closing the mouth was also observed. (Figure 2)

Figure 1: Preoperative photograph

Figure 2: Marked step deformity seen in the symphyseal area

Radiographic examination

A lateral view radiograph (Figure 3) and a P.A view radiograph (Figure 4) of the patient was done from the hospital where he was kept under observation. The radiographs showed a condylar fracture which was obscure and the symphyseal fracture where the fracture line could not be traced. Therefore for greater clarity, the patient was recommended a CT scan with 2D axial, coronal and sagittal view and 3D reconstruction of face. (Figure 5, 6). The CT scan revealed a displaced symphyseal fracture, a displaced condylar fracture with a medially displaced condylar head on the right side and an undisplaced condylar fracture on the left side which was the final diagnosis.

Treatment

The treatment plan for the patient was made which entailed

- Making an impression
- Fabrication of cap splint
- Circum mandibular wiring and cap splint insertion under GA and
- Active assisted mouth opening of the patient

Figure 3: Lateral view radiograph

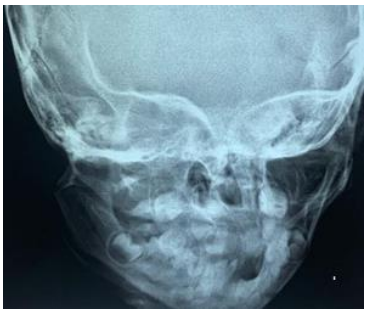

Figure 4: PA view radiograph

1. Making an impression

As the patient was very young, the impressions were made under sedation.U 0 and L0 trays were selected for the same. The trays were modified by cutting the ends with a disc and making them shorter. (Figure 7) The sharp edges were polished. Further the area impinging the mucosa was modified with the help of pliers. (Figure 8)

2. Fabrication of cap splint

After making the impression, (Figure 9, 10) two sets of casts were subsequently poured. The cast was split with a disc at the fracture site. (Figure 11, 12) The cast segments were held in reduced position and the upper and lower casts were articulated in maximum intercuspation. The two parts of the lower cast that were secured together by sticky wax (Figure 13), were then joined by the dental stone. Later an acrylic splint leaving occlusal surface open was prepared on the casts. (Figure 14,15)

3. Circum-mandibular wiring and cap splint insertion under GA (Figure 16, 17)

Under general anesthesia, LA infilteration with 2 % lignocaine was given intra orally and extra orally. The mandibular arch was then reduced manually with bi digital pressure, taking occlusion as guidance. Splint placement was done and stability was checked. Circum mandibular wiring was then performed. Stab incisions were placed in submandibular region to facilitate passage of mandibular bone awl, which was then used to enter lingually along the body of the mandible through stab incision and piercing lingual mucosa.A 26 gauge orthodontic wire was fed to awl and was secured. The awl was then withdrawn till tip of awl reached the lower border of mandible and then carefully passed onto buccal sulcus along the body of the mandible. Mandible was held in occlusion with splint in position; both buccal and lingual ends of wires were held together, and splint was stabilized by twisting the wire in clockwise direction in the respective regions (Figure 18). The occlusion was rechecked and stability of splint was verified. (Figure 19) Orthodontic wax was placed on the wire elements to avoid impingement on the mucosa. (Figure 20)

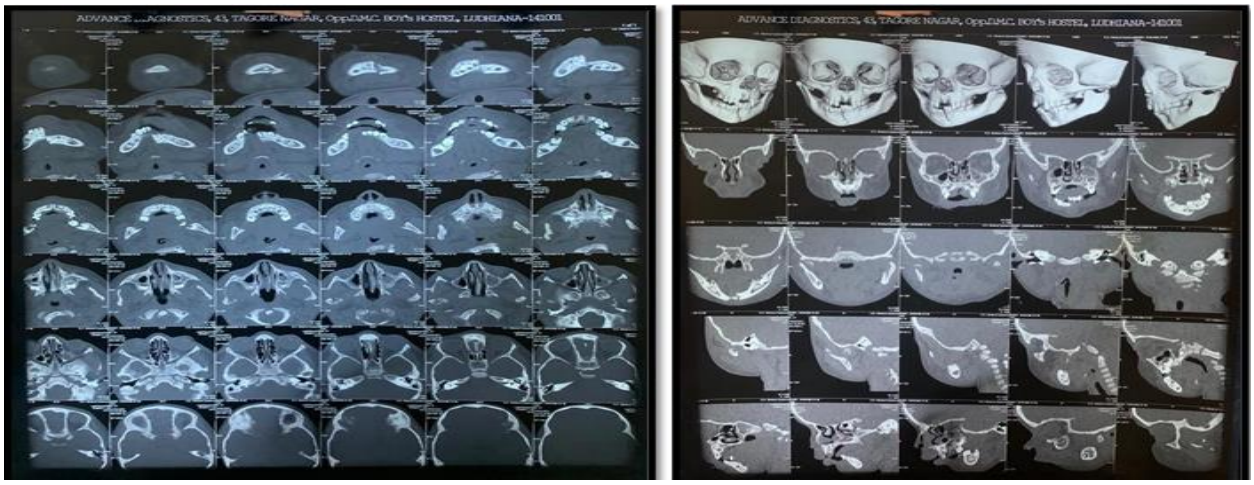

Figure 5, 6: 2D-3D CT SCAN showing displaced symphyseal fracture, displaced condylar fracture with medially displaced condylar head on the right side and undisplaced condylar fracture on the left side

Figure 7: Cutting the trays with a disc

Figure 8: Modified trays

Figure 9, 10: Impressions made under sedation

Figure 11: Cast split with a disc

Figure 12: Split cast

Figure 13: Cast joined with sticky wax

Figure 14, 15: Open cap split fabrication


Figure 16, 17: Circum-mandibular wiring and cap splint insertion under GA

Figure 18: Twisting the wire in clockwise direction in the respective regions

Figure 19: Stability of the splint verified after circum mandibular wiring

Figure 20: Wax placed on the wire elements to avoid impingement on the mucosa

Figure 21: Removal of the splint

Post-surgery, the patient was monitored and kept under observation for 5 hours Post-operative instructions were given to the patient which included avoiding physical activity and taking a soft diet for two weeks. Antibiotic treatment was instituted for five days. Patient was recalled every week for post-operative monitoring. The splint was removed after two weeks. (Figure 21) There was no mobility present and a satisfactory occlusion was achieved. (Figure 22).

4. Active assisted mouth opening of the patient

The management of condylar fracture was done by a conservative treatment that entailed clinical observation, restriction to a soft diet, and mandibular physical therapy. After 2 weeks, the fracture site was healed enough to handle stress and active- assisted opening was performed on the patient by application of gentle force by placing the thumbs on the maxillary canines and the middle fingers on the central mandibular incisors. (11) Active assisted mouth opening of the patient was done at every recall.

RESULTS

The patient was followed up for a period of 6 months and had no complications (malunion, infection, malocclusion, temporomandibular joint (TMJ) pain, and trismus) in postoperative period. The masticatory function was restored and a satisfactory mouth opening (31mm) was observed after a month.

DISCUSSION

Treatment of pediatric mandible fractures during the deciduous and mixed dentitions has remained a topic of debate. Depending on the type and pattern of injury, the treating surgeon may elect a conservative approach with soft diet and observation (9) versus an operative approach (8). In all cases, the overriding goal of treatment is restoration of function and preinjury occlusion and reestablishment of facial symmetry, while minimizing disruption of normal mandible growth and development. The type of treatment appropriate to achieve these goals depends on several factors including the location of fracture, displacement of fracture fragments, presence of malocclusion, and stage of dental development. (13-16) In the pediatric patient population, the condyle is the most common site of fracture. (17) These fractures rarely require operative management. Children with condylar fractures generally have adequate range of motion and occlusion. Certain cases may require a short period of MMF for 7 to 14 days to reduce pain and correct minor malocclusions.

Figure 22, 23: Post removal of splint

Surgery should be reserved for those with severely displaced fractures, substantial malocclusion, and cases with dislocation obstructing or limiting mandibular range of movement. Management of fractures in the symphysis/ parasyphysis region of mandible can range from conservative management to operative approach, depending on the extent of the injury and amount of displacement of the fracture. Nondisplaced and greenstick fractures are managed conservatively. While displaced fractures require an operative approach which could include various treatments including intermaxillary fixation with arch bars, eyelet wiring, Open reduction and internal fixation, Open reduction and osteosynthesis with titanium plates and screws, Open reduction and resorbable osteosynthesis plates.(18)

Arch bar, eyelet wiring is technically challenging in pediatric patients as primary teeth have conical shape with wide cervical margins and tapered occlusal surface. Primary teeth do not have stable foundation and can be accidently avulsed during wiring maneuvers. (19)

Limitations and complications of open reduction with internal rigid fixation include trauma to tooth buds, restricted growth and infection. (20). Open reduction and internal fixation with titanium plates and screws are thought to have a negative effect on the skeletal growth and unerupted teeth. It involves two-stage surgery because of the need for plate removal after complete healing. (21).The use of resorbable plates and screws is less likely to disturb facial skeletal growth but is still associated with the risk of damaging unerupted teeth even when using mono cortical screws. Other concerns for using resorbable materials are the strength of the material and its ability to withstand masticatory forces, and the extent of inflammation as the materials begin to degrade. (22), (23)

A conservative approach (observation or closed reduction) is considered a suitable approach for pediatric mandible fractures especially for children under the age of 2 years because the erupted teeth rarely provide adequate support for fixation. With the use of open cap splints, there is reduced dependence on repeated radiographic evaluation, as occlusion is clearly visible, mastication for soft diet and maintenance of oral hygiene is possible. It also has other advantages like ease of application and removal, less time consumption, cost-effectiveness, good stability during healing period and minimal trauma to surrounding tissues. (24) However, specific expertise and appropriate materials are required to fabricate these splints. The patient in the present case was treated with closed reduction using custom-made cap splint and circum mandibular wiring.

CONCLUSION

A Favorable Outcome was achieved by treating Symphysis Fracture by Acrylic Open Cap Splint with Circum- Mandibular Wiring and Conservative Treatment for Condylar Fractures.

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