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Case Series

Unravelling the vital role of maxillofacial surgeons in paediatric oral and maxillofacial surgery: a case series

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ABSTRACT

Oral and maxillofacial surgical procedures in children necessitate special considerations due to ongoing development. Key factors include obtaining parental consent, understanding developing anatomy and dentition, potential adverse effects on growth, behavioural guidance, and comprehensive peri- and postoperative care. This paper aims to outline the key considerations and challenges in managing paediatric oral and maxillofacial conditions. It seeks to review various treatment approaches for common conditions such as temporomandibular joint (TMJ) ankylosis, odontogenic cysts, tumours, maxillofacial trauma, and infections. Case studies are presented to illustrate various conditions and their management, reflecting contemporary practices and treatment strategies. The cases demonstrate diverse management approaches for paediatric oral and maxillofacial conditions. Dentigerous cysts and aggressive ossifying fibromas were treated with surgical interventions, including enucleation and reconstruction. TMJ ankylosis was addressed through aggressive resection and joint reconstruction, followed by intensive physiotherapy. Fractures and trauma cases were managed conservatively or with specialized techniques, such as botulinum toxin injections, highlighting the necessity for individualized treatment based on the specific injury and patient condition. Managing paediatric oral and maxillofacial conditions requires a tailored approach that balances effective treatment with the preservation of growth potential. Strategies must be adapted to accommodate the dynamic nature of growth and development in children, and regular follow-up is essential for monitoring outcomes and adjusting treatment plans as needed.

Keywords: TMJ, Maxillofacial trauma, Cysts, Tumours, RTA, GCS

INTRODUCTION

Paediatric oral and maxillofacial surgery (OMFS) addresses the specialized needs of neonates, infants, and growing children, including the management of congenital craniofacial anomalies, cleft lip and palate, trauma, abnormal jaw growth, TMJ disorders, dentoalveolar conditions, and various paediatric pathologies.[1] This subspecialty demands careful consideration of factors such as parental consent, understanding of developing anatomy and dentition, and the potential for adverse effects on growth and development.[2] The approach to surgical procedures in young patients often involves close coordination with other dental specialties, particularly orthodontics and paediatric dentistry. For complex cases such as craniofacial syndromes, obstructive sleep apnoea, or specific pathologies, a multidisciplinary team approach is essential. This team typically includes neonatal medicine, respiratory medicine, ear-nose and throat surgery, plastic surgery, and the paediatrics to ensure comprehensive care.[3,4]

CASE SERIES

Case 1

An 8-year-old male patient presented with pain on the right lower side of his face over the past 2 months. According to the patient's guardians, the swelling in the same area began as a small lump and gradually increased in size, accompanied by pain. Clinical examination revealed a hard, non-tender swelling along the lower border of the mandible on a line drawn from the lateral canthus of the eye to the mandible's lower border. Mouth opening was 3 cm. Intraoral examination showed swelling in the region of tooth 46, with buccal cortical plate expansion. Based on clinical and radiological findings, a provisional diagnosis of a dentigerous cyst on the right side of the mandible was made. Surgical treatment included enucleation of the cyst and removal of the impacted tooth 45 associated with the cyst. Histopathological examination confirmed the diagnosis of a dentigerous cyst.

Figure 1: (a and b) Pre-operative image, (c and d) preoperative radiograph showing dentigerous cyst associated with impacted 45, (e and f) intraoperative image showing enucleation of the cyst along with the impacted tooth, (g and h) post operative follow-up-5 months, (i) OPG showing satisfactory healing.

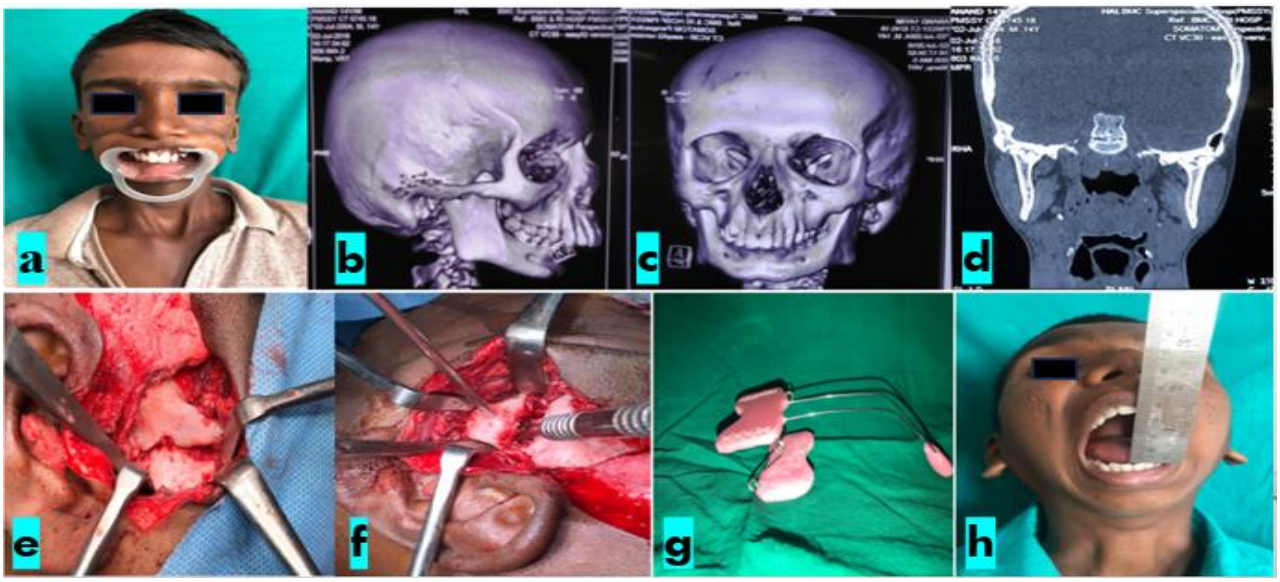

Figure 2: (a) Pre-operative image, (b-d) radiograph showing bilateral TMJ ankylosis, (e and f) intraoperative image showing removal of ankylosed mass, (g) Shekharappa appliance, (h) Postoperative image showing mouth opening of 3.5 cm.

Case 2

A 14-year-old patient presented with difficulty in opening his mouth for the past 5 years. The problem began around the time of shedding of deciduous teeth and the eruption of permanent teeth. The patient was born via normal delivery and has a history of a small-sized jaw since birth, loud snoring while asleep, and thumb sucking. History of consanguineous marriage is present.

Extraoral examination revealed a bird face deformity, micro-gnathic and retrognathic mandible, a convex facial profile, and potentially competent lips. Intraoral examination showed an interincisal distance of only 0.5 cm, with an overjet greater than 8 mm and an overbite greater than 4 mm. Routine laboratory tests indicated abnormal liver function tests and a positive hepatitis B antigen with low anti-HBs antibody levels (<1.0 mIU/ml). A CT faciomaxillary scan with 3D reconstruction was advised.

Based on clinical and radiological investigations, a diagnosis of TMJ ankylosis (Sawhney's type IV) was established. Treatment focused on releasing the ankylosed mass, creating a functional joint, improving nutrition and oral hygiene, and addressing necessary dental treatment. Reconstruction of the joint was planned to restore the vertical height of the ramus, prevent recurrence, and support normal facial growth. Aesthetic improvements may be addressed through cosmetic surgery in a later phase. Aggressive physiotherapy was advised, and a custom-made Shekharappa appliance was provided for the same.

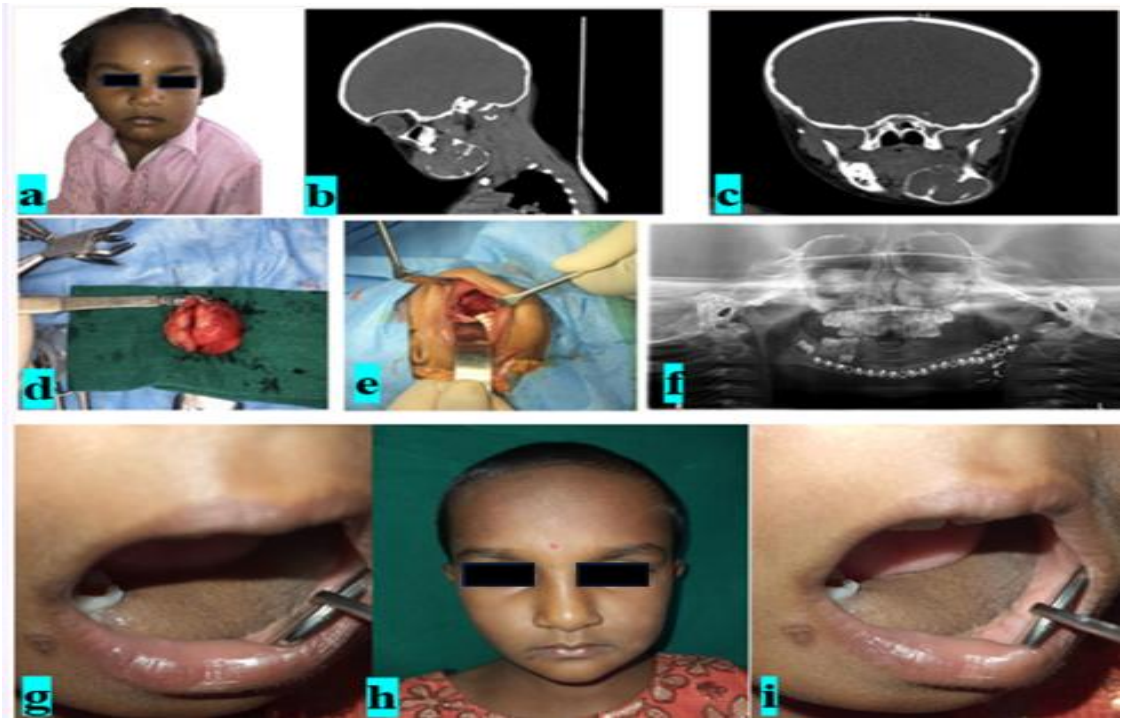

Figure 3: (a) Preoperative image, (b and c) preoperative CT images showing the lesion, (d and e) intraoperative images, (f) post operative CT image showing recon plate, (g-i) post op follow-up showing graft.

Case 3

A 5-year-old female patient presented with a chief complaint of swelling on the lower left side of the face that had developed over the past 5 months. Clinical examination revealed a bony, hard expansion of both the buccal and lingual cortical plates in the lower left primary canine-to-molar region. The swelling was well-defined, measuring 4×2 cm, and the overlying mucosa appeared normal in colour and consistency without tenderness. An orthopantomogram (OPG) showed a large, well-corticated, oval-shaped unilocular radiolucency in the left mandible, extending from the lower left primary canine to the distal root of the second primary molar, with ballooning of the buccal and lingual cortical plates and bowing of the mandible's lower border. The lesion was surgically excised under general anaesthesia, preserving the lower border of the mandible. Histopathological examination confirmed the diagnosis of aggressive ossifying fibroma. Despite initial treatment, the lesion recurred within 3 months, extending across the midline of the mandible. Consequently, a total resection of the left side of mandible was performed, followed by reconstruction using a free fibula flap.

Case 4

A 10-year-old child presented with a significant inability to open the mouth, which had persisted for the past 9 months. The patient's condition was diagnosed as left TMJ ankylosis after a thorough clinical evaluation and radiological imaging. This diagnosis was confirmed by the presence of abnormal bony fusion in the TMJ area, which was restricting jaw movement. To address the issue, an aggressive surgical approach was undertaken that involved resection of the ankylotic mass to restore joint mobility. Additionally, temporalis fascia was used for inter-positioning to prevent the reformation of ankylotic bone and ensure proper joint function. Postoperatively, the patient was advised to perform aggressive mouth opening exercises to improve range of motion and prevent future complications. The patient is under regular follow-up care to monitor progress, ensure effective recovery.

Figure 4: (a) Pre-operative clinical image showing mouth opening of 0.5 cm, (b and c) 3D images showing left TMJ ankylosis, (d and e) intra operative image, (f) post operative images showing mouth opening of 3 cm.

Figure 5: (a) Pre-operative image showing reduced mouth opening, (b) preoperative deranged occlusion, (c and d) CT image showing fracture of left condyle with medial displacement, (e) post operative image showing 3.5 cm mouth opening.

Case 5

14-year-old male patient reported to the OPD with the chief complaint of pain in the right and left side of the ear region in the past 3 days. Patient attenders give the alleged history of RTA (fall from the bicycle). On examination patient was conscious cooperative well oriented to time, place, person and situation. on examination there was swelling over right and left preauricular region, condylar movements were deranged, trismus was present, mouth opening being 2 cm. occlusion deranged bilaterally. CT faciomaxillary with 3D reconstruction was advised. Based on clinal and radiological examination diagnosis was right condylar fracture. treatment plan-upper and lower Erich arch bar placement with IMF. 0.4 units of inotox diluted with 0.4 units of saline. A total of 30 units inotox injected bilaterally to the lateral pterygoid muscle. Followed by aggressive physio therapy with histers appliance. patient was followed up regularly and mouth opening of 3.5 cm was achieved.

Case 6

An 8-year-old child presented to the emergency department with multiple facial lacerations and abrasions resulting from a road traffic accident (RTA). Despite the visible trauma, radiological examinations revealed no fractures, and the Glasgow coma scale (GCS) score was stable at 15, indicating full consciousness. The child underwent cleaning and debridement of the abrasions, followed by suturing of the lacerations under general anaesthesia (GA). Postoperatively, the child was observed overnight, and sutures were removed after 5 days. The wounds healed uneventfully, and the child was discharged in good condition with appropriate follow-up care instructions.

Figure 6: (a) Pre-operative image showing multiple lacerations and abrasions, (b and c) inta-operative image, (d) postoperative image after suture removal.

Figure 7: (a) Pre-operative OPG showing bilateral condylar fracture, (b) upper and lower arch bars with stable occlusion, (c) post-management mouth opening of approximately 3 cm.

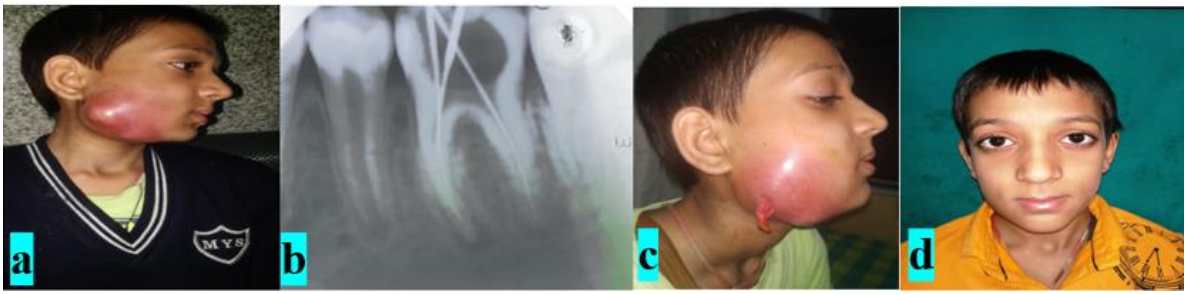

Figure 8: (a) Pre-operative image of pterygomandibular space infection, (b) radiograph showing the offending tooth, (c) incision and drainage, (d) follow-up.

Case 7

An 8-year-old patient presented to the emergency department with jaw pain and an inability to open the mouth following a fall from a bicycle. The patient was conscious, oriented, and had a GCS score of 15. Extraoral examination revealed abrasions on the chin but no obvious facial asymmetry, with severe tenderness noted bilaterally at the TMJs. Due to restricted mouth opening and pain, intraoral examination was not possible. Emergency radiological investigations revealed bilateral condylar fractures, while routine laboratory tests were normal. The patient was treated with IV analgesics and fluids, observed overnight for any changes in GCS. Erich arch bars were placed to the maxillary and mandibular arches, and the patient was trained to use elastics. After significant improvement in mouth opening, the arch bars were removed after 4 weeks, thus managed conservatively.

Case 8

A 12-year-old child presented with swelling on the right side of the cheek, restricted mouth opening, and mild fever. The child had experienced toothache for the past 5 days, which was followed by restricted mouth opening and progressive swelling. Mouth opening was limited to 0.5 cm. The patient received IV antibiotics and analgesics, and routine laboratory tests showed mild leucocytosis.

Radiological examination identified tooth 46 as the source of the infection. Following the administration of IV fluids, an emergency incision and drainage was performed extra orally at the most dependent part of the swelling. The drained material included foul-smelling pus mixed with blood clots. The patient was instructed to perform vigorous mouth opening exercises and underwent intermittent pus drainage. Vitals were monitored, and pus was sent for culture. After 48 hours, there was a notable reduction in swelling and improvement in mouth opening. Due to the patient's young age, root canal treatment was performed on tooth 46. The pus culture did not identify any pathogenic organisms.

DISCUSSION

It's crucial for oral and maxillofacial surgeons to understand the unique considerations when managing pathology, trauma, and deformities in paediatric patients. Children have distinct differences in their physiology and anatomy due to ongoing growth and development, impacting their treatment planning. When dealing with paediatric maxillofacial trauma, the focus extends beyond immediate care to the potential long-term effects on the developing facial skeleton and dentition. Though relatively rare in children, these injuries can have significant consequences, leading to functional impairments and aesthetic concerns.[3] Trauma in paediatric cases often results from accidents, falls, sports-related incidents, or physical altercations.[12] In mandibular fractures, condylar, sub condylar, and angle fractures are prevalent, comprising approximately 80% of cases in children.[4] Additionally, symphysis and para symphysis fractures are more common in paediatric cases compared to adults. Understanding these patterns helps in accurate diagnosis and appropriate management tailored to paediatric patients' unique needs.[3,4]

Absolutely, managing fractures in paediatric patients differs significantly from that in adults due to several key factors. Children's physiology and anatomy, along with their ongoing growth and development, necessitate a tailored approach to fracture management. Rapid growth in children impacts their bone healing process, which tends to be faster than in adults. Additionally, their bones have a greater capacity for remodelling, allowing for better correction of deformities.[4] These factors influence the approach to treatment, often requiring less invasive methods and achieving better functional and cosmetic outcomes. Moreover, the patient's cooperation and compliance play a pivotal role in the management process. Children might have different levels of understanding and cooperation compared to adults, influencing the choice of treatment and post-operative care. Prompt evaluation and immediate management are critical in paediatric maxillofacial trauma. Early intervention can prevent potential complications and ensure optimal healing, minimizing long-term functional and aesthetic issues. Tailoring the treatment plan to accommodate these factors is essential for successful outcomes in paediatric cases.[3]

Odontogenic cysts are frequently associated with impacted teeth. The occurrence rate of cysts in the paediatric age group is relatively low. Furthermore, the incidence of paediatric jaw cysts is predominated by cysts of developmental origin (63.2%) while those of inflammatory origin accounted only for 33.6%.[7] Vinicius Gomes Serra et al. justified the infrequent occurrence of inflammatory cysts in children and adolescents, since their pathogenesis starts from the pulp necrosis, and as recently erupted permanent teeth are generally healthy, not showing the condition necessary for the development of cystic lesion. In paediatric patients, the maxillary canine is commonly impacted.[17] Furthermore, the dentigerous cyst type is commonly encountered in children.[18] The treatment option is enucleation of the cyst followed by either removal of the impacted tooth or surgical exposure of the impacted tooth followed by orthodontic movement to a favourable position. OKC, though having the least incidence in children, is commonly seen as a part of naevoid basal cell carcinoma. The management of OKC includes marsupialization if it is encountered in paediatric patients whereas en-bloc or marginal resection is preferred if seen in adults.[9]

Odontogenic tumours are growths that arise from the tissues involved in tooth development. In paediatric patients, these tumours can occur, but they are relatively rare compared to adults.[2] Odontogenic myxoma, although uncommon in children, is a benign but locally aggressive tumour derived from embryonic mesenchyme associated with tooth development. Due to its rarity and potential for aggressive behaviour, management often involves a team of specialists including oral and maxillofacial surgeons, radiologists, and pathologists. Because of its propensity for local recurrence, a comprehensive and meticulous surgical approach is crucial to minimize the chances of regrowth. Long-term follow-up is necessary to monitor for any signs of recurrence or complications.[1]

The provided case histories and the management strategies in this article highlight a range of paediatric oral and maxillofacial conditions and their management, reflecting practices consistent with current literature. Case 1, involving a dentigerous cyst, aligns with standard treatment approaches, emphasizing enucleation and extraction of impacted teeth, consistent with findings by

Arce et al and Pramod and Shukla.[7,18] Case 2 and case 4, both addressing TMJ ankylosis, illustrate the need for aggressive surgical intervention and post-operative physiotherapy, as supported by Jayavelu et al and Sharma et al.[4,5]

Case 3's aggressive ossifying fibroma management, including total resection and reconstruction, mirrors recommendations for handling such rare but aggressive tumours (Jih and Kim; Khan et al).[24,25] Case 5, which involves condylar fractures, reflects modern treatment strategies including the use of Erich arch bars and botulinum toxin, as discussed by Canter et al and Akbay et al.[20,21] Cases 6 and 7 show conservative management for facial trauma and bilateral condylar fractures, aligning with practices outlined by Mukhopadhyay et al and Sharma et al.[4,13] Finally, case 8's approach to managing an odontogenic abscess through drainage and root canal therapy is consistent with recommended practices for such infections (Arce et al and Oliveira et al).[7,16]

Understanding the unique considerations in paediatric maxillofacial treatment, including the impact on growth and development, is crucial. Preserving developing tooth buds is a priority while devising treatment plans to avoid interference with the ongoing dental growth. In cases involving condylar fractures, preserving the growth potential of the condyle, which serves as the mandible's growth centre, is vital. Balancing conservative approaches with effective treatment strategies becomes essential in such scenarios.[22] Sometimes, aggressive intervention might be necessary, especially in cases like malignant odontogenic tumours, often requiring reconstruction post-surgery.[24] The dynamic nature of growth and development in paediatric patients underscores the significance of regular follow-ups post-surgery.[25] Continuous monitoring allows for tracking changes and ensuring that the treatment doesn't impede or negatively impact the ongoing growth processes. Overall, a balanced and thoughtful approach is necessary in paediatric maxillofacial treatments, considering the nuances of growth, development, medication, and the unique nature of dental changes during childhood.[4]

CONCLUSION

Managing orofacial pathologies in children requires a distinct approach due to concerns about potential interference with normal growth and development. Self-falls often serve as the primary cause of paediatric maxillofacial fractures. Treatment in the paediatric age group typically leans towards conservative approaches, reserving open reduction for cases involving significant displacement. Understanding the pathology comprehensively and considering the patient's growth phase are critical for determining the most appropriate treatment. Oral and maxillofacial surgeons play a pivotal role in these cases, utilizing their expertise to tailor treatments that align with the patient's developmental stage while addressing the pathology effectively.

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