CASE SERIES

Our Experiences with Management of Complex Oro-Facial Injuries

Titus O **CHUKWUANUKWU** [1]
Chimaobi M **ISIGUZO**[1]
Evaristus E **AFIADIGWE** [2]
Jude-Kennedy C **EMEJULU**[3]

[1]*Plastic Surgery Unit*
[2]*ENT Surgery Unit*
[3]*Neurosurgery Unit*

Department of Surgery
Nnamdi Azikiwe University/
Teaching Hospital, Nnewi
Anambra State, NIGERIA

Author for Correspondence
Titus O Chukwuanukwu
Plastic Surgery Unit
Department of Surgery
Nnamdi Azikiwe University/
Teaching Hospital Nnewi
Anambra State, NIGERIA

Email: drtchuks@yahoo.com
Phone: +234803 899 3305

Received: September 8th, 2012
Accepted: September 27th, 2012

ABSTRACT

Background: Complex oro-facial injuries are very challenging, and may be associated with airway compromise, traumatic brain injury, facial fractures, soft tissue displacements and disfigurements. Airway management is critical to resuscitation and different specialists may be required for optimal treatment, and multidisciplinary management improves outcome.
Objective: To demonstrate the challenges in managing complex traumatic oro-facial injuries.
Methodology: Descriptive review of patients with severe traumatic facial injuries that presented within a 12-month period (September 2008 – August 2009) to our centre; four cases managed over the period were described to illustrate the challenges.
Conclusion: Complex traumatic facial injuries are best managed by centres that can offer early multidisciplinary services from specialized units because of the challenges of airway compromise, appropriate soft tissue approximation, complex facial fractures, infection, tissue losses and other injuries.
Keywords: *Avulsion, multidisciplinary, reconstruction, severe trauma*

INTRODUCTION

Oro-facial injuries are common, and most of them are mild to moderate injuries, but quite a few can be very severe and complex. The head and neck region is composed of overlying skin covering the deeper skeletal structures (cartilages and bones) which protect deeper delicate organs. Therefore, following a forceful impact (blunt or sharp) on the face, the deformable outer soft tissue is more affected as it is sandwiched against an unyielding bony base. Bony and brain injuries usually are associated with very high energy transfers, and when fractured, the inner delicate tissues and organs can be damaged.

Traumatic oro-facial injuries commonly result from road traffic accident, fall from heights, domestic interpersonal violence or assault, bites from animals and humans, occupational accidents, sports related and self-inflicted. However, road traffic accident and specifically, motor vehicular accidents are found to be the most common cause, followed by fall from heights.[1,2] In a study in Nigeria, road traffic accidents were found to be the

most common cause and motorcycle accident constituted the greater proportion of these.[3] The pattern of presentation is due to the dominance of the motorcycle as a major means of transportation, coupled with the non-compliance of motorcyclists with road safety measures. The males are more affected than females.[1,3,4]

Complex oro-facial injuries are associated with severe bleeding because of the good vascularity of the head and neck region, and this may harass the uninitiated, though this, usually, may not be life-threatening if it is an isolated injury.[5] However, when associated with other injuries the morbidity may rise.

The face houses the nose, eyes, ears, lips and sinuses, with the nose serving as an entry into the airway. Following facial trauma, protection of the airway is of major concern during resuscitation and treatment. Foreign bodies, posterior displacement of the tongue following bilateral mandibular fractures, bleeding or vomitus can pose a threat to the patency of the airway, which therefore, has to be protected.[6]

The definitive treatment for the airway compromise will depend on the severity of injury, level of consciousness, presence of thermal injury and obstruction secondary to significant facial and neck oedema.[7]

Eight criteria for intubation were developed by the Association of Anaesthetists of Great Britain and Ireland, viz. (1) bilateral mandibular fractures (2) significant oral bleeding (3) loss of protective laryngeal reflexes (4) Glasgow Coma Score less than 8 (5) seizures (6) deteriorating arterial blood gases (7) when significant swelling or oedema is anticipated (8) long transfer in patients with significant facial fracture.[8]

Even though these criteria were developed specifically for patients with brain injury, there is an indirect application to those with complex / severe traumatic oro-facial injuries. Soft tissue facial injury associated with the first two criteria will definitely require airway management for successful resuscitation and treatment. Several techniques have been suggested to avert airway compromise such as emergency cricothyrodotomies and endotracheal intubation over a flexible bronchoscope.[8,9] The later is superior in the face of laryngotracheal injuries. The most definitive method that reduces interference with injured facial tissue and reduces the risk of worsening injuries around the face and the neck is the tracheostomy.[10] Tracheostomy makes anaesthesia easier, and hence, any doctor that is involved in traumatic soft tissue facial injuries must be able to do a tracheostomy.[8]

Since the face is the most prominent part of the body with several contours that are carefully organized into aesthetic units with delicate and precise boundaries, severe trauma can obtund the balance making the patient unrecognizable in the acute phase. Also, worthy of mention is the fact that the face contains structures that serve different functions for different systems (ear, nose, lips, eyelids and eyebrow). These structures have inherent functional and cosmetic designs that must be restored as much as possible since self-image and self-esteem are both closely related to the condition of the face.

Inaccurate approximation will lead to disfigurement; hence the plastic surgeon will need to give attention to details. An early intervention is absolutely necessary because of the accelerated rate of healing in the face. The risk of infection and further soft tissue loss is also another consequence of delayed intervention.[5]

Oro-facial injuries may not always occur in isolation. It could be associated with facial fracture, traumatic brain injury and laryngo-tracheal injuries. The need for multidisciplinary management should also be emphasized since this improves the outcome. Following an initial evaluation, therefore, the relevant specialists such as the plastic surgeon, neurosurgeon, otolaryngologist, anaesthesiologist and ophthalmologist, should be invited, accordingly.

OBJECTIVE

The study aims at identifying the challenges encountered in managing severe traumatic facial injuries in our centre, obvious advantages of multidisciplinary approach and problems associated with late presentation.

METHODOLOGY

This is a prospective study of patients with complex traumatic oro-facial injuries that presented to our centre within a 12-month period (September 2008 – August 2009). Selection was based on association with avulsion injury involving more than one third of the surface area of the face exposing the periosteum or cartilages of the nose or ear, and the presence of fractures along with difficulty in maintaining the patency of the airway thereby necessitating alternative airway management to aid treatment. Presentation of the patient after 72hours of injuries, and/or initial intervention by a non-specialist, is regarded as delayed.

CASE 1

A 20-year old male student admitted through the Accident and Emergency Department with a traumatic facial injury and marked nasal and mid-face avulsion following a passenger motorcycle road traffic accident 1 hour prior to presentation. There was an immediate loss of consciousness and bleeding from the head orifices, but no history of seizures. Examination revealed the avulsion of the entire mid-face with the entire nose and upper lip suspended on a distally based flap with nasal bone and cartilages exposed (Figure 1).

Figure 1. Case 1 showing avulsion of the mid-face

There was associated right frontal compound depressed skull fracture with evisceration of brain tissue, the Glasgow Consciousness Score was 7/15 and he was in severe respiratory distress. There were multiple upper and lower limb lacerations but, the chest and abdominal examinations showed no significant findings. He was immediately resuscitated and the vital signs were stabilized. X–ray studies were done to rule out cervical spine injuries.

The plastic surgeons, neurosurgeons and otolaryngologists were involved in the multidisciplinary management. An immediate facial reconstruction was done to repair soft tissue facial injuries after establishing a tracheostomy for airway maintenance during surgery. Nasal stents were placed using size-24 Foley's catheter (Figure 2).

He, also, had elevation and debridement of the right frontal compound depressed skull fracture. The facial wounds healed uneventfully and he was discharged, but he later developed post-traumatic seizures 5 months later, and presently he is on follow-up with the neurosurgeon and neurologist.

Figure 2. Case 1 after repairs, showing nasal stents and healing wounds

CASE 2

A 32-year old female trader, presented with an avulsion injury of the mid-face and nose, 2hours after a passenger motorcycle road traffic accident. She also had multiple lacerations of the cheeks with severe bleeding and a communication into the buccal cavity (Figure 3). There was no associated loss of consciousness, but she bled from the nostrils and mouth and had difficulty in moving the right upper extremity due to pain and swelling.

Figure 3. Case 3 with multiple lacerations of the cheeks and a communication into the buccal cavity

Clinical examination revealed a conscious but agitated patient in severe respiratory distress with mid and lower facial avulsion, involving the nose, upper lips and lower lips. There was tender swelling and deformity of the right forearm, but the distal sensations and pulsations were intact. Chest and abdominal examinations revealed nothing significant.

The plastic surgeons, orthopaedic surgeons and otorhinolaryngologists were all involved in the management of patient. She was resuscitated and stabilized. Facial reconstruction was carried out after securing an airway via a tracheostomy for inhalational anaesthesia since we needed to work in the oral cavity. Nasal stenting was done with size-24 Foley's catheter. The patient's wounds healed well, and she was discharged home (Figure 4).

Figure 4. Case 2 as the repairs heal up

CASE 3

A 39-year old male trader, who was involved in a passenger motorcycle road traffic accident and sustained a traumatic soft tissue facial injury, 2hours after the incident. There was severe bleeding, but no loss of consciousness. Examination revealed a laceration of the dorsum of the nose extending from the bridge to the tip and traversing the floor of the nose and the upper lip to communicate with the buccal cavity.

There was also, loss of the central incisor teeth and bilateral parasymphyseal mandibular fracture with significant airway compromise (Figure 5 and 6).

Figure 5. Case 3, laceration of dorsum of nose into the buccal cavity with mandibular fracture

Figure 6. Case 3 showing the extensive naso-buccal lacerations and airway compromise

Figure 7. The same Case 3 after emergency tracheostomy and repairs

The patient was resuscitated and quickly taken to theatre for emergency tracheostomy, and the soft tissues were repaired and mandibular-maxillary fixation done with Ivy's eyelet technique. Repair was successful (Figure 7).

CASE 4

A 23-year old female who was involved in a passenger motor vehicular accident following a burst tyre on high speed presented at the Accident and Emergency Department of our centre via a referral from a peripheral hospital 3days after her injury. She sustained multiple facial and nasal injuries and loss of consciousness lasting for more than one hour. The patient, also, had a positive history of bloody rhinorrhoea which stopped draining before presentation. An episode of vomiting of altered blood was noted. She remained lucid with no neurological impairments.

Examination revealed a sutured avulsion of the left frontal scalp. There was an irregularly shaped laceration of the right maxillary region with tissue loss, but which was sutured to the ala nasi under tension resulting in flaring of the right ala. There was avulsion of the columella with reduction in the vertical height of the nose and the nasal cavity was filled with clotted blood. The pre-auricular region had an extensive abrasion which was filled with necrotic tissue. There was loss of upper left incisor, left canine and all lower incisors and canines. The wounds were apposed with nylon-2 sutures and dressed with cotton wool which had dried and caked, with purulent discharge. The entire facial wounds were all grossly infected and malodorous.

The dirty dressings and sutures were all removed and wounds were extensively debrided, and dressings continued with normal saline, and the other appropriate

treatment protocols were instituted. The management involved the plastic surgeons and otorhinolaryngologists.

Figure 8. Case 4 with residual deformities after reconstructive surgery

The residual deformities were the flaring of the right ala nasi with a collapse of the tip of the nose due loss of the collumella. The left side of the upper lip was notched with mal-alignment of white roll. Further reconstructive surgery was scheduled to correct the residual deformities but the patient failed to consent because of financial incapacitation, and a claim of satisfaction with the achieved facial reconstruction (Figure 8).

DISCUSSION

Complex traumatic oro-facial injuries pose a huge management challenge. The achievement of a patent airway is critical to the resuscitation and treatment of the patient. Due to the involvement of the nasal and buccal cavities in the cases presented, the surgeons needed to have the skills to do a tracheostomy or have an otolaryngologist available to secure and divert the airway from the operating field. This aids smooth anaesthesia especially due to the prolonged surgery consequent upon the complexity of the injury and careful approximation of tissues that eliminates deformity. None of the presented cases took less than 4hours to repair and hence, the value of a reliable airway cannot be overemphasized.[8,11,12,13]

In the acute phase, airway compromise in patients with bilateral mandibular fracture may be managed by positioning the patient leaning forward so that the posteriorly displaced tongue obstructing the airway can shift anteriorly. A tongue stitch is also commonly used to pull the tongue forwards for the same purpose.[14] Naso- or oro-trachael intubation is a less traumatic method of securing the airway but was not feasible in the cases presented because the nasal and oral cavities were damaged and needed reconstruction. Moreover, the anaesthetists would be required to monitor the patients for prolonged periods after surgery and our centre lacks the adequate number of anaesthetists. Hence, tracheostomies were opted for.

The mandibular fractures were managed with interdental (mandibulo-maxillary) wiring. Use of mini plates and screws would have been better but these and the instruments needed for fixing them were not available to us. Interdental wiring, incidentally, is a common method used in many centres in Nigeria for management of mandibular and maxillary fractures.[15,16,17,18]

Motorcycle road traffic accidents accounted for 75% of the aetiology of severe traumatic soft tissue facial injuries. This reflects a similar pattern with the study done in Calabar, South-South Nigeria.[3] Motorcycles are common forms of transportation in our region as well as in most parts of Nigeria and the West African sub-region. None of the presented cases wore protective helmets, showing a disregard for safety measures. Hence, an effective way of reducing the

incidence of the injury is by advocating strict adherence to safety measures especially with the use of protective crash helmets.[19]

Immediate intervention in facial soft tissue injuries is absolutely important. Prolongation of repair time will usually lead to infection which will complicate the injury and lead to significant tissue loss.[5] Following this, attempts at repair will most likely result in deformities and impact on the self-esteem and psychology of the patient. Worse still, due to the accelerated healing in the face, deforming contractures can form and such will call for later revisions. The last case was a clear demonstration of this complication in which a delay led to marked disfigurement. Also, noteworthy is the fact that the facial nerve[20] and parotid ducts are soft tissues in the face that can be damaged, and as such, an early approximation improves the restoration of function. Delay in presentation will affect the prognosis of injury of the parotid duct and facial nerve.

The nasal stenting has proved very successful in preventing stenosis of the nasal cavity. The stent is usually anchored to the anterior surface of the columella and removed after the 4th or 5th post-operative day. The stent prevents raw surfaces from coming in contact due to oedema, which will result in healing by fibrosis. The size 24 gauge Foley's catheter is readily available and cheap and the lumen of the catheter serves for further drainage of the injured internal area.

Facial soft tissue repair requires a detailed knowledge of the anatomy and functions of the soft tissues of the face. More to that, a sound knowledge of the aesthetic units of the face that influence the principles of repair is imperative if the outcome will be aesthetically acceptable. Hence, the management of soft tissue facial injuries should not be for the uninitiated, and the plastic surgeon must be involved early in order to expect the best and most acceptable outcome.

Multidisciplinary management of the traumatic facial injuries is imperative because of the possible associated injuries. The 4th case demonstrated clearly that 'the minimum and necessary' should be done for such patients, followed by an appropriate referral without delay. They should be referred to centres with services of the plastic surgeon, neurosurgeon, otolaryngologist and maxillofacial surgeon. The multidisciplinary management of the first 3cases made the results from them very impressive.

CONCLUSION

Complex traumatic oro-facial injuries are challenging to manage especially if associated with airway compromise, facial fractures, soft tissue displacements and/or traumatic brain injury. Multidisciplinary management and early presentation produces the best outcome.

REFERENCES

1. Roccia F, Bianchi FA, Zavattero E, Biatte F, Boffano P. Aetiology and Pattern of facial lacerations and their possible association with underlying maxillofacial fracture. *J Craniofac Surg* 2011 Nov; 22(6): e19-23.
2. Gyhsen D, Ozsarlak, van der Hauwe L, van Goethem J, De Schepper AM, Parizel PM. Maxillofacial trauma. *JBR-BTR* 2000 Aug; 83(4):181-192.
3. Bassey GO, Anyanechi CE, Chukwuneke FN. Maxillofacial injuries in Calabar, South-South Nigeria. *Niger J Med* 2011 Apr-Jun; 20(2): 245–249.
4. Kummoona R. Management of maxillofacial injuries in Iraq. *J Craniofac Surg* 2011 Sep; 22(5):1561-1566.
5. Larry H, Patrick K. Soft tissue and skeletal injuries of the face. Charles HT (Ed). Grabb and Smith's Plastic Surgery, 6th Edition 2007, LWW Philadelphia; 316-332.

6. Ogilive MP, Pereira BM, Ryan ML, *et al*. Emergency department assessment and management of facial trauma from war related injuries. *J Craniofac Surg* 2010; 21:1002-1008.
7. Carithers JS, Koch BB. Evaluation and management of facial fracture. *Am Family Physician* 1997; 55:2675–2682.
8. Recommendations for the Safe Transfer of Patients with Brain Injury. London, UK: Association of Anaesthetists of Great Britain and Ireland 2006.
9. Gaufberg SV, Workman TP. New Needle Cricothyroidotomy Setup. *Am J Emerg Med* 2004; 22: 37–39.
10. Granholm T, Farmer DL. The surgical airway. *Respir Care Clin N Am* 2001; 7:13–23.
11. Nwawolo C.C, Oyewole E.A, Okeowo P.A. Tracheostomy: A longitudinal study. *Niger J Surg* 1997; 4: 53-56.
12. Okafor B.C. Tracheostomy: A review. *Niger Med J* January/March 1987 2(1): 1-10.
13. Orji FT, Ezeanolue BC. Update on pattern of tracheostomies at a tertiary institution after 27 years. *Nigerian Journal of Otolaryngology* March 2006; 3(1): 8-15.
14. Chukwuanukwu TOG, Afiadigwe EE, Ekwuogwu OC, Anyabolu AE. A technique in the emergency management of mechanical airway obstruction. *J Expt Clin Anat* 11(1): 75-80.
15. Nnabuko REE, Olaitan PB. Presentation and management of mandibular fractures in National Orthopaedic Hospital Enugu. *Nigerian Journal of Plastic Surgery* September 2005; 1: 14-17.
16. Akimbami BO. Management of mandibular fractures in Nigeria. A retrospective review of cases from 2 centres. *Nigerian Medical Practitioner* 2008; 53(2): 19-23.
17. Adeyomo WI, Iwegbu IO, Bello SA, Okoturo E, Olaitan AA, Ladiende AL, Ogunlewe MO, Adepoju AA, Taiwo OA. Management of mandibular fracture in a developing country: Review of 314 cases from two urban centres in Nigeria. *World J Surg* 2008; 32: 2631-2635.
18. Oginni FO, Ogboko VI, Odusanya SA. Changing pattern of maxillofacial fracture in a sub-urban Nigerian Training Hospital. *Niger Postgrad Med J* 2009 March; 16(1): 54-58.
19. Emejulu JKC, Isiguzo CM, Agbasoga CE, Ogbuagu CN. Traumatic brain injury in the Accident and Emergency Department of a tertiary hospital in Nigeria. *East Cent Afr J Surg* 2010; 15(2): 28-38.
20. Terence MM, Susan EM. Microsurgical repair of peripheral nerves and nerve grafts. Charles HT (Ed). Grabb and Smith's Plastic Surgery, 6th Ed 2007, LWW Philadelphia; 73-77.