Pattern, severity, and management of cranio-maxillofacial soft-tissue injuries in Port Harcourt, Nigeria

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ABSTRACT

Background: The pattern of craniofacial soft-tissue injuries occurring either in isolation or in association with fractures vary in different societies and is multiply influenced. The effects are enormous because of the prominence of the face; therefore, the purpose of this study was to document any changing pattern, severity and management of these craniofacial injuries in our center. Patients and Method: Cranio-maxillofacial region was classified into upper, middle and lower face. The cause, type, and site of the injuries were documented. Gunshot injuries were further categorized as penetrating, perforating or avulsions. Further, classification of injuries into mild, moderate, and severe was carried out based on multiple factors. Result: A total of 126 patients with soft-tissue injuries presented to our hospital out of which 85 (67.5%) were males and 41 (32.5) were females. The age range of the patients was between 10 months and 90 years with a mean ± SD of 26.4 ± 15.5 years. Road traffic accident was the most common etiology of which vehicular accidents constituted 50 (54.9%) and the motorcycle was 2 (2.2%). Assault contributed 16 (17.6%) while cases due to gun shots were 13 (14.3%). A total of 19 (15.1%) patients had associated head injuries, 11 (8.7%) patients had craniofacial fractures involving any of the bones while 3 (2.4%) patients had limb fractures and 2 (1.6%) patients had rib fractures. There were 51 (41.8%) cases classified as mild injuries, 37 (30.3%) cases as moderate injuries and 24 (19.7%) cases as severe injuries. Total of 126 cases managed, 121 (96.0%) received primary closure of the wounds while 5 (4.0%) received delayed closure under general anesthesia.

Key Words: Craniofacial, management, pattern, severity, soft tissue

INTRODUCTION

Soft-tissue injuries of the cranio-maxillofacial region still remain the most common group of diseases encountered in the casualty department of every health-care facility. Various types of injuries occur depending on the etiology and mechanism of injuries. Causal factors of these injuries include road traffic accidents, interpersonal violence/homicidal injuries, domestic accidents, falls, gun-shots, bomb blasts, industrial accidents and other work/occupational related injuries, sports related injuries, animal injuries, suicidal, earthquake, and iatrogenic injuries. However, the prevalence of the causes varies in different places and countries and also in prevailing circumstances. Motor cycle accidents occur more within the cities of many parts of Nigeria than vehicular accidents because of the high unemployment rate, depressed economy and the struggle for survival, likewise for same reasons, gunshot injuries are usually on the increase especially toward the festive periods. Injuries due to bomb blasts are uncommon in Nigeria, but until recent times, it has been on the increase in the northern part of the country due to political tension, instabilities, and sectional grievances. Soft-tissue injury can affect the skin, subcutaneous tissue, muscle, fat, nerves, blood vessels, salivary glands, and eyes. Quite oftentimes depending on the force of impact, soft-tissue injuries are associated with regional bone injuries, sinus injuries as well as varying levels of brain injury. Treatment of soft-tissue injuries has been fully documented even with an algorithm that is based on the extent
of tissue loss and this range from primary closure for lacerations to delayed reconstruction of avulsions with local, regional or distant pedicled or free transplant flaps. Tissue expansion procedures, use of cultured tissues and artificial skin/tissues are also available for secondary procedures. Recently, there was a ban of the operation of motor cycles for commercial purposes in Port Harcourt and Lagos metropolis and we are beginning to observe a decline in the incidence of these injuries from motor cycles. The aim of this study was to document the pattern, severity, possible changing trends, and management of these injuries seen in our center.

PATIENTS AND METHOD

The study was a retrospective analysis designed to document the pattern and management of all consecutive patients with cranio-maxillofacial soft tissue injuries that were treated from May 2008 to November 2012, in the University of Port Harcourt Teaching Hospital, Rivers State, South-south geopolitical zone, Nigeria. The hospital is one of the four federal Tertiary Health- care centers in the zone that serves a huge population of citizens within and beyond the state. It has a pediatric and adult accident and emergency departments with a total of 120 bed spaces. Demographic and clinical data of patients that sustained soft-tissue injuries to this region of the body with or without any other injury in other parts of the body were included in the study. No patient with such injuries was excluded from the study. Cranio-maxillofacial region was classified into upper, middle, and lower face. The cause, type, and site of the injuries were documented. Gunshot injuries were further categorized as penetrating, perforating or avulsions. Further classification of injuries into mild, moderate and severe was done based on the estimated amount of blood loss, immediate need for blood transfusion, associated head injury, skull bone fracture, single or multiple facial fractures, airway compromise and intensive care. When there is an immediate need for blood transfusion due to excessive blood loss with or without eye or head injury, open or closed skull fracture, multiple or comminuted facial fractures or airway compromise; the injuries are classified as severe. When the soft-tissue injuries are multiple, or very deep or associated with single compound or simple jaw fractures, it is classified as moderate. When the soft-tissue injury is single, two or few, simple, no tissue loss, minimal surface area and exposure of underlying tissues, it is classified as mild.

Investigations and treatment performed for the patients were noted as well as the outcome of treatment. Blood loss of 25-50% (1250-2500 ml) was assessed clinically by degree of restlessness, low blood pressure <80/50 mmHg, high respiratory rate >30 cycles/min, increasing pulse rate >100 beats/min, and confirmed by the value of packed cell volume (PCV) <15%. Head injury was assessed by scoring the eye opening; verbal response and best motor response parameters of Glasgow’s coma scale. The treatment outcome was based on the clinical esthetic assessment of the scars and patients satisfaction. Data obtained was imputed into the computer and was expressed as frequencies and percentages; analysis was performed using the SPSS software version 16.

RESULTS

A total of 126 patients with soft-tissue injuries of the cranio-maxillofacial region presented to our hospital out of which 85 (67.5%) were males and 41 (32.5%) were females. The age range of the patients was between 10 months and 90 years with a mean ± SD of 26.4 ± 15.5 years Table 1.

Information on the type, cause, site, and severity of injuries was missing in 2 (1.6%), 35 (27.8%), 26 (20.6%), 14 (11.1%) patients respectively. Road traffic accident was the most common etiology of which vehicular accidents constituted 50 (40.9%) and the motorcycle was 2 (2.2%). Assault contributed 16 (17.6%) of the injuries while cases due to gun shots were 13 (14.3%) Table 2.

A total of 32 (30.0%) injuries involved the scalp in each of 32 patients while 24 (24.0%), 15 (15.0%) and 10 (10.0%) injuries affected the lower lip, cheek and upper lip in each corresponding number of patients. 15 patients had injuries to multiple sites and one had an injury to both upper and lower lip [Table 3].

19 (15.1%) patients had associated head injuries, 11 (8.7%) patients had craniofacial fractures involving any of the bones while 3 (2.4%) patients had limb fractures and 2 (1.6%) patients had rib fractures Figure 1.

| Age/sex years | Male N (%) | Female N (%) | Total N (%) |
|---------------|------------|--------------|-------------|
| 0-9           | 11 (8.7)   | 7 (5.6)      | 18 (14.3)   |
| 10-19         | 7 (5.6)    | 6 (4.8)      | 13 (9.5)    |
| 20-29         | 30 (23.8)  | 10 (7.9)     | 40 (32.7)   |
| 30-39         | 23 (18.3)  | 6 (4.8)      | 29 (23.0)   |
| 40-49         | 5 (3.9)    | 5 (3.9)      | 10 (7.9)    |
| 50-59         | 6 (4.8)    | 5 (3.9)      | 11 (8.7)    |
| 60-69         | 2 (1.6)    | 0            | 2 (1.6)     |
| 70-79         | 1 (0.8)    | 1 (0.8)      | 2 (1.6)     |
| 80-89         | 0 (0)      | 0 (0)        | 0 (0)       |
| 90-99         | 0 (0)      | 1 (0.8)      | 1 (0.8)     |
| Total         | 85 (67.5)  | 41 (32.5)    | 126 (100)   |

Table 1: Age and gender distribution of patients with craniofacial soft-tissue injuries

| Etiology           | N % |
|--------------------|-----|
| Vehicle accident    | 50  |
| Motor cycle accident| 2   |
| Assault            | 16  |
| Falls              | 9   |
| Gunshots           | 13  |
| Sports             | 0   |
| Domestic accident   | 1   |
| Total              | 91  |
| Total              | 91  |

Table 2: Distribution of the etiology of soft-tissue injuries
Out of the type of injuries, lacerations ranked the highest constituting 70 (56.5%) followed by bruise (contusion), which was 16 (12.9%) while abrasion and avulsion constituted 11 (8.8%) cases each Table 4.

There were 51 (41.8%) cases classified as mild injuries, 37 (30.3%) cases classified as moderate injuries and 24 (19.7%) cases classified as severe injuries Figure 2. In addition to head injury and fractures, more than two-thirds of these severe cases had blood loss of more than 25% with PCV below 30% and evidence of hypovolemic shock on admission. One of our cases was a truck driver who sustained extensive degloving injury of the soft tissues of the midface and lower face in addition to gross communication and avulsion of the maxilla, right zygomatic complex and mandible fracture from the impact of the rim, which suddenly separated from the exploded tire while trying to reposition the tire Figures 3 and 4.

Out of all the 126 cases managed, 121 (96.0%) were treated by doing primary closure of the wounds under local anesthesia, 5 (4.0%) cases were treated with delayed closure under general anesthesia, 3 of these had avulsion and 2 of which was treated with local flaps (lip and cheek advancement flaps) and one with distant pedicle latissimus dorsi flaps. In one patient, residual defect on the left nasolabial fold was repaired with central forehead flap.

Outcome based on appearance of the scar was satisfactory in 99% of cases and 1% was requested to come for revision

DISCUSSION

The pattern of soft-tissue injuries that presented to our hospital and documented in this study was a little different from those that has been documented in previous reports.[1-8] In this present study, there were more males in most of the age groups with a total male to female ratio of 2:1. Other studies also documented a male preponderance.[1-6] In general, reasons alluded for males having more injuries are the fact that men are breadwinners of families and are involved more in outdoor activities to earn a better living, but when we compared studies, our study showed a lower male to female ratio than other studies. This may be an indication that more women are getting involved in both economic and social activities, which exposed them to the causes of these injuries. About 15% of the injuries were found in children and most of the cases were due to fall as also documented in the studies of Oginni et al., and Okoje et al.[2,8] It is important for parents to ensure adequate care of their children and to entrust their children to people who can monitor them closely when they are not around. As observed in other studies, these injuries were the most common in the third and fourth decades of life and this reflected the period of peak activities.[9-11]

Vehicular accidents were responsible for about 55% and still remained the highest cause of injuries in developing countries[1],[8] and Okoje et al.[9,10] In contrast to interpersonal violence seen in developed countries[10-18] with better roads, and better transport facilities. Cases due to motorcycle accidents in this present study

Table 3: Distribution of the sites of craniofacial soft-tissue injuries

| Site          | N  | %  |
|---------------|----|----|
| Scalp         | 32 | 32.0|
| Upper eyelid  | 3  | 3.0 |
| Lower eyelid  | 3  | 3.0 |
| Ear           | 5  | 5.0 |
| Glabella      | 1  | 1.0 |
| Nose          | 5  | 5.0 |
| Cheek         | 15 | 15.0|
| Upper lip     | 10 | 10.0|
| Lower lip     | 24 | 24.0|
| Submental     | 1  | 1.0 |
| Submandibular | 1  | 1   |
| Total         | 100| 100 |

Table 4: Distribution of the types of craniofacial soft-tissue injuries

| Site          | N  | %  |
|---------------|----|----|
| Bruise        | 16 | 12.9|
| Abrasion      | 11 | 8.8 |
| Laceration    | 70 | 56.5|
| Degloving     | 5  | 4.0 |
| Avulsion      | 11 | 8.8 |
| Penetrating   | 8  | 6.5 |
| Perforating   | 3  | 2.4 |
| Puncture      | 0  | 0   |
| Total         | 124| 100 |

Figure 1: Showing the distribution of associated injuries

Figure 2: Showing the classification of severity of craniofacial soft-tissue injuries
and it is not surprising considering the high incidence of abrasions when soft tissues come in contact with or are dragged on rough, friction surfaces. Again with changing trends in India as earlier noted, fist injuries from assault and sports had possibly increased incidence of contusions. These reasons also explain the occurrence of bone fractures without disruption of integrity/continuity of overlying soft tissues. It becomes necessary for the government to enforce the ban on the importation of second hand, badly refurbished and poorly padded vehicles. Avulsion and abrasion injuries ranked next to bruises constituting 8.8% and 12.9% respectively. More of these injuries involved the scalp (32%) followed by the lower lip (24%) and cheek (15%).

Head injury was the most common injury associated with soft-tissue trauma (15%) in our study. This was different from a report from Iraq (19), a war torn country in which the most common associated type of trauma was eye injury (29%), the reason for this difference was attributable to the nature of etiology, which was road traffic accident with blunt injuries to the head, in contrast to, penetrating injuries from projecting missiles into the eyes. However, virtually all the head injury had a Glasgow coma scale less than four, signifying the injuries to be more of brain contusions with transient loss of consciousness. In our study, we have categorized soft tissue injuries associated with any degree of head injury as severe because, regardless of the fact there were no prolonged loss of consciousness, any impact to any part of the face that is not concentrated to the area of contact or absorbed by the surrounding bones but high enough to be transmitted to the brain is severe in magnitude and can also predispose to immediate or long-term complications such as amnesia and convulsions.

In our study, laceration ranked the highest in the type of injuries that presented to our center, this was also similar to some other studies, but in contrast to study from East Delhi, India in which cases of abrasions and contusions were more. Contact with sharp objects in road traffic accidents and use of such objects in cases of assault contributed to the high incidence of lacerations, but those seen with RTA were more than assaults, furthermore, abrasions occur when soft tissues come in contact with or are separated from the exploded tire. This invariably determines the categorization of the severity of injuries. Furthermore, serious impact trauma provokes severe local and systemic body responses to the trauma. Severity of maxillofacial injuries particularly fractures of bones has been discussed in the literature based on many factors especially, the sites involved and
the complexity of the injuries; however, in this study, we have proposed a comprehensive classification by including some additional factors which are: amount of blood loss, multiplicity and complexity of soft and bone injuries, head injury, eye injury, airway compromise and need for intensive care and we have categorized these injuries as mild, moderate, and severe. According to our classification, 41.8% cases fell in the mild category while, 30.3% and 19.7% cases were in the moderate and severe category respectively.

Mechanisms of road traffic and gunshot injuries have been exhaustively discussed in the literature. Speed, position of victim, use of safety devices, and surface body geometry are mostly responsible for the degree of impact and injuries sustained in road traffic accidents. Similarly, velocity/kinetic energy range of shots, direction, and nature of primary missiles and effects of secondary missiles determine the wound characteristics of the projectiles. All the cases due to gunshots fell within the moderate or severe classification because of multiple tissue involvement and moderate to gross deep tissue necrosis.

Blood loss was an important indicator of severity of injury and a major cause of death in injuries in general, and because quite a number of multiple and moderate-caliber vessels and plexus abound in the craniofacial region, shock and acute renal failure from hypovolemia are serious complications that must be prevented by quick blood transfusion. In this study, we have distinguished severity of craniofacial soft-tissue trauma from the severity of trauma to the whole body based on the focus of the study, it is possible for an etiology to cause injuries to many different parts of the body and the facial injuries may be mild, but when a patient is multiply injured and require intensive care, such a case was classified as severe. Multiply injured patient that does not require intensive care, that is, pre-operative and/or post-operative intubation is not regarded as severe. Although, 19.7% of our cases were severe, only 1 (0.9%) actually required pre-operative intubation. It is preferable to perform initial treatment of patients with unstable hemodynamic status under local anesthesia. This prevents further compromise of vital signs in the acute phase of trauma. In a 2003 study by Gassner et al. only 5% of the cases were documented as fatal injuries based on the complexity of the skeletal and other associated body injuries and they also found that head injury was the leading cause of death (37.7%).

Although over 95% of our cases needed primary closure by direct suturing, unavailability of facilities for free flaps was a major limitation to achieving best repairs of some of the large wounds. However, the first option recommended when considering repair of large defects is a secondary reconstruction with local or regional, rotation or transposition pedicled flaps. When skin/subcutaneous tissue/muscle wound is allowed to heal secondarily, the defect tends to be smaller because of some regeneration, and with such relative reductions, there will be less need for distant flaps, which are more cumbersome, more time consuming and with possible dissimilar tissue surface characteristics.

Considering the physical, psychological, and emotional distresses that accompany these injuries, it is important for our government to legislate and enforce traffic rules, strengthen road safety measures and also implement poverty alleviation programs. In addition, there is a need for the provision of new or high grade vehicles, buses and coaches as well as revitalization of the rail transport, thorough multilayered tarring and regular maintenance of our roads, banning of motorcycles in other parts of the country and replacement with tricycles as well as absorbing these commercial cyclists into the new transport schemes.

In conclusion, the pattern of soft-tissue injuries seen in our center and documented in this report showed a remarkable reduction in the number of injuries sustained from motorcycle accidents as well as an increase in the number of females involved. Wound characteristics was severe in about 20% of cases and complex reconstructive procedures in the form of regional or distant flaps were required in 4% of the cases to repair the wide defects.

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