

## Etiology, pattern and outcome of management of facial lacerations in

### Dar es Salaam, Tanzania

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#### Abstract

**Background:** Facial laceration is amongst the commonly encountered soft tissue injury in the care of the traumatized patients, and its optimal treatment is important for minimizing subsequent complications. This study aimed at determining the etiology, pattern, and outcome of management of facial lacerations among patients attended at Muhimbili National Hospital, Tanzania.

**Methods:** This was a four months' prospective study of all consecutive patients with facial lacerations who were attended in the department of oral and maxillofacial surgery of the Muhimbili National Hospital (MNH). The variables examined included socio-demographic characteristics, etiology of facial laceration, prior management before referral to MNH, and the outcome of treatment. The data were analysed using IBM SPSS statistics for windows version 22 (Armonk, NY: IBM Corp) software.

**Results:** Seventy-six patients with facial lacerations were included in the study. The male to female ratio was 8:1. The age of the patients ranged from 16 to 57 years, with a mean age of  $31.63 \pm 10.02$  years. Motor traffic crashes (51, 67.1%), violence (18, 23.7%) and falls (7, 9.2%) were the etiological factors. The commonest affected facial esthetic zones were forehead (25, 32.9%), and the upper lip (24, 31.6%). The majority (60%) of wounds that were sutured/repared in other health facilities prior to referral to MNH had a poor approximation of wound edges. Scarring was the commonest complication.

**Conclusion:** Facial laceration affected males eight times more than females. Road traffic crash was the most common etiological factor. The forehead was the most frequently affected facial esthetic zone. The majority of patients treated in other health facilities prior to referral to a tertiary hospital had poorly approximated wound edges. Scarring was the most common complication of facial lacerations.

**Keywords:** Laceration, management, outcome.

#### Introduction

Facial laceration is amongst the commonly encountered soft tissue injury in the care of the traumatized patients, and its optimal treatment is important for minimizing subsequent complications (Lee *et al.*, 2015; Khare and Galinde, 2015). This type of injury has been documented in various literature and even depicted in sculptures in different societies, reflecting the image of the society towards such injury (Bhattacharya, 2012; Gaur, Rajan and Divedi, 2016). The reported incidence of facial wounds is between 4% and 7% of all accident and emergency visits (Lee *et al.*, 2015).

The etiology of facial injuries varies from one country to another and within the same country depending on the prevailing socio-economic, cultural and environmental factors (Adeyemo *et al.*, 2005). Causal factors of these injuries include road traffic crashes, assaults, falls, gun-shots, occupational-related injuries, sports-related injuries, animal injuries and iatrogenic injuries (Olayemi *et al.*, 2013).

The objectives of laceration repair are to achieve hemostasis, avoid infection, restore function to the involved tissues, and to achieve optimal cosmetic results with minimal scarring (Forsch, 2008; Lee *et*

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*al.*, 2015). However, the definitive management of laceration depends on factors such as time elapsed since injury, the extent and location of the wound, available laceration repair materials, and the skill of the physician (Forsch, 2008). Injuries to the facial structures occasionally have disastrous consequences on the affected person (Dhungana *et al.*, 2015), since most wounds that occur on the face leave a scar (Lee *et al.*, 2015).

There are few reports that provide detailed comparable information regarding the circumstances and patterns of facial lacerations (Roccia *et al.*, 2011). Considering the paucity of studies on facial lacerations and their outcomes in Tanzania, the present study was undertaken with the aim of determining the etiology, pattern, and outcome of management of facial lacerations among patients attended at Muhimbili National Hospital, Tanzania.

## Methodology

This was a four months' prospective study of all consecutive patients with facial lacerations attended at the oral and maxillofacial department of the Muhimbili National Hospital (MNH), between November 2017 and February 2018. MNH is a tertiary hospital located in Dar es Salaam city, Tanzania. It serves as a referral center and caters to the health needs of the majority of people from within the city and beyond. It is one of the very few centers in Tanzania where oral and maxillofacial surgeons are readily available.

The sample size was estimated using single population proportion formula taking prevalence of 67% based on the report by Awlla and Shihab, *et al.* 95% confidence interval and 7% error of margin (Awlla and Shihab, 2013). A convenient sampling technique was used to recruit participants in this study. The inclusion criterion was all patients with facial lacerations who attended treatment at the oral and maxillofacial unit of MNH within one-week post-injury. Those patients with facial laceration, but did not give consent for the study were excluded. Refusal to enroll or withdraw from the study did not in any way affect the patient's right to receive standard treatment.

All participants who consented to be included in the study were interviewed using a structured questionnaire which was assessed by a panel of experts in the field of oral and maxillofacial surgery in MNH and MUHAS. It was then pretested in a sample of patients approximating 10% of the calculated sample size before using it for the study). The obtained information in the study included sociodemographic characteristics of the patient, aetiology of injury, and prior management before coming to MNH. This was then followed by thorough clinical examination. The Facial lacerations were classified according to the MCFONTZL system developed by Lee *et al.*, (Lee *et al.*, 1999) with slight modifications where we considered it to be appropriate. MCFONTZEL classification system is based on distinct facial zones, which is a simple and clinically applicable method for the complete assessment of trauma-related soft-tissue injuries to the face (Awlla and Shihab, 2013). Confidentiality was maintained and identification numbers instead of patients' names were used in the questionnaires and clinical examination forms.

All patients with facial lacerations were treated on the day of admission following the accepted available guidelines. For the wound that was clean, and the patient had reported within 6 hours since the time of injury, thorough irrigation of the tissues was done using a copious amount of fluid (normal saline or Ringers' lactate solution). Once the wound was clean, it was primarily repaired under local anaesthesia. For those patients who reported with soft tissue injuries more than 12 hours post-injury and those with wounds that were contaminated or infected, mechanical cleansing of the wounds was done under local anaesthesia. This was followed by surgical debridement for removal of devitalized tissue and delayed primary wound closure was done or the wound was left to heal by secondary intention. For the patients who had their wounds repaired before reporting to MNH, the wounds were examined for appropriateness of suturing techniques. In cases, where the wound was inappropriately

managed, either it was reopened and sutured again immediately or it was left to heal and subsequent scar revision carried out.

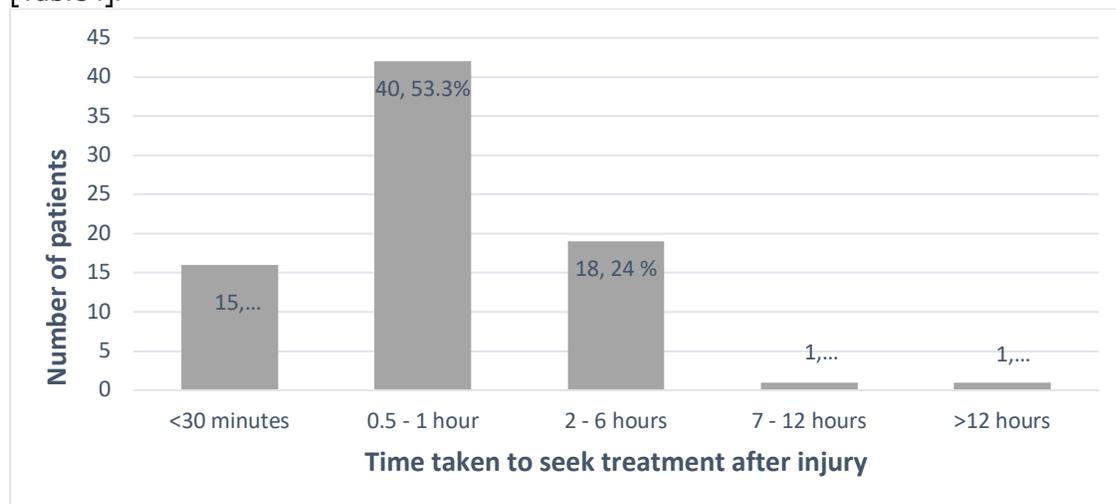
For the purpose of analysis, the age was categorized into groups with a range of 20 years (i.e. 0-19, 20-39, 40-59 years etc.). Body Mass Index (BMI) was categorized into underweight ( $<18.5 \text{ kg/m}^2$ ), normal weight ( $18.5 - 24.5 \text{ kg/m}^2$ ) and overweight ( $24.5 \text{ kg/m}^2$ ).

For data analysis, Statistical Package for Social Sciences software (SPSS) for windows (version 22, IBM Corporation Chicago, IL, USA) was used. Selected variables were represented as frequencies and percentages. Fisher's t-test of association was used and associations were considered significant when  $p < 0.05$ . uncontrolled logistic regression was used to analyse the relationship between the complications of facial laceration and selected risk factors. The results were reported as odds ratio and 95% confidence interval.

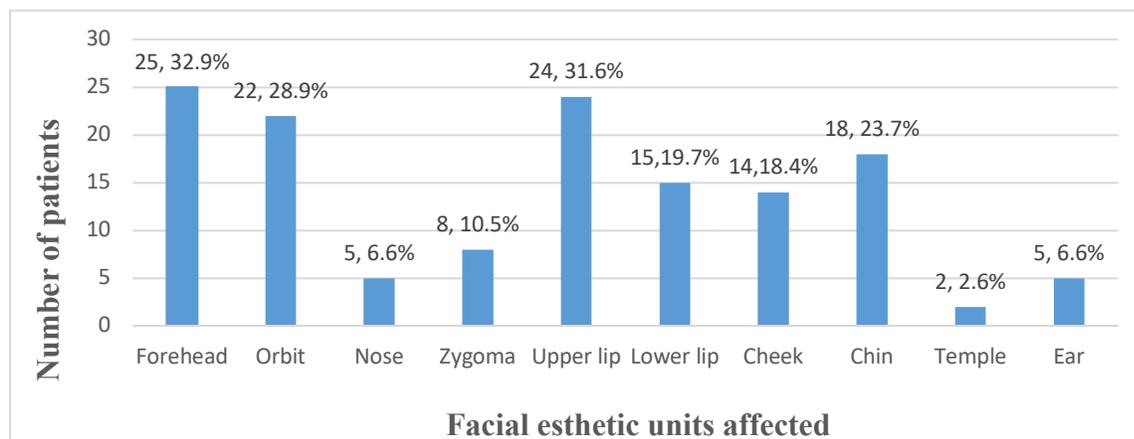
## Results

A total of 176 patients with oral and maxillofacial injuries were attended at Muhimbili National Hospital, out of whom, 76 (43.2%) had sustained facial lacerations. Males were 67 (88.2%) and females were 9 (11.8%), giving a male to female ratio of 8:1. The age of the patients ranged from 16 to 57 years, with a mean age of  $31.63 \pm 10.02$  years. The majority (58, 76.3%) of patients were in the age group 20-39 years, followed by 40-59 years (14, 18.4%) and 0-9 years (4, 5.3%). The etiology of facial lacerations included motor traffic crashes (51, 67.1%), violence (18, 23.7%) and falls (7, 9.2%). More than half (50, 65.8%) had their body mass index within the normal range, with the remaining falling in the overweight category.

Nearly all (75, 98.7%) patients with facial lacerations sought treatment on the same day of injury, with the majority (74, 97.4%) reporting to a health facility within six hours post-injury [Figure 1]. Only one patient sought treatment after 2 days post-injury due to neglect. Most (40, 52.6%) patients had only a single esthetic unit affected. Of those with multiple affected esthetic units, the majority (24, 66.7%) had two sites affected, followed by those with three affected sites (9, 25%) and four affected sites (2, 5.5%). The remaining one (2.8%) had seven affected sites. The commonest affected facial esthetic zone among the patients was the forehead (25, 32.9%), and the upper lip (24, 31.6%). The least (2, 2.6%) affected esthetic unit was the temple [Figure 2]. The orbits, followed by forehead were frequently injured sited in road traffic crashes, whereas in assault/ violence, forehead and upper lip were the frequently injured sites. The chin and lower lip were commonest sites to be injured in falls [Table 1].



**Figure 1: Distribution of patients with facial lacerations according to time taken to seek for treatment.**



**Figure 2: Distribution of facial laceration according to the facial esthetic zones.**

**Table 1: The distribution of the affected facial zone according to the etiology of facial laceration.**

Facial Zone Affected	Etiology of facial laceration		
	Road Traffic Crash (n=51)	Assault/Violence (n=18)	Fall (n=7)
Forehead	5 (29.4%)	9 (50%)	1 (14.3%)
Orbit	16 (31.4%)	5 (27.3%)	1 (14.3%)
Nose	3 (5.9%)	1 (5.6%)	1 (14.3%)
Temple	1 (2%)	1 (5.6%)	-
Cheek	8 (15.7%)	4 (22.2%)	2 (28.6%)
Ear	4 (7.8%)	1 (5.6%)	-
Upper lip	14 (27.5%)	8 (44.4%)	2 (28.6%)
Lower lip	9 (17.6%)	3 (16.7%)	3 (42.9%)
Chin	12 (23.5%)	3 (16.7%)	3 (42.9%)

Greater number (72, 94.7%) of patients were seen in other health facilities prior to being referred to the Muhimbili National Hospital (MNH), while the remaining ones (4, 5.3%) came directly to MNH. Prior to coming to MNH, surgical toileting and wound suturing was done in more than half (55, 72.4%) of the patient. Most (33, 60%) of the wounds that were sutured/repared in other health facilities prior to referral to MNH had a poor approximation of wound edges (overlapping edges).

Nine (27.3%) of the 33 wounds with poorly approximated edges had to be revisited and repaired immediately upon the arrival of the patient at MNH, while the remaining (24, 72.7%) required subsequent scar revision.

For those (21, 27.6%) who came without definitive management of their lacerative injuries from other facilities, their management was done at MNH. About 23.8% (n=5) of the participants had primary repair of their wounds. More than half (13, 61.9%) of the patients had their wounds left to heal by secondary intention, while the delayed primary repair was done in about 14.2% (n=3) of the patients with lacerations.

Healing occurred in the majority (65, 85.5%) within one-week post-injury. The cause of delayed wound healing in remaining ones (11, 14.5%) included infection (8, 72.7%) and wound necrosis (3, 27.3%). All patients recruited in the study were followed up for a month period. Forty-eight (63.2%) had developed complications within a period of one month. The most frequently encountered complications included: scars (42, 87.5%), fibrosis (5, 10.4%) and functional impairment (1, 2.1%).

Healing of the wound within one-week post-injury was independent of sex of the patient, body mass index of the patient and the quality of approximation of the wound edges ( $p > 0.05$ ). Poorly approximated wound edges had a significant association with the occurrence of complications within one-month post-injury ( $p < 0.001$ ) and with eventual scarring of the site of injury ( $p < 0.001$ ) [Table 2].

All domain-specific predictors for complications of laceration with p-value less than 0.1 were retained for final multiple regression model. This model was adjusted for suturing prior to referral MNH, and wound approximation. Poor wound edges approximation was associated with 17-folds higher odds of having complications (OR=17.5, 95% CI 4.02 - 76.17) and 15-folds higher odds of developing subsequent scarring of site of injury (OR=15.5, 95% CI 3.92 - 61.6).

**Table 2: The relation between selected variables and various outcomes of the lacerated wound**

Variables of interest	Wound healing within 1-week post injury			Complication within 1 month post injury			Scarring		
	Yes	No	p-value	Yes	No	p-value	Yes	No	p-value
Sex (N= 76)									
Male	57 (85.1%)	10 (14.9%)	0.76	42 (62.7%)	25 (37.3%)	0.816	36 (53.7%)	31 (46.3%)	0.464
Female	8 (88.9%)	1 (11.1%)		6 (66.7%)	3 (33.3%)		6 (66.7%)	3 (33.3%)	
Body Mass Index (N= 76)									
Normal	42 (84%)	8 (16%)	0.6	31 (62%)	19 (38%)	0.772	28 (56%)	22 (44%)	0.858
Over weight	23 (88.5%)	3 (11.5%)		17 (65.4%)	9 (34.6%)		14 (53.8%)	12 (46.2%)	
Suturing before coming to MNH (N=67)									
Yes	45 (81.8%)	10 (18.2%)	0.404	38 (69.1%)	17 (30.9%)	0.073	36 (65.5%)	19 (34.5%)	0.04
No	11 (91.7%)	1 (8.3%)		5 (41.7%)	7 (58.3%)		4 (33.3%)	8 (66.7%)	
Approximation of wound edges following suturing before coming to MNH (N=55)									
Good	19 (86.4%)	3 (13.6%)	0.475	8 (36.4%)	14 (63.6%)	0.000	7 (31.8%)	15 (68.2%)	0.000
Poor	26 (78.8%)	7 (21.2%)		30 (90.9%)	3 (9.1%)		29 (87.9%)	4 (12.1%)	

## Discussion

It is a widely accepted fact that more than any other part of the body, the face is closely tied to our sense of self, identity, empathy, attraction and communication, and any changes to facial appearance can challenge the sense of self (Rahtz *et al.*, 2018). Hence, when the laceration injury, which is the most common type of soft tissue injury (Olayemi *et al.*, 2013; Lee *et al.*, 2015; Khare and Galinde, 2015) occurs in the face, proper attention to the aesthetic outcome after repair becomes of paramount concern of the victim (Esezobor *et al.*, 2013). Taking this into consideration, this study was conducted to determine the etiology, pattern, and outcome of management of facial lacerations among patients attended at Muhimbili National Hospital, Tanzania.

In this study, facial lacerations were found to affect the males more than females. This is in line with other studies done on similar subject (Roccia *et al.*, 2011; Esezobor *et al.*, 2013; Lee *et al.*, 2015). The predominance of males in traumatic injuries has been documented in several studies (Ramli *et al.*, 2008; Miguens-jr *et al.*, 2016; Mpiima *et al.*, 2018), and gender-based activities are the main attributed cause.

In concurrence with the findings of other studies (Adeyemo *et al.*, 2005; Esezobor *et al.*, 2013; Gilyoma, Mabula and Chalya, 2013; Agbor *et al.*, 2014), the peak incidence of facial injuries was in the third and fourth decades of life in this study. In this period of life, individuals are usually most active and tend to remain outdoors in search of their livelihood and this increases their vulnerability to injuries (Gaur, Rajan and Dvivedi, 2016).

The findings of this study indicated that the commonest etiology of facial lacerations were motor traffic crashes, violence and falls. These findings are in agreement with what has been reported in studies elsewhere (Roccia *et al.*, 2011; Esezobor *et al.*, 2013; Khare and Galinde, 2015).

Results of this study revealed that facial lacerations were predominantly distributed around the midline region of the face following a T-shaped distribution, over the forehead, upper orbit, upper lip, lower lip and chin. Similar findings have been reported in other literature (Lo and Aslam, 2005; Roccia *et al.*, 2011; Hwang *et al.*, 2013). The prevalence of lacerations with a T-shaped distribution is attributed to the anatomic bony prominences of the maxillofacial region, which predisposes an individual to soft tissue injuries (Roccia *et al.*, 2011).

Falls led to lacerations predominately to the lower lip and chin, these findings are in agreement with another study (Roccia *et al.*, 2011). These are areas that are most likely to lacerate upon fall since they are the first facial area to come into contact with the ground. In most of the assault cases, the injuries appear to be aimed at common areas (Lo and Aslam, 2005) such as the forehead.

Almost all the patients with facial lacerations were attended for their injuries in other health facilities prior to being referred to the Muhimbili National Hospital (MNH). This finding was not unusual considering the hierarchy in the current public health referral system in the country, which comprises a pyramidal network of dispensaries, health centres and hospitals (Manzi *et al.*, 2012). Therefore, patients do not come directly to the tertiary referral health facility without passing through other health care facilities.

The findings of this study revealed that more than half of the laceration wounds that were repaired in other health facilities presented with a poor approximation of wound edges of which all had overlapping wound edges. This can be attributed to the emergency nature of the injury; whereby the attending physician is more concerned about arresting bleeding rather than cosmetics at that given time. Another reason is that in the majority of the health facilities, there is a shortage of maxillofacial surgeons and plastic surgeons, thus suturing is done by a general practitioner and at times nursing staff, who have little skills in proper suturing techniques. When repairing facial laceration, a greater understanding of the biomechanics of tissue wounding, molecular biology of wound healing and the art of soft-tissue repair is crucial (Bhattacharya, 2012).

In this study, it was observed that the majority of the wounds had healed by the second week, which coincides with the proliferative phase of wound healing. The proliferative phase begins in the microenvironment of the injured site within the first 48 hours and can unfold up to the 14<sup>th</sup> day after the injury (Gonzalez *et al.*, 2016).

Obstacles for proper wound healing may include both systemic and local factors. These local factors include wound infection, wound necrosis, repeated trauma, and tissue hypoperfusion (Hakkarainen *et al.*, 2014). In this study, wound infection was the major contributing factor for delayed wound healing.

The most commonly observed complication of STI in this study was post-trauma scarring. Though scarring in the facial region may cause functional limitations, it also affects patient's self-image, leading to considerable psychological problems with self-esteem and self-confidence (Serghiou, Holmes and Mccauley, 2004). Higher incidence of scarring could be attributed to the poor technique of wound suturing during the initial phase, as it was found that more than half of the victims who had their wounds sutured prior to reporting to MNH had poor wound approximation.

In the light of this study, the following limitations were obvious; Firstly, this was a hospital-based study carried out in a single tertiary institute, thus it captured only patients who attended for treatment at MNH during the study period and it might have missed those who did not report to any health facility for various reasons or had never been referred to MNH following management at the initial health facilities of attendance. Secondly, the study duration was short.

Generally, the present study casts light on the current situation in our country as far as soft tissue injuries, in particular, facial lacerations are of concern. The results of this study will aid the relevant authorities and health institutes in making appropriate evidence-based training programs for the general practitioners on proper tissue suturing techniques, so as to improve the management of patients with facial lacerations in the future.

### **Conclusion**

Facial laceration is a common type of soft injury. Males were affected eight times more than females. Road traffic crashes were the most common etiological factors for facial lacerations. The forehead and the upper lip were the most commonly affected facial esthetic zones. The majority of patients treated in other health facilities prior to referral to a tertiary hospital had poorly approximated wound edges. Scarring was the most common complication of facial lacerations.

**Ethics:** The ethical clearance for this study was sought from the Ethical Committee of the Muhimbili University of Health and Allied Sciences (MUHAS). Permission to conduct the study was sought from the administration of MNH.

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**Conflict of interests:** The authors declare that they have no competing interests.

**Consent for publication:** Not applicable

**Authors' contributions:** All authors participated in conceiving and planning the study, KSS collected and analyzed the data. KSS drafted the manuscript. JRM did a critical revision of the manuscript. All authors contributed to the final critical revision of the manuscript, and have read and approved the final manuscript.

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