Trends in Maxillofacial Trauma: A 17-Year Study at Los Angeles County Hospital – A Level 1 Trauma Center

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Abstract

Objectives: Examine the characteristics of all operative facial fractures encountered at Los Angeles County Medical Center (LAC+USC) from 1993-2010 examining demographics, fracture number, fracture patterns, and mechanisms of injury

Study Design: Retrospective chart review

Methods: IRB approved retrospective chart and imaging review for operatively managed midface fractures at LAC+USC between July 1993 and July 2010

Results: Total of 5,549 facial fractures that required operative repair from July 1993 to July 2010 in a total of 4,299 patients. Mean age was 34.6 years, and 88% male with a M:F ratio of 7:1. Orbital floor and ZMC are the most prevalent types encountered in both the overall and pediatric populations. 51% of fractures are the result of assault and 20% the result of MVAs. When comparing the data from 1993-2001 to that from 2002-2010, there is an increase in the percent caused by assault from 43% to 60%, and a decrease in the percent caused by MVAs from 23% to 16%. Overall there is a declining trend in the total number of operative fractures.

Conclusion: There are several unique characteristics and trends when examining the operative facial fractures encountered at LAC+USC Medical Center. Younger males are significantly more likely to be involved in facial trauma requiring operative repair, which is consistent with published literature. There has been an overall decrease in the number of operative facial fractures over the time period studied, paralleling changes in automobile safety and decreasing aggravated assault rates in California. Zygomaticomaxillary complex and orbital floor are the most prevalent fractures encountered, and their incidence has remained stable despite the decrease in overall fracture number. There has been a shift in the mechanism of injury, with a decrease in the incidence of fractures caused by motor vehicle accidents, and an increase in the incidence of fractures causes by physical assault.

Introduction

There are over 3 million incidents a year of facial trauma. The incidence and etiology varies based on region, setting (urban vs rural), population and socioeconomic factors. Treatment ranges from simple observation to operative stabilization. Maxillofacial trauma requiring surgical repair is a large burden on both patient and hospital, especially in the larger Level I trauma centers throughout the United States.

LAC+USC is a Level 1 Trauma Center located in downtown Los Angeles. It is one of the largest public hospitals and training centers in the United States, and is the single largest healthcare provider in Los Angeles County. It is a 745-bed hospital with an Emergency Department that consists of 130 beds and sees >150,000 average emergency room visits per year, treating >28% of the region’s trauma victims. Given the emotional, functional, and cosmetic repercussions associated with facial fractures and the large financial burden associated with their care, it is imperative that we have an understanding of the patterns of these injuries in order to better provide adequate and effective treatment. There are few studies examining the U.S. facial fracture demographics published in the last 20 years and many of them are limited in sample size and duration of study.

Methods and Materials

IRB approved retrospective chart review of all surgically managed facial fractures at LAC+USC Hospital was conducted between July 1993 and July 2010. The EMR was used to obtain demographic data including age, gender, date of presentation, fracture type, laterality, and mechanism of injury. Facial lacerations, non-operative fractures, as well as isolated mandible, temporal bone, and nasal fractures were excluded.

Results

There were a total of 5,549 facial fractures that required operative repair from July 1993 to July 2010 in a total of 4,299 patients. Demographic data demonstrated a mean age of 34.6 years (range: 8 months – 93 years). The fracture population was 88% male with a M:F ratio of 7:1. This contrasted with the overall LAC+USC hospital patient gender distribution which is 57% female and 43% male. The distribution of facial fracture sub-site (Figure 1) demonstrates that orbital floor fractures and zygomaticomaxillary complex (ZMC) are the most prevalent types of operative fractures encountered in both the overall population (32.5% and 30.6% respectively) and the pediatric population specifically (39.3% and 22.6% respectively).

With regards to mechanism of injury (Figure 2), 51% of fractures were the result of assault and 20% the result of MVAs. When examining the pediatric population specifically, MVAs are the most common mechanism of injury at 37% with auto vs pedestrian (15%) and falls (14%) being second and third most common. By separating the fracture data into two time periods (Figure 3), it demonstrates an increase in the percent of fractures caused by assault from 43% to 60%, and a decrease in the percent of fractures caused by MVAs from 23% to 16% when comparing the data from 1993-2001 to 2002-2010. There is a declining trend in the total number of operative fractures per year from 584 in 1993 to 206 in 2010 (Figure 4).

With regard to the time of week and year, operative fracture presentations are more common during the weekend on Saturdays and Sundays, and the two most common months for facial fractures during 1993-2010 were September and October rather than the summer months of June and July.

Discussion

There are several unique characteristics and trends when examining the operative facial fractures encountered at LAC+USC Medical Center. Younger males are significantly more likely to be involved in facial trauma requiring operative repair, which is consistent with published literature.

The overall number of facial fractures requiring operative repair has decreased from 584 in 1993 to 206 in 2010. Regarding anatomic location of injury, orbital floor and ZMC fractures are the most prevalent fractures, but their incidence has remained stable as the total number of fractures has declined each year. Assault was the most common mechanism of injury, and its incidence increased from 43% (from 1993-2001) to 60% (from 2002-2010). Motor vehicle accidents, the second most common mechanism of injury, saw a decrease in incidence from 23% to 16%. These mechanisms of injury (MVA and assault) can likely be explained by the developed and urban setting of LAC+USC. The decrease in MVAs as a mechanism of injury may be due to improvements in automobile safety features (airbags and seatbelts) which occurred in the mid to late 1990s. Multiple previous studies support this conclusion and have demonstrated that the use of a restraint device decreases the chance of sustaining a facial fracture.

The overall decrease in operative fractures at LAC+USC could perhaps be attributed to the combination of a decreasing number of vehicle collisions in California with passenger-sustained injuries and a decrease in aggravated assault rates (Figure 5), especially given that they demonstrate the two largest mechanisms of injury. Interestingly however, the increase in assault demonstrated above as a mechanism of injury over time at LAC+USC contrasts the gradual decline in the number of aggravated assaults per 100,000 population in California. When examining pediatric facial fracture mechanisms compared to those of the overall patient population, we see a higher percentage of MVAs, auto vs pedestrian, and falls, and a significantly lower percentage of assault, which is consistent with the international literature.

Operative facial trauma presentation appears to be more common on the weekend days of Saturday and Sunday, which can likely be explained by the decrease in working hours and increase in interactions and recreational activities on the weekends. Interestingly, traumas were found to be more frequent during the months of September and October rather than the summer months of June-August.

An understanding of the cause, severity, and distribution of maxillofacial trauma allows for clinical and research strategies to be established for effective treatment and prevention of injuries. The success of such efforts at the local level depends on knowledge of patient characteristics as well as mechanisms and outcomes of injuries specific to the community. It is our intent that this data will provide a better understanding of regional injury mechanisms and patterns of operative facial trauma.

References

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