

Maxillofacial Injuries and Violence Against Women

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Objective: To determine if patterns of facial injuries differed between those of female assault victims with maxillofacial injuries and those of female patients with maxillofacial injuries from other causes.

Methods: We reviewed the medical and dental records of 326 adult female facial trauma patients treated by otolaryngologists and oral/maxillofacial surgeons at the University of Kentucky Medical Center. Information abstracted included date of injury, dates of presentation for medical attention, mechanism(s) of injury, diagnoses, and treatments.

Results: While victims of intimate partner violence were more likely to have zygomatic complex fractures, orbital blow-out fractures, and intracranial injuries than were other patients with facial trauma, women assaulted by unknown or unidentified assailants were more likely to have mandible fractures ($P = .004$).

Conclusion: These results in conjunction with other presenting circumstances, such as delay in presentation, can assist the surgeon treating patients with maxillofacial injury in recognizing interpersonal violence against women.

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DOMESTIC VIOLENCE (DEFINED as violence perpetrated by anyone domiciled with the victim) or intimate partner violence (IPV; defined as violence perpetrated by a spouse or significant other) is a worldwide problem that crosses all cultural, racial, and socioeconomic lines. The estimated yearly incidence of IPV in American women is 9 cases per 1000, and the prevalence of IPV in the United States is estimated to be 25% to 33%.¹⁻⁵ The prevalence of IPV is similar in most developed countries: the Council of Europe indicated that 23% of women and 15% of men have experienced IPV at some time; IPV incidents constitute 20% of all reported assaults in England and Wales; the lifetime prevalence of IPV in South Africa is 24.6%; and in Australia, 38% of the female population has experienced domestic abuse.⁶ The existence of domestic violence/IPV has long been recognized as a societal ill, with physical and psychological consequences. Its incidence has been increasing for the past several decades in most developed countries despite growing awareness about these behaviors and availability of protective resources for victims.^{7,8} This increase may be due in part

to improved reporting of individual episodes as the social environment has become more accepting of reporting and interventions and as avenues of reporting have become more accessible to victims. Because IPV accounts for 34% to 73% of facial injuries in women, facial plastic surgeons and other health care providers who treat patients with maxillofacial injuries are in a unique position to identify these victims and refer them to local domestic violence service programs for safety planning, information and referrals, support services, and advocacy, depending on the victims' needs and choices.^{9,10}

Intimate partner violence is primarily a crime affecting women; worldwide, 4 times as many women are victims of IPV than are men.¹¹ Women are 3 to 6 times more likely than are men to be injured or killed by a partner or by someone known to them than they are to be killed by a stranger; nearly 80% of assaulted women know their attacker.^{2,7,12} While the incidences of craniomaxillofacial injuries resulting from interpersonal violence are increasing in the general population, the incidence of female assault cases is increasing disproportionately.^{7,11-15} Women constitute 20% to 25% of facial trauma victims.¹⁶ The treatment of facial trauma in

women is a significant public health problem and costs the health care system \$3 billion to \$5 billion yearly, with a possible total cost of more than \$7 billion when lost productivity due to injury or fatality is considered.^{3,12}

Traditionally, both female and male victims have been reluctant to report IPV to health care providers out of fear, embarrassment, and uncertainty of the provider's response. The ability to build trust with patients and to recognize patterns of injury associated with IPV would be helpful for medical professionals who assess for victimization in patients and treat them according to nationally recognized standards of care.¹⁷ Several investigators have documented injury patterns in assaulted women with varying incidences.^{9,10,13,18,19} The goal of this study was to compare facial injuries of assaulted women with those of women who sustained facial trauma due to other causes to determine if there were statistical differences in the incidences of injury subtypes between the groups. Our null hypothesis was that there was no statistically significant difference in incidences of injury pattern between assaulted women and women who sustained facial trauma due to other blunt force mechanisms.

METHODS

University of Kentucky Institutional Review Board approval was obtained for the study. The University of Kentucky College of Dentistry and Kentucky Medical Services Foundation billing records were searched for female patients who were 18 years or older between January 1998 and December 2004, had *International Classification of Diseases, Ninth Revision, Clinical Modification* diagnosis code 802.0 through 802.9, and presented for treatment to the University of Kentucky Medical Center. Two hundred thirty-four adult female facial trauma victims were identified through the College of Dentistry billing records search. Of these 234 patients, 67 (28.6%) were excluded from review due to missing or incomplete medical records. In addition, 2 patients had duplicate records, and 1 patient was identified in the billing record as a woman but was a man. This left 164 (70.1%) dental records available for review.

The results from the Kentucky Medical Services Foundation search were culled to identify patients treated by otolaryngologists. Two hundred forty-seven patients were identified who were treated by otolaryngologists, and of these, 73 (29.5%) were excluded from review due to missing or incomplete medical records. Of the remaining 174 patients, medical record review for 11 patients revealed no indication of facial trauma, and 1 patient had a mandibular fracture resulting from oral cavity malignancy. This left 162 (65.6%) medical records for review, and a total of 326 (overall 67.8%) combined medical and dental records of adult female facial trauma victims.

Information abstracted from medical records included demographic data (patient age and ethnicity), date of injury, date of earliest presentation for medical attention, diagnosis codes, and treatments. Patients were grouped as to whether their injuries were caused by IPV (ie, assault perpetrated by a current or former spouse, partner, or dating relationship), family violence (ie, assault perpetrated by a parent, sibling, or other blood relative), fall, work-related injury, assault by a known assailant not domiciled with the victim (ie, assault perpetrated by a friend, neighbor, or acquaintance), assault by an unknown assailant, motor vehicle crash, self-inflicted gunshot wound, sporting accident, other accident, or unknown/undocumented cause. Most re-

corded injuries were grouped as bruising, lacerations, nasal fractures, mandible fractures, zygomatic complex fractures, orbital blow-out fractures, and intracranial injuries.

For the target population, additional information extracted included whether assault victims did or were able to identify their assailant(s) and whether there was documentation of notification to the police or a social worker when the patient presented for care. The method of injury (ie, gunshot, stabbing, punching, kicking, hitting, biting, burning, bludgeoning, pushing, throwing) was also recorded when available.

Two-sided Pearson χ^2 tests were used to determine whether correlations existed between age, injury patterns, and causes of injury, as well as likelihood ratios using SPSS software (SPSS Inc, Chicago, Illinois). An asymptotic significance level of $\leq .05$ was considered statistically significant. Patients with penetrating trauma were excluded from the statistical analysis.

RESULTS

DEMOGRAPHICS AND PSYCHOSOCIAL HISTORY

The mean (SD) age of the patients in this study was 35.0 (15.2) years (median, 32.5 years). The mean (SD) age for assault victims was 30.8 (9.1) years (median, 29 years; range, 19-60 years). There was no correlation between patient age and cause of injury ($P = .98$).

The mean (SD) time interval from the date of the assault to patient presentation at either an emergency department or medical office was 12.6 (42.0) days (median, 4 days for IPV victims and 5 days for other assault victims; 5-day median overall), with a range of 0 to 270 days. Documentation of notification to the police or a social worker occurred in only 7 (15.6%) of the assault victims. Notification was more common in IPV victims (26.1%) than in other assault victims (7.7%), which is expected as a legal mandate of the commonwealth.²⁰ The results of this study indicate that about 1 in 4 patients at risk for ongoing IPV was appropriately referred for specialized protective services as required by state law and hospital policy.

CAUSES OF INJURY

The most common cause of facial trauma in the adult female patients was motor vehicle crashes (139 patients [42.6%]), followed by falls (70 patients [21.5%]), assault (45 patients [13.8%]), undisclosed or undocumented mechanisms of injury (35 patients [10.7%]), sporting injuries (including all-terrain vehicle accidents, 25 patients [7.7%]), other accidental causes (8 patients [2.4%]), self-inflicted gunshot wounds (2 patients [0.6%]), and work-related accidents (2 patients [0.6%]). Of the 45 assault victims, 19 (42.2%) were documented victims of IPV or family violence; of these, many were IPV cases (18 [94.7%]). Of the remaining 26 assault victims, most (24 [92.3%]) could not or did not identify their assailant.

PATTERNS OF INJURY

Several causes of injury were found to correlate with pattern of injury ($P = .004$). Overall, assault was associated

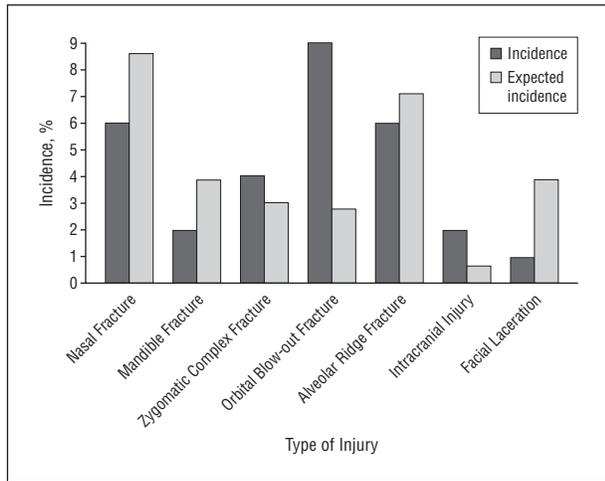


Figure 1. Incidence vs expected incidence for intimate partner violence.

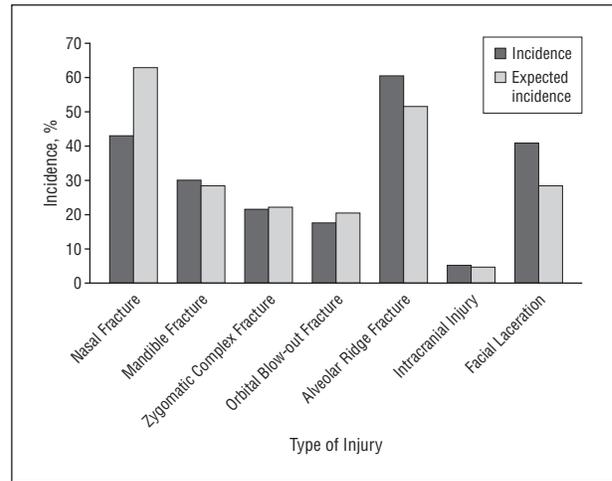


Figure 3. Incidence vs expected incidence for motor vehicle crashes.

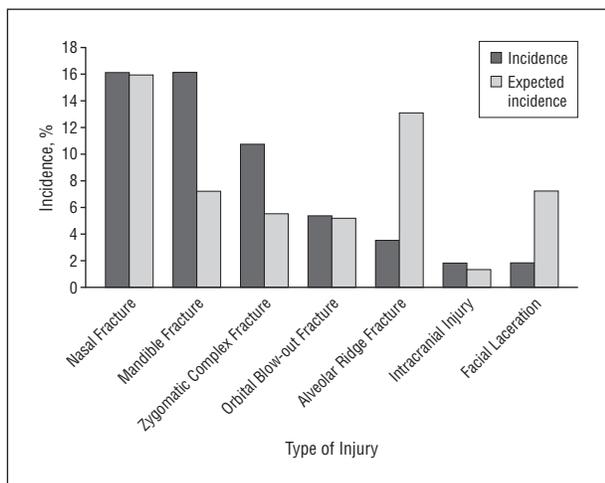


Figure 2. Incidence vs expected incidence for assault by unknown or unidentified assailant.

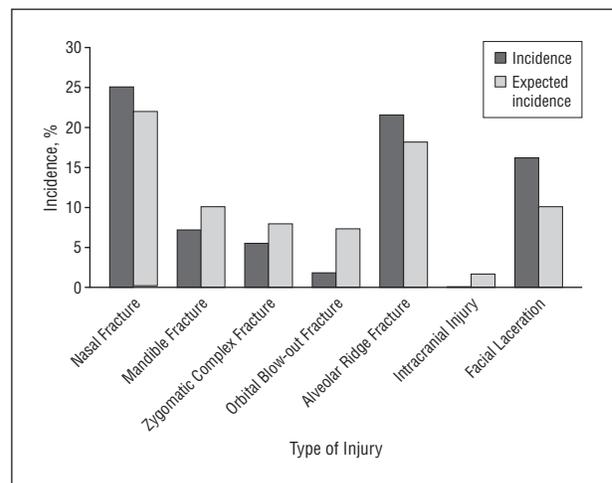


Figure 4. Incidence vs expected incidence for falls.

with mandible fractures, zygomatic complex fractures, orbital blow-out fractures, and intracranial injuries. Specifically, higher than expected numbers of zygomatic complex fractures, orbital blow-out fractures, and intracranial injuries were found in IPV victims (Figure 1). Victims assaulted by unknown or unidentified assailants were more likely to have mandible fractures than were other assault victims (Figure 2). In contrast, higher than expected counts of mandible fractures, alveolar ridge fractures, intracranial injuries, and facial lacerations were found in motor vehicle crash victims (Figure 3). Nasal fractures, which were the most common injuries, correlated with family violence, falls, work-related injuries, assault by a known assailant (not IPV), sporting accidents, other accidents, and unknown/undocumented cause of injury but not with IPV, motor vehicle crashes, or assault by an unknown assailant. Patients with falls as the cause of injury were more likely than expected to have nasal fractures, alveolar ridge fractures, and facial lacerations (Figure 4). Alveolar ridge fractures also correlated with unknown/unspecified cause of injury.

Several patients sustained other injuries or functional impairments in addition to their fractures, intra-

cranial injuries, and facial lacerations. Three patients, 1 of whom was an IPV victim, developed optic neuropathy as a result of their orbital fractures. Two patients, 1 of whom was an IPV victim, lost teeth in conjunction with maxillary fractures. Two patients, 1 of whom was an IPV victim, developed sensorineural hearing loss, and another IPV victim sustained a hemotympanum. Another IPV victim sustained facial nerve paralysis.

COMMENT

PATTERNS OF INJURY

Of assault-related injuries, facial injuries are more common than are injuries to other body areas, occurring in 83% of assault cases.⁸ From 88% to 94.4% of victims of IPV present with injuries to the head and neck, and 56% of these patients have an associated facial fracture.^{7,12} Many studies have examined the patterns of facial injury resulting from blunt trauma and assaults in both male and female patients. In general, mandible and nasal fractures are commonly cited as the most frequent injuries,

with zygomatic complex fractures slightly less frequently noted.^{7,11,15}

However, in the study by Huang et al¹³ of maxillofacial trauma in women, zygomatic complex fractures were the second most common fracture pattern (24% of patients) following mandible fractures (42%). More important, patients with zygomatic complex fractures had a high incidence of multiple injuries, with neurosurgical injuries being the most common.¹³ This correlates with the study results by Zachariades et al,¹⁰ which found that the mandible was most often injured (39%), followed by the zygomatic complex (10%) and nasal bones (2%). In another study of assaulted women, Fisher et al⁹ found that most fractures (50%) were zygomatic complex fractures and that mandibular and nasal fractures had an equal prevalence (22%). Gayford¹⁸ and Hill et al¹⁹ also found a higher incidence of zygomatic fractures and periorbital injuries in "battered wives." While our results indicate that nasal fractures were the most common fractures in all patients, IPV correlated statistically with periorbital fractures and intracranial injury, and assault by an unknown assailant correlated with mandible and zygomatic complex fractures. Thus, differing injury patterns between male and female victims of assault may indicate differences in facial bone structure between men and women or may imply different mechanisms of injury. These mechanisms may also explain differences in fracture patterns between female assault victims and women with maxillofacial fractures resulting from other forms of trauma, such as motor vehicle crashes and falls.

Some studies have demonstrated a preponderance of left-sided facial injuries in female IPV victims, suggesting a correlation with more right-handed assailants in the population.^{7,8,21} Female victims of IPV in these studies were less likely to be assaulted with weapons, and thus a higher proportion of resulting injuries have been reported to be limited to the soft tissues of the face.^{8,11,12} None of the IPV victims in our study were assaulted with firearms, but this may be due to the fact that many women assaulted with these weapons do not survive their injuries. Also, our IPV patients were more likely to have skeletal injuries than to have lacerations. Nevertheless, because of underreporting, the epidemiology of female facial assault remains poorly defined.^{4,5,12} Recognition of fracture patterns, as well as patients' manners of presentation, can assist physicians in identifying IPV and can be effective in the development of protocols and programs aimed at comprehensive treatment and follow-up with these patients.

Early recognition and intervention are particularly important in light of the fact that many victims of IPV face ongoing abuse after leaving the hospital or physician's office. The Kentucky Intimate Partner Violence Surveillance Project data indicate that the frequency and severity of IPV increase throughout the relationship in 39% of abusive partnerships.^{4,5} In addition, only 46% of patients with facial trauma are compliant with completion of medical care or are allowed to complete medical treatment, which creates a narrow window for intervention. Factors associated with poor follow-up compliance include periorbital injury and treatment with open reduction and internal fixation of facial fractures.²²

It has been estimated that only 25% of cases of IPV are reported to authorities as required by law or policy whether the referral is for purposes of law enforcement documentation and investigation for potential subsequent prosecution at a later date or as a means of connecting the victimized patient with trained social workers or advocates who specialize in safety planning, support, and related services for these high-risk victims.¹ Clinical and hospital policies that encourage the reporting of IPV and the referral of victims to appropriate community resources are supported by the American Medical Association, the Centers for Disease Control and Prevention, and The Joint Commission on Accreditation of Healthcare Organizations.^{3,17} In addition, many US municipalities, such as the target jurisdiction in this study, have established ordinances mandating medical personnel to report to local law enforcement when a patient presents with a firearm-related injury or other injury related to a crime. In our study, reporting to authorities occurred in less than 16% of assault patients but was more common in IPV victims (26.1%), as may be required by state law and hospital policy, than for other victims for whom such mandate does not exist unless the assault involved a firearm.²³ Medical professionals play an important role in the initial identification and care of victims of IPV. Treating health care professionals need to be highly alert to those patients who present with facial injuries without an obvious or plausible cause, with injuries inconsistent with the stated method of injury, or with evidence of multiple injuries (possibly in different stages of healing) because many IPV victims are reluctant to divulge their assailants' identities or the mechanisms of injury due to fear of retaliation by the assailant, embarrassment, or uncertainty about the physician's response to disclosure.^{7,10} Other indicators include a significant delay between the injury and presentation, and a history or clinical evidence of previous injuries, which occurs in 33% of women assault victims with facial injury.^{7,10} The mean interval to presentation for treatment for assault victims in our study was approximately 12 days (median, 5 days).

In a study of 307 female patients with maxillofacial injuries, Huang et al¹³ found frequent inadequate documentation describing the circumstances surrounding facial injuries in assault victims. Of the assault victims in this group, the patient interviews failed to satisfactorily identify and/or document the alleged assailant in 68% of cases. Of documented assailants, 28% were described as males. Of the male assailants, 61% were husbands or boyfriends. The authors were of the opinion that this finding represented severe underreporting of IPV and other forms of assault against women.¹³ The Kentucky Intimate Partner Violence Surveillance Project yearly statewide telephone survey findings (2000-2003) indicate that less than 13% of interviewed women had ever been screened by a medical professional for IPV.^{4,5} Of the women who had not been screened, approximately 31% had experienced 1 or more types of IPV.^{4,5}

Furthermore, it has been shown that brief questioning by a member of the health care team can increase the identification of abused women from 5.6% to 30% and may identify those who will need additional assistance.²⁴ McLeer et

al²⁴ found that most women responded readily to questions regarding assault and were relieved when someone asked directly how they had been injured. Thus, physicians who treat maxillofacial trauma, in particular, have a significant role not only in the repair of physical injury but also in identification of IPV victims as patients with layers of physical, mental health, and safety needs. These physicians need to be knowledgeable about resources available to victims of IPV to address their social and psychological needs and should be instrumental in initiating the appropriate referrals to agencies that will address the long-term psychosocial aspects of treatment.

CONCLUSIONS

Intimate partner violence, which is usually violence against women, is a serious cultural problem with psychosocial ramifications that have yet to be fully studied. Our study indicates that periorbital injuries positively correlate with IPV and that women assaulted by unidentified or unknown assailants had a higher than expected incidence of mandible fractures than other female facial trauma patients. Underreporting of IPV remains a hindrance to appropriate social intervention for many victims. While our study was limited to facial trauma victims, it demonstrates that universal screening and examination of the patterns of presentation, including patterns of injury, can assist medical professionals in identifying these patients and initiating appropriate medical and social intervention.

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