Epidemiology of Facial Injury in Female Blunt Assault Trauma Cases

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Background: Etiology of trauma in the female population differs from that of the male population. To date, domestic violence has been researched extensively, but little has been published about the epidemiology of facial injury in the female population.

Objectives: To analyze the differences in the circumstances under which males and females are injured, to identify gender-specific patterns of injury, and to assess whether differences in the demographics, health status, and drug-use profile exist between female and male assault cases and whether these factors lead to a difference in outcome.

Methods: A cohort of 91 female assault cases was compared with a control group of 706 males with similar injuries resulting from blunt assault trauma. Information was gathered by retrospective review of 797 consecutive cases requiring admission for facial injuries resulting from blunt assault trauma. Fisher exact, χ², and t tests were used to assess statistically significant differences between the male and female cohorts.

Results: The female cohort comprised 12% of all cases admitted for blunt assault facial trauma. One third of female blunt assault facial trauma patients were subjects of domestic violence. Statistically significant differences were found between males and females for the type of assault (rape, domestic violence, altercation, etc) with P<.0001. Females were more likely to be admitted with soft tissue injury only but no fracture (P<.05), less likely to be assaulted with a weapon, and unlikely to be involved in an altercation, gang violence, arrest, or robbery. Females were also less likely than males to be injured while intoxicated (P<.05). Incidence of specific injury patterns and outcomes, however, were similar between the 2 groups.

Conclusion: The present data support the hypothesis that the female blunt assault facial trauma population represents a distinct epidemiological entity, with significant differences in the circumstances of injury, mechanism of assault, and role of intoxication in the incidence of injury. The prevalence of facial trauma in female assault cases makes it critical for the facial plastic surgeon to be vigilant in the evaluation and treatment of these patients.


DIFFERENTIAL crime statistics regarding domestic violence, rape, and patterns of drug abuse result in a fundamental difference in the nature of assault trauma between female and male subjects. While much has been written about domestic violence, epidemiology of facial injury, and treatment outcome as separate issues, little has been published analyzing epidemiological differences between male and female populations. This study was undertaken to answer the following questions:

- What differences exist in the circumstances under which males and females are injured?
- Do different injury patterns occur that are gender specific?
- Do differences in the demographics, health status, and drug-use profile of these subjects exist?
- Do these factors lead to a difference in outcome?

Differences in the epidemiology of trauma in male and female groups have been reported by Scherer and colleagues (1989), Goins et al (1992), Haug et al (1990), Greene et al (1997), and others. The reasons for these differences appear to be multifactorial but have not yet been analyzed in depth with respect to facial trauma. Many of these differences find their root in the differing social context of male and female injury. Females are more prone to domestic violence and rape and less prone to involvement in criminal violent activity or gang association. Additionally, drug and alcohol abuse, which has previously been associated with facial assault trauma, has a different pattern among women. The epidemiology of facial assault injury remains poorly defined for the female population. Since several studies
MATERIALS AND METHODS

We conducted a retrospective review of 797 consecutive blunt assault facial trauma patients admitted to the San Francisco General Hospital, San Francisco, Calif, for blunt assault facial injuries between 1989 and 1995 and identified and characterized an experimental population of 91 female patients, as well as a control group of 706 similar male patients. All cases met inclusion criteria of facial injury, resulting directly from a blunt blow. Those injured in a fall or by penetrating injury occurring during an assault with a blunt instrument were excluded. Data were collected by chart review with data entry on a standardized form. The database was assembled on Excel software (Microsoft, Seattle, Wash), and all statistical calculations were performed with Statistica software (Statsoft, Tulsa, Okla).

Demographic data, including age, sex, and race, were collected. Information on health status, including history of tobacco, alcohol, drug abuse, and psychiatric history, was assessed. Circumstances surrounding the actual assault were analyzed, such as whether the assailant was known to the patient, whether the assault occurred in the context of domestic abuse, robbery, or other crime. Mechanism variables assessed included weapon type, the side of the face hit, and whether the patient was intoxicated at the time of injury.

Injury data included number of fractures and their site, associated injury to other anatomical structures, and loss of consciousness. To assess the outcomes of different therapeutic modalities, data were collected on whether open reduction and internal fixation was performed, closed reduction, and delay before treatment. Outcome data included complications, occlusion, infection, and hospitalization duration. Fisher exact, t, and χ² tests were used to assess association between demographic variables and injury type, circumstances, and severity factors.

suggest that the proportion of female assault cases is increasing, a better understanding of the factors leading to facial trauma is imperative to addressing this dire trend.5

Domestic violence represents a leading cause of trauma among females. Recent research has suggested that violence against females often has a context, mechanism, and perhaps even injury type distinct from those of male cases. Assault trauma in females is a major public health problem, costing the health care system $3 to $5 billion per year, and devastating millions of lives.6 Females are 6 times more likely than males to sustain injury from an intimate acquaintance, as opposed to strangers. Nine in 1000 domestic abuse, robbery, or other crime. Mechanism variables assessed included weapon type, the side of the face hit, and whether the patient was intoxicated at the time of injury.

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Most injuries from domestic violence occur in the head and neck,7 and studies have suggested that injuries to these structures are a clinical indicator of abuse, since 94.4% of domestic violence patients present with injuries to the face, head, and neck.9

Gender appears to affect the pattern of facial assault trauma. Males constitute the majority of facial fracture cases (>70%), and the etiology of their injuries is well understood. Most males are injured in altercations with strangers soon after consuming alcohol or in violent gang or drug-related activities.9,10 The pattern of injury appears to be different in females. According to Zachariades,11 in 67% of cases, females were assaulted by an intimate acquaintance, and 70% of the attacks were unarmed. Risk factors include poverty, age (between 17 and 28 years), substance abuse by either partner, and marital status (ie, divorced, separated, or single).5,12-13 White females were more often assaulted by spouses, while black females were assaulted by intimate acquaintances to whom they were not married.12

Since violence against females produces more than 1 million injuries a year, and claims the lives of 2000 females per annum,12 it is important to develop a database to better understand and track patterns of trauma in these cases. To facilitate comparison between a female cohort and a male control group, this study focuses on a specific mechanism resulting in a specific severity of injury. This study is expected to facilitate improved treatment of injuries in light of predictable gender-specific differences, to facilitate prevention of injury, and finally, to improve recognition of abuse by specialists in disorders of the head and neck—the areas most commonly injured in this population.

RESULTS

The female population constituted a minority of patients admitted for blunt assault facial trauma, with only 91 patients admitted during the study interval (12%). Female patients were younger on average than male patients, with a mean age of 32 years, vs 35 years for men. With respect to socioeconomic status, one third of the female cohort was unemployed or homeless, which was not statistically different from the male cohort (Table 1).

The context within which the assaults occurred against females and males was significantly different, with P<.0001 on χ² test. One third of the female subjects were domestic abuse cases (31.9%; P<.0001, χ² test). Sexual assault cases included 6.6% of the female subjects. No
females were injured during the course of an arrest or gang violence, and only one sustained a injury during a “consensual” alteration (P = .004). The male subjects, by contrast, were mostly injured in violent altercations with strangers (74 subjects; P = .004, χ² test, in comparison with the female cohort). Males constituted the majority of subjects injured during robbery, gang violence, or while being arrested. This aspect of the study is limited by the fact that many patients did not report the context of their assault. Fifty-four percent of female cases had the context of assault documented, while clear documentation existed in only 14% of male cases (Table 2).

Only 18.7% of female cases resulted from armed assault, compared with 28% of males (P = .05). Injury type differed between the sexes, with a larger proportion of females having soft tissue injury alone without any fracture (22% vs 14% of males; P = .04). Differences in the incidence of associated injuries, loss of consciousness, number of fractures per patient, specific injury type, and the delay between injury and treatment were not statistically significant (Table 3).

While alcohol and tobacco use were the same in the male and female cohorts, females were statistically less likely to be intoxicated at the time of injury than were males (18% vs 28%; P = .03, χ² test) (Table 4). Females were also less likely to undergo rigid internal fixation (37% vs 49% of males; P = .03, χ² test). The incidence of complications, infection, and duration of hospitalization were not significantly different between males and females (Table 5).

This study was undertaken to test the hypothesis that epidemiological characteristics differ between male and female populations. The present data support this conclusion. Overall, statistically significant differences were found in the circumstances of assault between the male and female cohorts (P < .0001, χ² test). Females tended to be younger, and a significant proportion were subjects of domestic violence (31.9%) and rape (6.6%) (P < .0001). Although similar proportions of males and females claimed to be the subject of an unprovoked attack (12.5% vs 11% of females), males were much more likely to be involved in altercations (11%), gang violence (4.1%), or to be injured while being arrested (1.1%). Since only 242 (30%) of the 797 patients admitted reported the specific context of their injury or had outside (police, emergency medical service) records of the occurrence, these numbers may well be underreported. It is likely that many patients involved in drug-related activity were reluctant to tell the admitting physician the actual circumstances of their assault; likewise some of the intoxicated subjects could not remember the assault. Female subjects may have refrained from reporting their assailant secondary to intimidation or battered woman syndrome.

Significantly, females were more likely to be admitted with soft tissue injury, rather than a fracture (22% vs 14% in males; P = .04). The lower frequency of fractures observed may be related to the fact that a smaller proportion of females were assaulted with a weapon than were males (19% vs 28%). In turn, the differing fracture rate may be related to the fact that most domestic attacks occur without the use of weapons, and perhaps, the attacker uses more restraint than that of the perpetrator in the violent acts predominating among males (eg, gang-related assaults, altercations). This might lead to a lesser severity of fractures in females, resulting in a lesser fre-
frequency of necessity of rigid internal fixation among female subjects, which is statistically significant (37% of fractures vs 49% in males; \( P = .03 \), \( x^2 \) test). The rigid internal fixation frequency may also be lower because females were less likely to be intoxicated (\( P = .03 \)) than males, and thus better candidates for closed reduction and arch bars in the case of mandible fractures, which constituted 57% of all fractures. The lower complication and infection rate, although not statistically significant, may reflect the differences in treatment and severity.

Notably, in many of the cases we describe, the physician was likely the first person to identify the domestic abuse. The psychological dimension of the trauma can be harmful to the patient and complicate treatment. It is important for the surgeon to recognize multiple facial injuries as a symptom of domestic abuse and to be attentive to the risk factors of substance abuse (by either partner), low socioeconomic status, and improbable mechanisms of injury to make the diagnosis of domestic abuse and help the patient break the cycle of abuse and injury.8,13-15

In summary, patterns of incidence and outcome differ markedly between female and male cohorts. Much of these differences can be attributed to domestic violence, which produces more injuries in females than assault by strangers and motor vehicle crashes combined.16-18 This information may assist the treating surgeon in counseling patients, and developing preventive programs aimed at treating females who are subjected to violent acts.19

**CONCLUSIONS**

- Injury patterns were found to be gender specific with a higher proportion of soft tissue–only injuries in the female group.
- Demographics differed significantly between males and females, with the females being younger on average and less likely to be intoxicated at the time of assault.
- The circumstances during which assault and injury occurred were different between males and females, with female injuries tending to occur as a cases of domestic abuse or rape, and male injuries predominantly resulting from more consensual altercations and criminal activity.

- Given the prevalence of facial injury in domestic abuse, a central role exists for the facial plastic surgeon and otolaryngologist, in collaboration with primary and emergency care specialists, social workers, and mental health specialists.

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