

Pattern, severity and aetiology of injuries in victims of assault

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Summary

Although the incidence of assault and other violent crime is increasing in the UK, the cause and overall pattern of injury, and the need for admission have not been defined in adult victims who attend hospital. In a prospective study, all 539 adult victims of assault attending a major city centre Accident & Emergency department in 1986 were therefore interviewed and examined.

Facial injury was extremely common: 83% of all fractures, 66% of all lacerations and 53% of all haematomas were facial. The upper limb was the next most common site of injury (14% of all injuries). Twenty-six per cent of victims sustained at least one fracture and nasal fractures were the most frequently observed skeletal injuries (27%) followed by zygomatic fractures (22%) and mandibular body (12%), angle (12%) and condyle (9%) fractures. Seventeen per cent of victims required hospital admission.

Overall, the type of injury observed correlated with the alleged weapon used ($P < 0.001$) though 20% of victims who reported attacks with sharp weapons sustained only haematomas or fractures. Injury most often resulted from punching (72% of assaults) or kicking (42% of assaults). Only 6% of victims reported injury with knives but 11% were injured by broken drinking glasses. Those who were kicked were most likely to need hospital admission.

Introduction

Both Police crime records and A & E department data demonstrate a steady increase in the incidence of violent crime in the UK over recent years^{1,2}. Though maxillofacial surgical research has shown that assault is now the most frequent cause of fractures of the facial bones in Britain^{3,4}, there have been few investigations of overall injury patterns, the incidence of injury requiring admission to hospital or the use of different types of weapon in relation to adult victims of violence who attend hospital. In contrast, this information is available in wife⁵ and child abuse⁶. A & E department investigations concerned with alcohol abuse⁷ and distribution of superficial injuries⁸ have concluded that facial injury is frequent in assault but detailed investigations of injury patterns and admission rates are lacking. In view of recent concern that patients with multiple injuries may not always receive optimum management⁹, this is an important omission. Consecutive victims of assault who attended a large inner-city A & E department were therefore interviewed and examined.

Patients and methods

All assault victims who attended the A & E department of the Bristol Royal Infirmary during 1986

were interviewed and examined. This department serves a well defined catchment population: apart from the Bristol Royal Hospital for Sick Children casualty unit, it is the only such department serving central and south Bristol. Data was collected by trained interviewers, who were usually undergraduate students resident in the hospital. Information relating to victim's age, gender and occupation were recorded, with details of weapons allegedly used, numbers of blows sustained and whether the victim fell to the ground. All injuries were charted on a standard proforma, and classified as haematomas, lacerations or fractures. Intra-oral lacerations were included except where these were associated with underlying jaw fractures involving the attached alveolar mucosa or hard palate. Weapons were classified as blunt, sharp, broken glass, fist, feet, firearm or 'other'. An injury severity scale was formulated which took account of both number and type of injuries:

Category I: One laceration or one haematoma

Category II: Multiple soft tissue injuries

Category III: One fracture

Category IV: One fracture and soft tissue injury elsewhere

Category V: Multiple fractures

This new scale was first validated and evaluated in relation to admission rates¹⁰. Chi-squared and linear regression statistical tests were used to identify associations between variables.

Results

Five hundred and thirty-nine victims were included in the study, 455 (84%) men (mean age 26 years, range 12-76 years) and 84 (16%) women (mean age 27 years, range 14-73 years).

Type of injury

The incidence of haematomas, lacerations and fractures is presented in Table 1. Haematomas were

Table 1. Type of injury by gender of victim

Type of injury	No of victims (n=532)		Total No	Total (%)
	Men	Women		
Haematoma	281	72	353	42
Laceration	320	34	354	42
Fracture	110	29	139	16
Total	711 ^a	135 ^a	846 ^a	100

^aIncludes victims with more than one type of injury.
 $\chi^2=17.19$ on 2 df. $P < 0.01$

Table 2. Type of weapon by gender of victim

Weapon	No of victims (n=510) ^a		Total	
	Men	Women	No	(%)
Blunt	81	11	92	18
Sharp (excluding drinking glasses)	34	3	30	36
Drinking glasses	51	4	55	11
Fist	303	63	366	72
Feet	187	26	213	42
Head	21	1	22	4
Gun	1	4	2	0
Other ^b	6	4	10	2
Total no of victims	429	81	510	100

^aTwo hundred and thirty-nine (47%) of victims reported assault with >1 weapon (range 2-4)

^bIncludes hot fluids (2 assaults), teeth (2 assaults), aerosol (1 assault), 'body' (1 assault)
 $\chi^2=25.36$ on 7 df. $P<0.05$

found in 281 (62%) of 455 men and in 72 (85%) of 85 women. Three hundred and twenty men (70%) and 34 women (40%) sustained at least one laceration, while 110 men (24%) and 29 women (35%) suffered at least one fracture. The incidence of injury in men and women was significantly different; men suffered unexpectedly more lacerations than women, who suffered proportionately more haematomas ($P<0.01$).

One hundred and thirty-nine (26%) victims sustained at least one fracture, 110 men (24%) and 29 women (34%). Thus 74% had no bony injury, and although there were proportionately more women with fractures, this difference was not statistically significant. Overall, there was no correlation between reported numbers of blows and numbers of injuries (correlation coefficient $r=0.33$).

Details of weapons allegedly used in the assault are presented in Table 2. Forty-seven per cent of victims reported being struck with more than one type of weapon, and most (72%) reported the use of fists or feet. Only two victims had gun-shot wounds: one patient sustained only bruising of the anterior thorax caused by pellets from an air-rifle and the other sustained a penetrating abdominal injury. Eleven per cent had been injured with broken drinking glasses - by far the most frequently used sharp weapon. Surprisingly, no facial lacerations were attributed to broken spectacles, though a few patients had lost contact lenses (without apparent injury) during their assaults. The absence of spectacle

injuries may reflect the low numbers of patients over the age of 35 seen in this investigation. Female victims differed from male victims in that proportionately fewer reported the use of sharp weapons or being kicked ($P<0.05$).

Eighty per cent of victims reporting the use of sharp weapons had lacerations, though 20% sustained only haematomas or fractures. Fifty-seven per cent of victims reporting assaults with blunt weapons sustained lacerations, as did 30% of victims who were allegedly kicked and 35% who were allegedly punched. Proportionately more fractures followed punching and kicking than when only blunt or sharp weapons were reported. Correlation between injury and weapon was shown by the χ^2 statistic ($P<0.001$) and the correlation coefficient ($r=0.74$).

Pattern of injuries

Distribution of haematomas, lacerations and fractures is presented in Table 3. Eighty-three per cent of all fractures, 66% of all lacerations and 53% of all haematomas affected the face. The upper limb was the next most injured region (14% of all injuries), followed by the thorax (8% of injuries) and other head and neck injuries (8%). The abdomen was least affected (2% of injuries). More men than expected had facial haematomas, but fewer had upper and lower limb injuries compared to women ($P<0.01$). There were a disproportionately large number of lower limb haematomas in females. Facial lacerations were relatively common in men and proportionately more women than expected had lower limb lacerations ($P<0.01$). There were no differences between men and women with regard to the incidence of fractures at various sites.

Fractures are categorized in Table 4. Nasal fractures were most commonly seen (27% of victims), followed by zygomatic fractures (22%), mandibular angle fractures (12%) and mandibular body fractures (12%). Le Fort pattern fractures (1%) were rarely seen, and there were no spinal, femoral, scapular or pelvic fractures. After the facial bones, the most common skeletal injuries were fractures of the phalanges (6% of victims). Forty-nine per cent of facial injuries affected the middle third of the face, 28%, the lower third; and 23%, the upper third. More left sided injury was seen than right sided.

Severity of injury

Fifty-seven per cent of victims had one laceration or one haematoma, 13% sustained multiple haematomas and/or lacerations, 4% sustained one fracture,

Table 3. Site of injury by type

Site of injury	No of victims ^a (n=530)		Laceration	(%)	Fracture	(%)	Total	
	Haematoma	(%)					No	(%)
Face	344	53	380	66	141	83	865	62
Other head & neck	48	7	59	10	6	4	113	8
Thorax	94	14	13	2	3	2	110	8
Abdomen	26	4	3	1	0	0	29	2
Lower limb	58	9	12	2	4	2	74	5
Upper limb	79	12	103	18	16	9	198	14
Total	649	100	570	100	170	100	1389	100

^aIncludes victims with multiple injuries
 $\chi^2=159.06$ on 10 df. $P<0.0001$

Table 4. Types of fracture by region

Region	Fracture	Number of of victims (%)	
Face			
Upper third	Supra-orbital ridge	2	1
Middle third	Nasal complex	42	27
	Zygomatic complex	38	22
	Le Fort I/II	2	1
Lower third (mandible)	Condyle/coronoid	15	9
	Body ^a	21	12
	Angle	21	12
	Symphysis	2	1
Other head and neck	Skull	2	1
Thorax	Rib	3	2
Abdomen		0	0
Lower limb	Phalanges	2	1
	Tibia	1	0
	Lateral malleolus	1	0
Upper limb	Metacarpals	3	2
	Phalanges	9	5
	Radius/ulna	5	3
	Humerus	2	1
Total		176	100

^aIncludes three dento-alveolar fractures

20% sustained one fracture and laceration(s) and or haematoma(s) and 6% more than one fracture. There was no significant difference between men and women with regard to severity of injury. After the facial bones, the most common skeletal injuries were fractures of the phalanges (6% of victims). The severity of injury caused by various weapons is set out in Table 5. The use of blunt weapons was associated with minor injury (category I) and a combination of fists and feet caused proportionately more severe (category IV) injury. Sharp weapons tended to cause more multiple soft tissue injuries (category II), but punching gave rise to fewer such injuries.

Overall, injury was progressively more severe as the alleged number of blows increased, so that victims reporting more than three blows were more likely to have a fracture ($P < 0.05$). Of those with the most severe injuries (category V), fewer victims than expected reported falling over during their assault.

Seventy-one (16%) of 455 men were admitted to hospital, and 15 (18%) of 84 women (Table 6). Twenty-six per cent of victims who reported being kicked were admitted, but only 12% who had been attacked with

Table 6. Admission to hospital by gender of victim

	No of victims (n=539)			Total		
	Admitted (%)	Not admitted (%)		No	(%)	
Men	71	83	384	85	455	84
Women	15	17	69	15	84	16
Total	86	100	453	100	539	100

χ^2 (Yates corrected)=0.13. Not significant

a blunt weapon, and only 14% who were attacked with fists. Whilst 24% of victims assaulted with sharp weapons required admission, this applied to only 9% who were assaulted with drinking glasses.

There was no significant association between the need for hospital admission and the number of blows sustained, or falling over during an assault.

Discussion

The high incidence of facial injury in this series of over 500 patients seen in a city centre Accident & Emergency department is striking. Two thirds of victims suffered facial injuries. Maxillofacial fractures were the most common skeletal injuries and should be excluded in any adult assault victim, particularly those with facial haematomas. In a previous comparative study of injuries in adult assault victims, relating to soft tissue injuries⁸, a preponderance of facial wounds was also found.

These results also highlight differences in wound patterns in male and female victims. For example, proportionately more men sustained lacerations. This finding is consistent with cause of injury, in that proportionately more men reported assault with sharp weapons or drinking glasses. Whilst there have been few comparable investigations reported in the literature, Gayford⁵ reported that periorbital haematomas, and the use of blunt instruments, were common in wife-battering. It may be that a male assailant tends to choose a blunt weapon in preference to a sharp one when assaulting a woman because he does not wish to cause permanent disability, or because he believes that he does not need a weapon in a conflict with a woman because he is stronger. Alternatively, in assaults involving only men, sharp weapons and glasses may be used to gain advantage over an opponent of roughly equal strength, thereby producing more lacerations. The findings of Gayford's study of battered wives⁵ are inconsistent in this respect. Gayford suggests that men spontaneously use

Table 5. Severity of injury by weapon

Severity of injury category	Weapon (No of victims=491)			Fists	Fists and feet	Total	
	Blunt	Sharp ^a	Feet			No	(%)
I	38	26	13	84	74	235	58
II	8	10	2	10	16	46	11
III	2	3	0	1	4	10	2
IV	4	4	3	36	42	89	21
V	5	1	1	10	9	26	6
Total	57	44	19	141	145	406	100

^aIncludes drinking glasses

$\chi^2=31.32$. $P < 0.05$

any weapon which is to hand, and cites saucepans and other kitchen utensils because many assaults take place there. Clearly, there is an element of weapon 'selection' in domestic violence, because knives are also readily available in the kitchen, yet are used infrequently. If the hypothesis that little or no injury is intended is correct, then the observation that battering husbands appear particularly polite and concerned when they bring their injured wives to hospital⁵ may simply reflect their true feelings of remorse and not represent an attempt to conceal the cause of injury.

Comparison of injury and type of weapon showed that attacks with fists, or a combination of fists and feet, gave rise to fractures significantly more often compared with attacks with blunt weapons. This may reflect the greater momentum of fists and feet compared with most blunt objects. These findings confirm that expert witnesses can, at best, give an indication only of likely causes of injury, and cannot be expected to give categoric opinions concerning precise cause. However, further work is necessary to differentiate between incised wounds caused by sharp weapons and other types of laceration in adult assault victims. A & E staff should record the characteristics of wounds so that correlation with an alleged weapon can be made later - particularly in relation to compensation claims.

These data indicate that the face is a preferred 'target' in assault, or at least is more vulnerable. Clothing provides some protection for the trunk and limbs, and may partly explain the preponderance of facial injuries. Upper limb injuries, second in frequency in this study, may reflect a tendency on the part of the victims to defend themselves by using their arms, or simply that 'victims' struck their assailants and injured themselves in so doing. This seems particularly likely in the case of phalangeal or metacarpal fractures. Clearly, the distinction between 'victim' and 'assailant' may be difficult and in relation to night-time urban violence involving males, the term 'participant' will be more appropriate.

The psychological factors underlying the reasons for the selection of each 'target' area are largely unknown, though an investigation into the causes and importance of this behaviour might provide a useful insight into conduct during a fight or assault, and might even identify behaviour which has been 'learned' from television and other media violence.

In this study, left-sided facial injuries were more frequent than right-sided, and this almost certainly reflects that most assailants are right-handed⁶. Facial injuries were similarly distributed in both men and women, except that nasal injuries were less frequent in women. This may reflect that, for some underlying psychological reason, male assailants wished to avoid producing nasal deformity in women, over and above their tendency to avoid striking the face in the first place.

The application of the injury severity scale demonstrates that in those victims who can remember this detail, the number of blows broadly correlated with outcome. For example, those reporting less than three blows were less likely to have a fracture, and those who reported more than three blows were more likely to have a fracture; the longer an assault continued, the greater the likelihood of severe injury. Interestingly, data concerning falls tended to confirm this: fewer of those who fell had multiple injuries compared with those who did not fall, who were presumably more likely to continue to be injured. The exceptions were victims who were subsequently kicked, who were more likely to require admission.

In this study, one in six victims were admitted to hospital - a similar proportion to that described in a study of victims known to the police¹². In an Accident & Emergency department with 50 000 new patient attendances per annum, less than two admissions per week does not represent a substantial drain on resources compared with other categories of patient. Nevertheless, this admission rate emphasizes that a minority of patients are seriously injured.

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