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Update on patterns of mandibular fracture in Tasmania, Australia

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Abstract

Mandibular fractures often present to hospital, so if we understand trends in patterns of fractures and their demographics it may help us to deliver a better service, and prevent these injuries. Here, we compare current data on mandibular fractures in Tasmania with data from 15 years ago, and with current world trends. Patients who presented to the Royal Hobart Hospital with fractured mandibles were audited, and the data analysed and compared with those from a previous study. About 37 fractured mandibles presented to hospital each year. Most patients were men aged 20–30 years old. Ninety-seven of the 159 fractures (61%) were secondary to assault, 27 (17%) were the result of sport, and 24 (15%) followed falls. Road crashes contributed only 5% of mandibular fractures. Sixty-six patients (60%) were intoxicated at the time of injury. The angle of the mandible was the most common site of fracture and open reduction and internal fixation was the treatment of choice. There have been important changes in mandibular fracture patterns in Tasmania in the last 15 years. There was a rise in alcohol-related interpersonal violence, and men were most commonly involved. There was also a decrease in mandibular fractures caused by road crashes, which suggests an improvement in road safety.

Keywords: Mandible; Trauma; Facial fractures; Epidemiology; MVA; Assault; Emergency department

Introduction

Mandibular fractures continue to be one of the most common facial fractures. An understanding of their patterns, aetiology, and incidence is required so that we can provide the best management. The aim of this paper was to analyse the mandibular fracture patterns in a tertiary referral general hospital in Hobart, Tasmania, and we have recorded the demographics, aetiology, characteristics of fractures, and their management. We also compared fracture patterns in Hobart with those of a similar study published 15 years ago to find out if the patterns were changing.[1]

We reviewed relevant publications on PubMed using the search terms "mandible", "fracture", and "patterns". This retrieved 216 papers, of which 14 were excluded as they referred only to children, 74 were not relevant to the topic, and 89 were published in 2003 or earlier. This left 39 papers published during the last 10 years that were relevant.

Papers about mandibular and other facial fracture patterns were usually from developing countries, where motor vehicle crashes were described as the most common cause.[3–5] Papers published in areas of minimal alcohol consumption such as Saudi Arabia[2] also reported road crashes as the most common cause. These papers noted the possibility of under-reported domestic violence, which may have affected the statistics. Assault was the most common mode of fracture in papers from developed countries, such as Greece[6] and New Zealand.[7]

Men were most commonly involved in all papers, ranging from 60.9% of 46 patients[8] were male and 90% of 2581 patients[7] were male with mandibular fractures. The most common age of these patients was 20–30 years of age.[9–11] It was reported as slightly older in Chile[12] (mean age 34

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years), and Kubilius et al.[13] noted that the mean age was higher among women than among men.

Only two papers mentioned the involvement of drugs or alcohol. Zix et al.[14] noted that 13% of their patients were intoxicated at the time of injury, whereas 45% of patients in Lee et al.'s cohort[7] were intoxicated. Only one paper mentioned the timing of fractures, and found summer to be the most common time of year.[15]

The parasymphysis was the most commonly-quoted site.[4,5,16] The ramus was mentioned as the most common in only 2 papers.[17,18] Fractures of the parasymphysis and condyle were the most common in bilateral fractures.[4] Fractures of other bones occurred in 30–52% of cases.[13,15] The most common method of management was by open reduction and internal fixation.[12,19–21]

Patients and methods

A tertiary hospital in Hobart, Tasmania provides the only public Oral and Maxillofacial Surgery (OMFS) service in Tasmania, and we audited patients who presented to this hospital with a fractured mandible from 1 January 2011—31 December 2013. This was done through both the Emergency Department Information System and through the logbooks of the oral and maxillofacial surgical registrars. This way we could cross-reference patients and retain records of patients who may have either been seen in the emergency department but not in the public OMFS unit, or who were directly referred from outside the hospital) to the OMFU, bypassing the emergency department.

These patients were then audited with reference to their sex, age, mechanism of injury, and consumption of alcohol. The characteristics of the mandibular fracture and any other injuries were also analysed, as was the management of the patients. The data were compared with similar data that were published in 2002,[1] in which patients with mandibular fractures from 1993 to 1999 had been audited. We also reviewed other publications to assess mandibular fracture patterns in other centres worldwide. Where appropriate and numbers allowed, chi square tests were used.[23]

This work was granted an exemption from the Ethics Review process by the hospital Institutional Review Board as it was viewed to be of negligible risk.

Table 1
Age groups of 111 patients with mandibular fractures.

Age group (years)	No (%) of patients
0–10	5 (5)
11–20	22 (20)
21–30	47 (42)
31–40	21 (19)
41–50	8 (7)
51–60	5 (5)
61–70	1 (<1)
71+	2 (2)

Table 2
Aetiology of 159 mandibular fractures.

Cause	Number (%) of fractures
Assault	97 (61)
Sport	27 (17)
Fall	24 (15)
Road crash	8 (5)
Workplace	3 (2)

Results

From 2011 to 2013, 111 patients presented to the hospital with fractured mandibles, making a total of 159 fractures (1.4 fractures/patient). About 37 patients presented with fractured mandibles each year.

Details of patients

There were 98 men and 13 women (male:female ratio 7.5:1), and their ages are shown in Table 1.

Incidence of fractures

The numbers of fractures each year were roughly equal, with 31 (28%) in 2011, 43 (39%) in 2012, and 37 (33%) in 2013. Summer was the most common time, with 17 fractures occurring in January, and only 6 in July.

Aetiology

The most common cause was assault, usually punching. It accounted for 97 of all fractures (61%), significantly more than any other cause ($p = 0.000$) (Table 2), and 90 were men. Sport was the next most common cause of injury, accounting for 27 fractures (17%), which was also significant ($p = 0.01$). The most common type of sport implicated was Australian Rules Football, which was responsible for 14 of the 27 sports-related injuries. The next most common was horse-related activities, followed by cricket and hockey. Falls accounted for 24 fractures, and road crashes for only 8.

Role of alcohol

Sixty-six patients (60%), 97 of whom were male, were under the influence of alcohol at the time of their fracture.

Patterns of fracture

Ninety-three mandibular fractures were unilateral (59%), and the rest bilateral. Of the bilateral mandibular fractures, most involved two fracture sites ($n = 156$, 40%) three fracture sites ($n = 8$, 2%). Left side more common ($n = 37$, 57%) than right side ($n = 27$, 41%) and symphysis ($n = 1$, 2%) at the mandibular midline. The significantly most common site for mandibular fractures was the angle of the mandible ($n = 53$,

Table 3
Sites of 159 mandibular fractures.

Site of fracture	Number (%) of fractures
Angle	53 (33)
Subcondylar	43 (27)
Parasymphyseal	27 (17)
Condylar	20 (13)
Body	13 (8)
Coronoid	3 (2)

33%) ($p = 0.00$) (Table 3). This was followed by subcondylar fractures ($n = 43$, 27%), and parasymphyseal fractures ($n = 27$, 17%). Thirteen mandibular fractures were associated with other facial fractures (8%). Of the multiple facial fractures: 2 due to falls and only 1 due to assault.

Management of fractures

Open reduction and internal fixation was the treatment of choice ($n = 99$, 62%), 50 were treated conservatively (32%), and the remaining 9 were managed by closed reduction and manipulation.

Discussion

The incidence of mandibular fractures at the hospital from 2011 to 2013 was about 37 each year, which was only slightly higher than the incidence from 1993 to 1999, which were 36 each year.[1] The age range of patients who presented with fractures had also not changed significantly, and the most common age group was from 20 to 30 years. This had not changed at the hospital in the last 15 years, and remained consistent with other centres. The male:female ratio in our study was 7.5:1. This correlated well with other studies, but showed an increase in male predominance from the previous study, which showed a male:female ratio of 4.5:1.

January remained the most common time for mandibular fractures, which may relate to both an increase in nightlife and alcohol intake during the summer months. Summer has been quoted in other studies as a more common time for fractures.[15] A small increase in May could be the result of the Australian Rules Football season, which accounted for an increase in sports-related fractures during this time.

Assault remained the most common mode of injury in Hobart, and increased slightly from 55% in 1999 to 60% in 2013. This was significantly higher than the incidence of assault-related mandibular fractures in New Zealand, which was 44%. Most other papers have quoted road crashes as the most common cause of injury, but in our study they accounted for only 5% of all mandibular fractures. This may be explained by the emphasis on road safety in Australia. The incidence of fractures after road crashes has decreased between 1999 and 2013 from 18% to 5%, despite an increase in population.

The second most common cause that we found was sport. This remained relatively stable between 1999 and the present. In 1999, 17% of fractures resulted from sport, nearly half of which involved Australian Rules Football. Now, 17% of fractures result from sport, over half of which are football-related.

The increase in the part played by alcohol in the incidence of mandibular fractures increased from 41% in 1999 to 60% in 2013, which may correspond to the increased number of assaults. Alcohol-related violence among men seems to be becoming a bigger issue, as the incidence of drunken men with mandibular fractures increased from 85% in 1999 to 97% in 2013. Efforts must be made to reduce the level of interpersonal violence associated with male drunkenness in Tasmania.

The distribution between unilateral and bilateral mandibular fractures did not change much between the 2 time periods, and the number of unilateral fractures increased slightly from 53% to 59%. This may be related to the shift away from road crashes, which are often associated with multiple fractures. In 1999 the number of fractures on the left and right sides of the mandible were roughly equal. We found a predominance of left-sided mandibular fractures, which may be related to being hit by a right-handed assailant.

The angle remains the most common site of mandibular fracture. This differs from most of the other published data, which describe the mandibular parasymphysis as the most common site. The two international papers that also featured the angle as the most common site were from Nigeria[17] and Tunisia,[18] so there does not seem to be a geographical explanation for the difference. These 2 papers, however, also show assault as the most common cause of fracture. It may be, therefore, that assault is associated with mandibular angle fractures more than with other fracture patterns.

Open reduction and internal fixation remains the most common management for mandibular fractures. This is also in keeping with most other centres, except those from Tunisia[18] and Malaysia,[22] which quoted closed reduction as their treatment of choice.

This study has shown that there have been several changes in patterns of mandibular fracture in Hobart since 1999. First, the incidence of affected men has increased. There has also been a shift from road crashes to assault as the main cause of the fractures, and an increase in the involvement of alcohol in patients with fractured mandibles, particularly among men. The large number of assaults was related to a higher incidence of fractures of the mandibular angle in this study and in others, implying that assault involving the facial bones commonly results in a fracture of the mandibular angle.

These findings suggest that there has been an improvement in motor vehicle safety with regards to the aetiology of fractured mandibles. There has also been an increase in fractures as a result of alcohol-related interpersonal violence amongst men in Tasmania, with an increased number of fractures of the mandibular angle.

Conflict of interest statement

We have no conflict of interest.

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Ethics statement/confirmation of patients' permission

All data are anonymous.

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