

A retrospective study of patients with mandibular fractures treated at a Swedish University Hospital 1999-2008

Access this article online
Website: www.amsjournal.com
DOI: 10.4103/2231-0746.147119
Quick Response Code: 

Anwar Ramadhan, Petter Gavelin, Jan M. Hirsch, Lars P. Sand

Department of Surgical Sciences, Oral and Maxillofacial Surgery, Medical Faculty, Uppsala University, SE-751 85 Uppsala, Sweden

Address for correspondence:

Associate. Prof. Lars P. Sand, Department of Surgical Sciences, Oral and Maxillofacial Surgery, Uppsala University Hospital, SE-751 85 Uppsala, Sweden.
Email: lars.sand@hotmail.com

ABSTRACT

Background: Fracture of the mandible is one of the most common fractures of the maxillofacial skeleton. However, the etiology, gender, and age distribution vary between different regions and countries, and the purpose of this study was to evaluate the current trend of patients with mandibular fractures at the Department of Oral and Maxillofacial Surgery, in Uppsala, Sweden. **Aim:** The aim of this retrospective study was to analyze patients with mandibular fractures treated in the University Hospital of Uppsala (the county capital of Uppland) Sweden during a 10-year period (1999-2008). **Materials and Methods:** This study was designed as a retrospective study of patients admitted to the Department of Oral and Maxillofacial Surgery at Uppsala University Hospital, Sweden. The location of fractures was evaluated clinically by the surgeon and on the X-rays. We classified the data according to gender, age, etiology, day of the week, month of the year, fracture site, and method of treatment of the fractures. **Results:** Records were collected from patient charts from 266 patients. One hundred eighty-seven patients (70%) with mandibular fractures were of male gender, and 132 patients (50%) were aged 16-30 years. Interpersonal violence constituted the most common etiological factor for mandibular fractures (24%), followed by falls (23%). Forty-nine percentages of the patients were treated surgically, and 51% were treated conservatively. There was an increase of the annual incidence of fractures toward the end of the period, even though not statistically significant. **Conclusions:** Mandibular fractures occurred primarily among younger men between 16- and 30-year-old. Condyle fractures were the most common fracture site and 50% of the patients required surgery. Summer months and weekends were the most common time of mandibular fractures.

Keywords: Epidemiology, fracture, mandible, Sweden

INTRODUCTION

The mandible is a prominent part of the face and has important functional roles such as speech, chewing, and swallowing. It is also very important from an esthetical point of view. Due to the prominent position in the face, fracture of the mandible is one of the most common fractures of the maxillofacial skeleton.^[1-4] The mandible constitutes a “mobile” bone and has some weak parts. The collum mandibulae is the weakest part, and accordingly, it has been shown to be the most common fracture site.^[5,6] Furthermore,

the angulus mandibulae, where impacted wisdom teeth are frequently seen, is a part often involved in mandibular fractures.^[7]

In some parts of the world, traffic accidents constitute the most common etiological factor for mandibular fractures,^[2,4,8,9] whereas in the western world violence is a more common reason for the injury.^[1,8,10-12] Sweden is considered quite a “safe” country when it comes to traffic accident prevention. The use of seat belts is common, and many cars are equipped with airbags. Further, speeding is comparably infrequent.

Uppsala is the fourth biggest city in Sweden with 200,000 inhabitants. It is the main city of Uppsala County, which has slightly more than 300,000 inhabitants. It is a highly industrialized area and has two universities, the Swedish University of Agricultural Sciences and Uppsala University with all together more than 50,000 students.

The aim of this retrospective study was to analyze patients with mandibular fractures treated in the University Hospital of Uppsala during a 10-year period (1999-2008). We also wanted to investigate the “timing” of accidents in order to optimize the on-call duty at the Department of Oral and Maxillofacial Surgery, in Uppsala.

MATERIALS AND METHODS

In this retrospective study, records of 266 patients with 406 mandibular fractures between 1999 and 2008 at the Department of Oral and Maxillofacial Surgery in Uppsala University Hospital, Sweden, were reviewed.

Gender, age, etiology, day of the week, month of the year, fracture site, and method of treatment were recorded. We also reported alcohol use and drug abuse when such data were available. The treatment was either surgical (open reduction + osteosynthesis) or conservative (closed reduction + maxillomandibular fixation).

All 406 fractures were confirmed clinically and/or radiologically. Patient details were reviewed retrospectively by examining the patients’ charts. Where doubtful or missing data regarding the location of fractures were at hand, the radiographs were studied to clarify the fracture site.

Statistical analysis

Differences in etiology and age distribution between men and women, and difference in incidence between days of the week, and between calendar months, were analyzed using Chi-square tests. Marginal 95% Wilson confidence intervals were calculated for the percentage of fractures by site. The R version 2.15.0 was used for the analysis (The R Foundation for Statistical Computing, Vienna, Austria).

RESULTS

In total, 266 patients with mandibular fractures were recognized. One hundred eighty-seven patients (70%) were male, and 79 (30%) were female.

The mean number of annual patients with mandibular fractures was 27 with a nonsignificant increase to 35 (2007) and 45 (2008) toward the end of the period [Figure 1].

One hundred and thirty-two patients (50%) were between 16 and 30 years of age, with a majority of male in all age groups, except in those younger than 16 years [Table 1]. This difference was statistically significant ($P = 0.00235$).

Sixty-three patients (24%) presented with mandibular fractures caused by interpersonal violence, 60 falls (23%), 51 bike accidents (19%), 42 traffic accidents (16%), and 28 sport

accidents (11%). There was a statistically significant difference between the etiology pattern among men and women; 32% of fractures in men were caused by violence, while 41% of fractures in women were caused by falls. Among the 63 victims of interpersonal violence, 60 (95.2%) were male ($P < 0.0001$) [Table 2].

Alcohol abuse was confirmed in 22 patients (8.2%), whereas 130 patients (50%) reported no use of alcohol at the time of the fracture. Drug abuse was documented in two cases (0.2%). Alcohol or drug abuse was not documented in 112 patients (42%).

A total of 406 mandibular fractures were found in the 266 patients. One hundred and seventy-six fractures ($43 \pm 4.7\%$) occurred in the condyle, 73 ($18 \pm 3.4\%$) in the parasymphysis and 72 ($18 \pm 3.4\%$) in the angle [Figure 2 and Table 3].

One hundred and thirty patients (49%) were treated surgically, and 135 (51%) were treated conservatively.

There was a nonuniform distribution of mandibular fractures over calendar months, which was statistically significant ($P = 0.001$); more fractures occurred during the summer months [Figure 3 and Table 4]. There was also a nonuniform distribution of mandibular

Table 1: Distribution of mandibular fractures according to age and gender

Age (years)	Men (%)	Women (%)
<16	15 (8)	16 (20)
16-30	103 (55)	29 (37)
31-45	35 (19)	10 (13)
46-60	19 (10)	11 (14)
>60	15 (8)	13 (16)
Total	187 (100)	79 (100)

Table 2: Etiology of mandible fractures according to gender

Etiology	Male (%)	Female (%)	Total
Violence	60 (32)	3 (4)	63
Fall	28 (15)	32 (41)	60
Bike	27 (14)	24 (30)	51
RTA	35 (19)	7 (9)	42
Sport	20 (11)	8 (10)	28
Other	17 (9)	5 (6)	22
Total	187 (100)	79 (100)	266

RTA: Road traffic accident

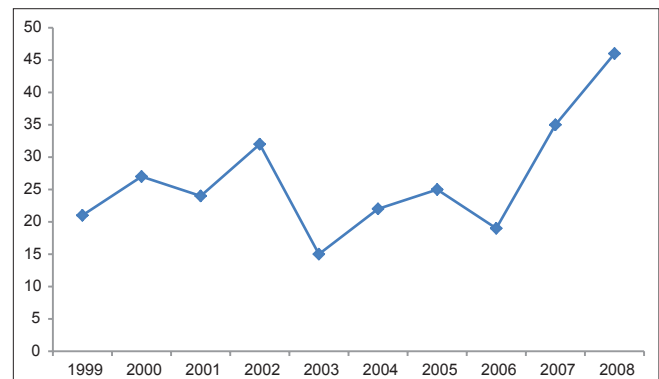


Figure 1: Annual number of mandibular fractures

fractures over the weekdays ($P = 0.007$), with a higher incidence of fractures in the weekends [Figure 4].

DISCUSSION

The most common causes of mandibular fractures worldwide are violence and traffic accidents.^[1,9] This is seen in the western countries, and especially in Scandinavia.^[8,10,11,13,14] In our study, we found that violence among men and falls among women were the most common etiologies of mandibular fractures in Uppsala County, and this was statistically significant. These results are in accordance with Hallmer *et al.* 2010, who investigated mandibular fractures in Malmö, the third biggest city in Sweden.^[10]

In the majority of studies from different parts of the world, the highest incidence of mandibular fractures was found in young men.^[5,9,15,16] Our study confirmed these results, with a statistically significant increase of mandibular fractures in men between 16- and 30-year-old. Further, in studies regarding maxillofacial injuries at war, mandible fractures among young men were reported to be most common.^[3,17]

Seventy percent of the patients in our study were men, and 39% of all patients were men between 16- and 30-year-old. The gender and age distribution is very similar in studies from all over the world. Young men are the vast majority of patients with mandibular fractures.^[5,12,14]

Our study confirmed other studies regarding gender difference in the etiology of mandibular fractures.^[1,10,16] In our study, “violence” was significantly more common in men, whereas “falls” was significantly more common in women.

In our study, alcohol or drug abuse was not documented in 42% (112 patients). This is a weakness of our study. One of the explanations may be that many patients were unconscious, intubated, or in a state of coma at the time of hospital admission. Further, some of the patients arrived late after the injury, which made alcohol and drug abuse difficult to evaluate. Only 22 (8, 2%) patients reported use of alcohol at the time of the trauma, whereas 130 (50%) reported no use of alcohol. According to the World Health Organization (2004), Sweden has among the lowest consumption of alcohol per capita of European countries.^[18] However, it is a known fact that self-reported alcohol use is highly underestimated since alcohol use is considered a social stigma.^[19,20] We may therefore assume that the real figure is higher than 8,2%.

One explanation for the higher incidence for mandibular fractures among younger men may be that the alcohol consumption

pattern among younger men in Sweden has been connected to violence.^[20]

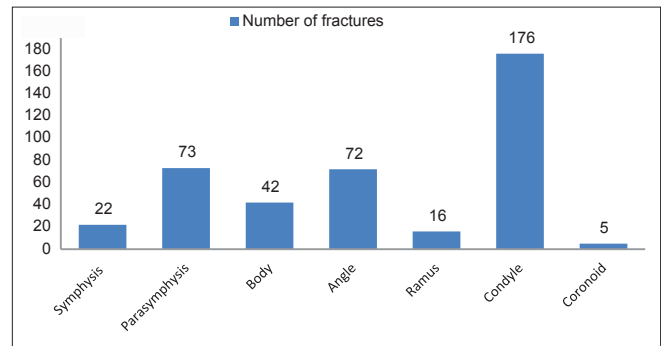


Figure 2: Location of mandibular fractures (n = 406)

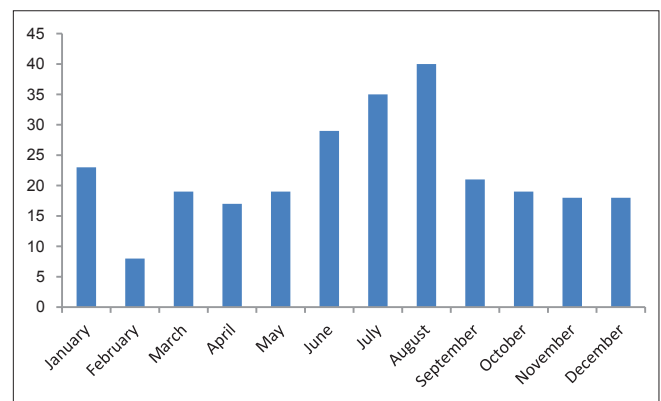


Figure 3: Variation in mandibular fractures by month

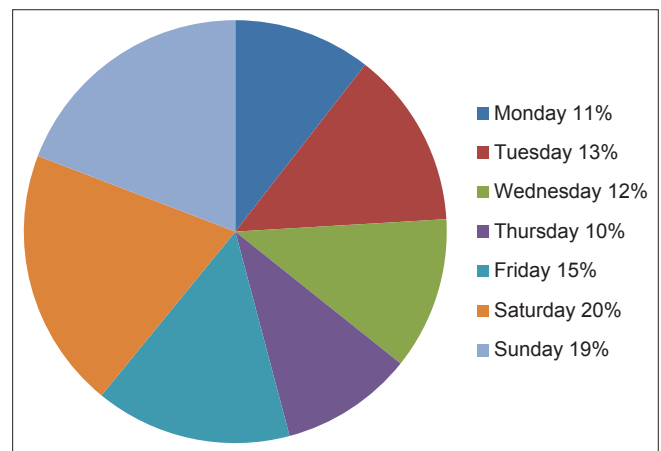


Figure 4: Variation in mandibular fractures over days of the week

Etiology	Symphysis (%)	Parasymphysis (%)	Body (%)	Angle (%)	Ramus (%)	Condyle (%)	Coronoid (%)
Violence	3 (14)	20 (27)	10 (24)	35 (49)	4 (25)	20 (11)	1 (20)
Fall	4 (18)	7 (10)	10 (24)	8 (11)	1 (6)	59 (34)	3 (60)
Bike	4 (18)	10 (13)	4 (9)	3 (4)	1 (6)	53 (30)	0 (0)
RTA	6 (27)	19 (26)	11 (26)	10 (14)	6 (38)	22 (13)	0 (0)
Sport	0 (0)	10 (14)	5 (12)	10 (14)	1 (6)	13 (7)	1 (20)
Other	5 (23)	7 (10)	2 (5)	6 (8)	3 (19)	9 (5)	0 (0)
Total	22 (100)	73 (100)	42 (100)	72 (100)	16 (100)	176 (100)	5 (100)

RTA: Road traffic accident

Table 4: Etiology by month

Month	Violence (%)	Fall (%)	Bike (%)	RTA (%)	Sport (%)	Other (%)
January	7 (11)	5 (8)	1 (2)	3 (7)	5 (17)	2 (9)
February	3 (5)	4 (7)	0 (0)	0 (0)	1 (4)	0 (0)
March	4 (6)	7 (12)	1 (2)	5 (12)	2 (7)	0 (0)
April	4 (6)	2 (3)	3 (6)	2 (5)	3 (11)	3 (14)
May	4 (6)	3 (5)	5 (10)	3 (7)	0 (0)	4 (19)
June	6 (10)	6 (10)	5 (10)	7 (17)	3 (11)	2 (9)
July	7 (11)	11 (18)	10 (20)	5 (12)	2 (7)	0 (0)
August	11 (17)	9 (15)	9 (17)	6 (14)	1 (4)	4 (18)
September	5 (8)	4 (7)	6 (11)	3 (7)	2 (7)	1 (4)
October	5 (8)	3 (5)	5 (10)	3 (7)	2 (7)	1 (4)
November	5 (8)	5 (8)	2 (4)	1 (2)	4 (14)	1 (4)
December	2 (3)	1 (2)	4 (8)	4 (10)	3 (11)	4 (19)
Total	63 (100)	60 (100)	51 (100)	42 (100)	28 (100)	22 (100)

RTA: Road traffic accident

Globally, the anatomical location of mandibular fractures varies. Ellis 3rd et al. and Maliska et al. found that the body, followed by the condyle, was the most common fracture sites in their studies.^[1,4] Subhashraj et al. found that in India, the most common fracture site was the parasymphysis, followed by the condyle.^[2] Comparing some regions of Scandinavian countries, the body, followed by the condyle, was the two most common anatomical sites of the lower jaw injuries in Sweden and Norway.^[10,14] However, in Iceland, the opposite was found.^[13]

In our study, condyle fractures represented the greatest portion of the fractures (43%), followed by those of the angle and parasymphysis, which confirms that the fracture location of the mandible may vary in different regions over the world.

The relation between the etiology and location of mandibular fractures has been described earlier.^[1,8,10,11,13,14] Three studies reported that the body and the angle, in that order, were the two most common sites of fracture in violent situations.^[1,13,14] In our study, we found that fracture in the angle, followed by the condyle and parasymphysis, were the most common fracture locations in violent situations. In falls, Ellis 3rd et al. showed the same result as in our study, with condyle fractures followed by body fractures as the most common locations of mandibular fractures.^[1]

To the best of our knowledge, our study was the first to report the timing aspects of mandibular fractures. The most common days of the week when the patients came for treatment were Friday to Sunday. On these days, people are generally not at work. When we looked at the time of the year, June to August were the months when people suffered the most from mandibular fractures. In Sweden, this is the time of the year when many people have holidays. Further, this is the warmest time of the year, and more people spend more time outdoors. Hence, the majority of fractures happened when people were away from work. In Sweden, there is high accident prevention at work. Further, use of alcohol at work has very low social acceptance. Since there are social, cultural, and economical differences between countries the timing of mandibular fractures will probably vary from country to country.

CONCLUSIONS

Mandibular fractures occurred primarily among younger men aged between 16 and 30 years. Condyle fractures were most

common fracture site and 50% of the patients required surgery. Summer months and weekends were the most common time of mandibular fractures. The most common etiologies of mandibular fractures are violence and falls.

REFERENCES

- Ellis E 3rd, Moos KF, el-Attar A. Ten years of mandibular fractures: An analysis of 2,137 cases. *Oral Surg Oral Med Oral Pathol* 1985;59:120-9.
- Aksoy E, Unlü E, Sensöz O. A retrospective study on epidemiology and treatment of maxillofacial fractures. *J Craniofac Surg* 2002;13:772-5.
- Sadda RS. Maxillofacial war injuries during the Iraq-Iran War: An analysis of 300 cases. *Int J Oral Maxillofac Surg* 2003;32:209-14.
- Maliska MC, Lima Júnior SM, Gil JN. Analysis of 185 maxillofacial fractures in the state of Santa Catarina, Brazil. *Braz Oral Res* 2009;23:268-74.
- Lee KH. Epidemiology of mandibular fractures in a tertiary trauma centre. *Emerg Med J* 2008;25:565-8.
- de Matos FP, Arnez MF, Sverzut CE, Trivellato AE. A retrospective study of mandibular fracture in a 40-month period. *Int J Oral Maxillofac Surg* 2010;39:10-5.
- Thangavelu A, Yoganandha R, Vaidhyanathan A. Impact of impacted mandibular third molars in mandibular angle and condylar fractures. *Int J Oral Maxillofac Surg* 2010;39:136-9.
- Oikarinen K, Schutz P, Thalib L, Sándor GK, Clokie C, Meisami T, et al. Differences in the etiology of mandibular fractures in Kuwait, Canada, and Finland. *Dent Traumatol* 2004;20:241-5.
- Al Ahmed HE, Jaber MA, Abu Fanas SH, Karas M. The pattern of maxillofacial fractures in Sharjah, United Arab Emirates: A review of 230 cases. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2004;98:166-70.
- Hallmer F, Anderud J, Sunzel B, Güner N, Andersson G. Jaw fractures diagnosed and treated at Malmö University Hospital: A comparison of three decades. *Int J Oral Maxillofac Surg* 2010;39:446-51.
- Thorn JJ, Møgeltoft M, Hansen PK. Incidence and aetiological pattern of jaw fractures in Greenland. *Int J Oral Maxillofac Surg* 1986;15:372-9.
- Kubilius R, Keizeris T. Epidemiology of mandibular fractures treated at Kaunas University of Medicine Hospital, Lithuania. *Stomatologija* 2009;11:73-6.
- Olafsson SH. Fractures of the facial skeleton in Reykjavik, Iceland, 1970-1979. (I) Mandibular fracture in 238 hospitalized patients, 1970-79. *Int J Oral Surg* 1984;13:495-505.
- Torgersen S, Tornes K. Maxillofacial fractures in a Norwegian district. *Int J Oral Maxillofac Surg* 1992;21:335-8.
- Ozkaya O, Turgut G, Kayali MU, Uğurlu K, Kuran I, Baş L. A retrospective study on the epidemiology and treatment of maxillofacial fractures. *Ulus Travma Acil Cerrahi Derg* 2009;15:262-6.
- Sojot AJ, Meisami T, Sandor GK, Clokie CM. The epidemiology of mandibular fractures treated at the Toronto general hospital: A review of 246 cases. *J Can Dent Assoc* 2001;67:640-4.
- Akhlaghi F, Aframian-Farnad F. Management of maxillofacial injuries in the Iran-Iraq War. *J Oral Maxillofac Surg* 1997;55:927-30.
- WHO. Global Status Report on Alcohol 2004. Geneva: World Health Organization; 2004.
- Landberg J, Hübner L. Changes in the relationship between volume of consumption and alcohol-related problems in Sweden during 1979-2003. *Alcohol Alcohol* 2014;49:308-16.
- Svensson J, Landberg J. Is youth violence temporally related to alcohol? A time-series analysis of binge drinking, youth violence and total alcohol consumption in Sweden. *Alcohol Alcohol* 2013;48:598-604.
- Subhashraj K, Nandakumar N, Ravindran C. Review of maxillofacial injuries in Chennai, India: A study of 2748 cases. *Br J Oral Maxillofac Surg* 2007;45:637-9.

Cite this article as: Ramadhan A, Gavelin P, Hirsch JM, Sand LP. A retrospective study of patients with mandibular fractures treated at a Swedish University Hospital 1999-2008. *Ann Maxillofac Surg* 2014;4:178-81.

Source of Support: Nil, **Conflict of Interest:** None declared.