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The Surgeon, Journal of the Royal Colleges
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The effect of deprivation on the incidence of mandibular fractures in a British city

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ARTICLE INFO

Article history:

Received 17 January 2016

Accepted 30 March 2016

Available online xxx

Keywords:

Mandibular fractures

Facial trauma

Deprivation

Poverty

ABSTRACT

Aim: To examine the relationship between social and material deprivation and mandibular fractures.

Method: Three hundred and forty three consecutive patients who underwent mandibular fracture fixation were selected for the study. After exclusions, 290 were divided into age groups and ranked according to their Index of Multiple Deprivation (IMD) score. Rankings were determined using postcodes, and divided into quintiles for statistical analysis.

Results: Ages ranged from 7 to 82 with 146 (50%) patients aged between 20 and 29. Males accounted for 85% of cases. The most common site of fracture was the angle ($n = 195$) and assault was shown to be the most common mechanism of injury (63.3%). A strong relationship was demonstrated between fractures of the mandible and worsening deprivation, with the most striking relationship seen with fractures sustained as a consequence of assault. Females were less likely than males to sustain a fracture of the mandible as a consequence of assault; however, when assault was the mechanism of injury they were also likely to be from a deprived background.

Conclusion: This study has demonstrated that a strong relationship exists between deprivation and the incidence of mandibular fractures in our catchment area. Fractures that resulted from interpersonal violence were shown to have a particularly strong correlation with deprivation.

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Introduction

The mandible is one of the most frequently fractured bones of the facial skeleton, accounting for up to three quarters of all facial fractures.^{1–3} Males in the third decade are the most likely group to sustain a fracture of the mandible^{1–4} and alcohol is a well-reported contributory factor.^{5,6} Assault is

widely accepted to be the most common cause of mandibular fractures in the developed world – Rashid et al. reported that Interpersonal violence was the cause for 72% of mandibular fractures in London,⁷ and this observation is supported by studies in other major urban areas.^{1,2,8,9}

A link between assault and increasing deprivation has been well documented.^{10–12} Deprived communities tend to have poor social cohesion limiting social control and higher

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<http://dx.doi.org/10.1016/j.surge.2016.03.008>

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background levels of community violence. In addition, socially disadvantaged groups have a higher prevalence of a number of risk factors more specific for physical violence, such as alcohol and drug abuse.^{13–15} Although an association between fractures of the mandible and deprivation is casually observed in the clinical setting, to our knowledge, no study specifically examines this. Consequently, this study aims to examine the relationship between mandibular fractures and combined material and social deprivation.

Methods

Information regarding patient demographics, injuries sustained and procedures undertaken were ascertained through electronic records and patient notes and examined retrospectively. We included all mandibular fractures, which underwent Open Reduction and Internal Fixation (ORIF) across the two acute trusts in Bristol, United Kingdom between the years 2011–2013. Only fractures that underwent ORIF were included in the study. The pre-determined catchment area comprised of the City of Bristol, South Gloucestershire, North Somerset, Bath and North East Somerset. This catchment area was used for analysis to avoid selection bias based on hospital location. Patients managed conservatively were excluded, as were patients from outside the predetermined catchment area.

Deprivation status

The Index of Multiple Deprivation (IMD) 2010 is used as the indicator for deprivation.¹⁶ This index is a measure of the material deprivation of small areas of England termed Lower Layer Super Output Areas (LSOAs) and enables comparisons to be made between like sized areas across the country. There are 32,482 LSOAs across England each containing approximately 1500 residents. The index is based on 7 domains of deprivation: Income Deprivation; Employment Deprivation; Health and Disability Deprivation; Education, Skills and Training Deprivation; Barriers to Housing and Services; Crime Deprivation; Living Environment Deprivation. The domains are then combined with different weightings to give an overall IMD. Each individual LSOA is given an IMD score, which enables them to be ranked from most deprived (Rank 1) to least deprived (Rank 32,482) to give an IMD ranking. Our catchment area is divided into 653 LSOAs, these were ranked 1 to 653 based on their raw IMD scores. Individual LSOAs were placed into Quintiles based on their IMD ranking. Each patient in the study was allocated to an individual LSOA based on his or her postcode. The South West of England is relatively undeprived compared to the rest of the country and although Bristol has deprivation 'hot spots', which are amongst some of the most deprived areas in the country, it also has a large number of the least deprived areas in the country.¹⁷ As such, Bristol would be regarded as a comparatively undeprived area of England.

Statistical analysis

Index of Multiple Deprivation (IMD) ranking were divided into quintiles to allow statistical analysis by means of a chi-squared test using SPSS software.

Results

Information was obtained for 426 patients from coding data. Eighty-two patients had been inappropriately coded as fractures and therefore excluded. Forty-six were from outside of the pre-determined catchment area and 8 patients had postcodes that were not recognised, or did not live in England. These patients were excluded. Following these exclusions there were 290 patients that had undergone primary treatment of a mandibular fracture and met our inclusion criteria.

Among the 290 validated fractures with IMD scores there were a total of 466 fractures of the mandible treated. The most common sites of fracture were the angle ($n = 195$) and parasymphysis ($n = 160$). The IMD scores of the 290 patients analysed ranged from 1.85 to 70.36 (median IMD score 17.37, IQR: 10.73–30.52). These were ranked within the 653 LSOAs ranging from 1 to 653 with a median rank of 242 (IQR: 103–383). IMD rankings were distributed into Quintiles: 1 – most deprived – (30.5%), 2 (22.5%), 3 (23.5%), 4(15.2%) and 5 – least deprived (8.7%) (Table 1). These show a significant link between deprivation and incidence using a Chi Squared Test ($p = 3.86 \times 10^{-8}$).

Ages ranged from 7 to 82 with a median of 25 (IQR: 21–33). The largest proportion of patients, 50.3% ($n = 146$) were in their third decade and 85.2% ($n = 247$) of the patients were male and 14.8% ($n = 43$) female. Assault is the most common cause of mandibular fractures across both hospitals accounting for 193 injuries in the 290 patients (66.6%). Falls account for 7.9% of injuries, sports 5.9% and RTAs 9.3%. Information was unavailable for a total of 25 patients, or 8.6% (Table 1).

Assault was shown to have a very strong correlation of increasing incidence with deprivation score, with 60 of the 193 patients falling into the most deprived quintile (Table 2). There

Table 1 – Percentage of patients categorised in deprivation quintile, age, aetiology and gender.

	Number of Patients	% Total (95% CI)
Deprivation Quintile		
1	88	30.2 (25.2–35.8)
2	65	22.4 (17.9–27.4)
3	68	23.4 (18.81–28.5)
4	44	15.2 (11.4–19.6)
5	25	8.62 (5.8–12.2)
Age of patient		
0–19	46	15.9 (11.9–20.4)
20–29	146	50.3 (50.3–56.1)
30–39	53	18.3 (14.1–22.9)
40+	45	15.5 (11.7–19.9)
Aetiology		
Assault	193	66.6 (61.0–71.8)
RTA	27	9.3 (6.3–13.0)
Fall	23	7.9 (5.2–11.4)
Sports	17	5.9 (3.5–8.9)
Iatrogenic	4	1.4 (0.4–3.2)
Pathological	1	0.3 (0.02–1.5)
Unknown	25	8.6 (5.8–12.2)
Gender		
Male	247	85.2 (80.8–90.0)
Female	43	14.8 (11.1–19.2)

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