*Int. J. Oral Maxillofac. Surg. 2011; 40: 1369–1372*
doi:10.1016/j.ijom.2011.04.021, available online at http://www.sciencedirect.com

International Journal of Oral & Maxillofacial Surgery

Clinical Paper
TMJ Disorders

# Temporomandibular disorders in patients with mandibular fractures: a preliminary comparative case–control study between South Australia and Oman

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*A. Al-Hashmi, A. Al-Azri, M. Al-Ismaily, A. N. Goss: Temporomandibular disorders in patients with mandibular fractures: a preliminary comparative case–control study between South Australia and Oman. Int. J. Oral Maxillofac. Surg. 2011; 40: 1369–1372.* 

*Abstract.* The status of temporomandibular disorders (TMD) in subjects with previously treated mandibular fracture was evaluated in two centres: South Australia (SA) and Oman (O). TMD status was evaluated using Mandibular Function Impairment Questionnaire (MFIQ), Helkimo index for clinical dysfunction (HI), RDC/TMD and Wilkes' classification. Data were retrieved for adult patients treated for mandibular fracture over 3 years from January 2004 to December 2006. Thirty-six subjects participated from SA and 23 from O. Their results were compared with matched controls. The incidence of TMD symptoms in SA injured and control groups was higher compared with the O groups. There was statistically significant difference on all evaluation indices for SA injured subjects compared with controls (MFIQ/P 0.04, HI/P 0.0015, RDC/TMD/P 0.05, Wilkes classification/P 0.03). These TMD symptoms were clinically insignificant for most subjects and all were internal derangement of the temporomandibular joint (TMJ). There was no significant difference in all evaluation indices for O injured subjects compared with controls. For SA injured subjects who reported clinically significant TMD symptoms, assault and bilateral mandibular fractures were predominant features. The study shows that most mandibular injuries fully recover and the associated TMJ trauma usually has low clinical significance in the long term.

Key words: TMD; mandibular fracture; South Australia; Oman; Hilkemo index; RDC/TMD; mandibular function impairment questionnaire; Wilkies classification..

Accepted for publication 1 April 2011
Available online 1 September 2011

Temporomandibular disorders (TMD) are multifactorial[10]. High life events and anxiety have been identified as important factors in muscular type TMD[15]. Trauma has been implicated as an important factor in intraarticular TMD[16,19], in terms of the aetiology of the condition and the responsiveness to non surgical treatment.

Mandibular fractures are common and account for approximately 50% of all facial fractures[1,14]. Trauma sufficient to result in mandibular fractures may have direct and indirect effects on the intraarticular structures of the temporomandibular joint (TMJ). This has been demonstrated by magnetic resonance imaging (MRI)[8] and direct vision by arthroscopy[9]. Animal experimental studies show trauma resulting in biochemical changes within the TMJ, cartilage degeneration and intraarticular adhesions[12,17,25]. The long term effect of such TMJ changes on jaw function is not clear and although most clinicians are aware of the association between mandibular trauma and the later development of TMD there have been few systematic studies.

There are several subjective and objective techniques to evaluate TMD. Widely used research instruments include the Helkimo clinical dysfunction index (HI)[11]; the Research Diagnostic criteria for TMD (RDC/TMD)[4]; Mandibular Function Impairment Questionnaire (MFIQ)[23] and Wilkes' classification of internal derangements of the TMJ[24]. As there is no consistency of outcome between these different research tools, all were applied.

In this study, the authors evaluated the effect of previous mandibular fracture on the TMD status of South Australian (SA) and Omani (O) patients. The results were compared with a control group matched for age and sex.

## Materials and methods

All patients age 17–70 years who had suffered a mandibular fracture requiring surgical treatment by the oral and maxillofacial surgery (OMS) units in South Australia and Oman between 1 January 2004 and 31 December 2006 were contacted by mail. In South Australia at that time, facial fracture patients were shared by the plastic and OMS units on a strict daily rotation, so the SA patients are representative of the overall trauma population. In Oman, all isolated facial fracture patients were treated by the OMS unit with a few complex multi-trauma patients being treated by the craniofacial service. The populations of South Australia and Oman are similar at 2 million, but there is a difference in the average age of the population. In South Australia it is 39.1 years[2] and in Oman 23 years[18]. There are also marked cultural and social differences in populations.

The patients were invited to return to the clinic for review. An age and sex matched control group evaluation was performed on patients attending for routine dental extractions. Exclusions from the control group were a previous history of facial trauma, previous history of treatment for TMD and psychiatric disorder.

The clinical review consisted of the following assessments. (1) The MFIQ assesses, on a 5-point scale, perceived hindrance during 11 mandibular functions and perceived difficulty eating food with different consistencies collected in six items (scale range 0–68)[23]. It is a patient-based index for assessing the presence or the severity of mandibular function impairment. (2) The HI involves five clinical examinations: mandible motion, TMJ sounds and deviation, muscle pain with palpation, joint pain with palpation, and pain with motion. Scoring was performed as described by HELKIMO[11]. This is a clinically based index proposed by HELKIMO for epidemiological studies to screen the community for TMD symptoms[11]. It describes the presence or the severity of clinical TMJ dysfunction. (3) For RDC/TMD only the clinical-based examination axis[4] was used. This includes pain history, pain with palpation or motion, measurement of all mandibular motion and assessment of any joint sounds. It is a more extensive system of assessing patient history of pain plus clinical examinations. It uses certain diagnostic criteria to classify TMD into myogenic, disc-displacement or arthralgic/osteoarthritic subgroups. (4) Wilkes' classification of internal derangement was used to stage the severity of the disc-displacement found using the RDC/TMD system. This classification was made on clinical grounds and imaging by MRI or arthrogram was not performed additionally.

The assessment of the SA injured and control groups was performed by the first author. In the O injured and control groups it was partially performed by first author and after calibration by the second author.

The data were recorded on a stand alone PC using a Microsoft Excel XP database sheet. For statistical analysis, all calculations were performed using SAS Version 9.1 (SAS Institute Inc., Cary, NC, USA). To compare the MFIQ, HI, RDC and Wilkes' responses across the control and injured groups, Fisher's exact test was

*Table 1.* Demographics of SA and O subjects; overall trauma; TMD assessed injured patients and control.

| | Gender M/F | Age (years) 15–19/20–40/40–82 | Aetiology RTA/IPV/fall/sport/other | Site Symphysis/body angle/condyle | Fracture type Unilateral/bilateral/multiple | Treatment ORIF/CT |
|---|---|---|---|---|---|---|
| SA | | | | | | |
| Overall ($n$ = 277) | 241/36 | 27/214/36 | 14/218/20/20/4 | 106/36/177/66 | 130/138/9 | 266/60 |
| Injured ($n$ = 35) (13%) | 30/7 | 3/25/9 | 0/24/11/1/0 | 15/5/20/21 | 9/26/2 | 40/12 |
| Control ($n$ = 20) | 14/6 | 2/14/4 | – | – | – | |
| Oman | | | | | | |
| Overall ($n$ = 272) | 235/37 | 25/195/42 | 143/19/50/29/31 | 98/58/79/135 | 135/109/28 | 194/151 |
| Injured ($n$ = 23) (8.5%) | 19/4 | 7/16/0 | 13/2/3/0/0 | 12/3/6/4 | 13/8/2 | 19/5 |
| Control ($n$ = 21) | 10/11 | 1/17/3 | – | – | – | |

CT, computed tomography; IPV, interpersonal violence; ORIF, open reduction with internal fixation; RTA, road traffic accident.