RESEARCH PAPER

Psychosocial Support Following Maxillofacial Trauma and its Impact on Trauma Recurrence

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Abstract

Background Injuries sustained to the maxillofacial region can result in significant physical trauma and long lasting psychosocial impairment. Maxillofacial trauma has been reported in literature to be a potentially recurrent disease. Patients who suffer maxillofacial trauma can benefit from psychological support.

Aim This study aims to identify maxillofacial trauma patient characteristics, investigate maxillofacial re-injury rate after provision of psychological support and report incidence of post traumatic stress disorder symptoms after maxillofacial trauma.

Method A total of 100 patients were identified from the departmental trauma database over two time periods at Royal Darwin Hospital; 50 patients did not have psychosocial intervention and 50 patients received intervention. Data on demographics, trauma pattern and aetiology were collected. A brief counselling session was conducted on second patient group by a trained mental health nurse and a survey using Trauma Screening Questionnaire was completed one month following injury.

Results The most common cause of injuries was assault in both groups followed by falls and the most common site of injuries was in the mandible in both groups. Almost half of all patients were in the 15–24 and 25–34 age groups. 17 % of patients in pre-intervention period and 4 % of patients in intervention period had injury recurrence at 3 year follow

up. Patient groups at risk of developing post traumatic symptoms included male, non-indigenous population, employed group with no alcohol involvement.

Conclusion Maxillofacial trauma can cause considerable psychological morbidity and expose the patient to high risk of post traumatic disorder symptoms. This type of injury was found to affect particular groups of population and is associated with high rate of recurrence. Psychological support should be provided to these patients as a routine part of trauma aftercare.

Keywords Maxillofacial · Trauma · Psychological support

Introduction

Maxillofacial trauma commonly presents to the emergency department. The Victorian State Trauma Registry (2004) reported that 16 % of major trauma patients sustained injuries to the maxillofacial region [1]. A high proportion of injuries occurred in males (73 %) and the 15–24 year age group (27 %) and there was a rising trend in assault related injury. Mandibular fractures most likely required operative procedures [1].

Significant stress, anxiety and depression can be associated with maxillofacial injuries [2]. These patients have mental health needs and are usually responsive to psychosocial aftercare [3]. In certain individuals, unresolved psychological issues combined with adverse circumstances and environments may predispose the individual to repeat injury. Trauma has been described as a recurrent disease and one where education of the patients on prevention is essential [4].

One of the first researchers to determine the association between maxillofacial injury and psychological distress was Shepherd in 1990 who observed a small but significant

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proportion of patients to suffer from anxiety and depression [5]. Anxiety levels and depression were similar for the assault and accident groups after 1 week, but the assault group had persistently elevated anxiety levels after 3 months.

Bisson et al. identified that 27 % of patients who presented with facial trauma suffered from post traumatic stress disorder at 7 weeks [3]. Hull et al. found 54 % of patients had post traumatic psychological symptoms at 10 days post injury and 41 % met the diagnostic criteria for post traumatic stress disorder (PTSD) at a 4–6 review [6]. Glynn et al. identified that 25 % of patients with maxillofacial injuries appeared to meet the diagnostic criteria for PTSD at 1 month review [2].

This study aims to describe the demographics, trauma pattern and aetiological factors of patients treated in a tertiary Oral and Maxillofacial trauma unit for maxillofacial fractures and examine the rate of recurrence after introduction of psychosocial intervention service. Patients at risk of developing PTSD will be identified to contribute further data to enhance current understanding of PTSD following maxillofacial injury.

Materials and methods

Patients and Methods

A retrospective review was conducted for patients treated at the oral and maxillofacial surgery unit at the Royal Darwin Hospital for the period spanning 2006 to 2009. A baseline list of all maxillofacial trauma cases treated for the period 2006–2007 and 2008–2009 was generated through examination of all admissions listed in the maxillofacial unit logbook. These cases were then filtered to select only patients who had received surgery for maxillofacial trauma. From this list, 100 cases were then randomly selected to form the pre-intervention and intervention periods. The randomisation was carried out by a medical student, who selected every fifth case of facial trauma presentations from the department log book. Analysis of the case notes was further carried out by three members of the Maxillofacial unit. Each case note was de-identified and only the hospital record number was documented.

One hundred patients were selected for the study. Fifty patients were randomly selected for the period September 2006 to August 2007 to generate a representative sample of patients who had been treated for maxillofacial trauma, but who had not received psychological counselling. The other 50 patients were selected randomly for the period November 2008 to October 2009 to produce a representative sample of patients who had been treated for maxillofacial trauma and received psychological counseling.

A total of 99 patients were included in the study. For the pre-psychological intervention period, 49 patients were identified and for the intervention period, 50 cases were identified; one patient from the pre-intervention group was excluded as patient had soft tissue only who was managed by the emergency department and not treated by the Maxillofacial unit. For the 50 patients managed during the intervention period, 45 patients received psychological intervention by the mental health nurse; five patients were not included in the study, because the trauma screen had already been administered by other medical staff.

In the group of patients who received psychological intervention (intervention group), a brief counselling session was conducted by a trained mental health nurse during which patients received information about definition of ‘at risk drinking’, physical harms from at risk drinking, methods to reduce future at risk drinking and avenues to seek further help. A survey using Trauma Screening Questionnaire was completed by these patients one month post injury. Results from this survey are presented in this study.

Trauma Screening Questionnaire (TSQ)¹ was used to assess patients in intervention group one month post injury. It is a validated questionnaire with high predictive value, in particular as a negative predictor. It is accepted as being an accurate assessment tool at the one-month mark following injury. It is a self-report measure of responses to a traumatic event and consists of 10 questions measuring re-experiencing and vigilance (arousal) symptoms adapted from the Post-traumatic Stress Disorder (PTSD) Symptom Scale (PSS-SR; Foa et al. 1993). The 10 questions require a yes or no answer, with scoring of six or more positive responses placing patients at risk of having PTSD according to the DSM-IV (American Psychiatric Association, 1994) and possibly requiring a more detailed assessment for definitive diagnosis. It is based on research conducted in the United Kingdom and recommended to be implemented in acute settings such as at Emergency Department or Surgical Outpatient Clinic. The main aim of TSQ is to assess current symptoms and likelihood to development of PTSD but not to diagnose PTSD.

Variables collected include population demographics, aetiology of injury, operation and admission details, access to mental health services, post traumatic stress disorder symptoms (vigilance and re-experience), employment status and re-injury. Re-injury was classed as any traumatic maxillofacial event that occurred after the date of the operation and resulted in the patient being admitted to hospital. It included both soft tissue and hard tissue

¹ Brewin CR (2005) Systematic review of screening instruments for the detection of posttraumatic stress disorder in adults. *Journal of Traumatic Stress*, 18, 53–62.

injuries. The patients were followed at the three year mark from initial presentation.

Data will be analysed using SPSS statistical Software. The sample will be described against a number of variables. Relationships between categorical variables were tested using Chi squared test. A significance level of $p < 0.05$ was applied for these tests.

Ethics approval to conduct this retrospective study was granted by The Human Research Ethics Committee of the Northern Territory Department of Health and Menzies School of Health Research (HREC) on 28th Aug 2015.

Results

Demographics

Male patients accounted for 80 % of all patients in both the non-intervention and intervention groups (Table 1). Indigenous patients accounted for higher number of injuries than non-indigenous patients; 63 % in the non-intervention group compared with 56 % in the intervention group. In general, unemployed patients and employed patients had similar likelihood of maxillofacial trauma (non-intervention group 49 %/intervention group 42 %). In addition, a high frequency of maxillofacial trauma occurred in Darwin suburbs (non-intervention: 48 %/intervention group: 42 %).

In both groups, the highest representation of maxillofacial trauma was in the 15–24 and 25–34 year age groups respectively; 37 % in the 15–24 year age bracket in the non-intervention group and 34 % in the 24–35 year age bracket.

Aetiology and Timing of Injuries

The most common cause of maxillofacial injury in both groups was assault (88 % in non-intervention group and 86 % in intervention group) followed by falls (10 % in both groups) (Table 2). Alcohol involvement was noted in 46 % of patients in non-intervention and 73 % of intervention group.

Table 2 Aetiology, alcohol involvement, site of injury, associated injury distribution of maxillofacial trauma

	Non intervention	Intervention
<i>Aetiology</i>		
Assault	43 (88 %)	43 (86 %)
Fall	5 (10 %)	5 (10 %)
MVA	1 (2 %)	2 (4 %)
<i>Alcohol involvement</i>		
Alcohol involvement	22 (46 %)	35 (73 %)
No alcohol involvement	17 (35 %)	10 (21 %)
Not recorded	9 (19 %)	3 (6 %)
<i>Site of facial injury</i>		
Lower third of facial skeleton	36 (74 %)	32 (65 %)
Mid third	12 (25 %)	13 (27 %)
Upper third	0	1 (2 %)
Pan-facial	1 (2 %)	3 (6 %)
<i>Presence of other injuries</i>		
Other injury	10 (21 %)	8 (17 %)
No other injury	37 (79 %)	40 (83 %)

The majority of maxillofacial injuries occur mid week, predominantly on Wednesday and Thursday respectively. (non-intervention group: 19 % and 26 %/intervention group: 19 % and 18 %).

Site of Injuries

The site of injury was predominantly the mandible. (non-intervention group: 74 %/intervention group: 65 %) with a minority recording an associated injury to other areas of the body (non-intervention group: 21 %/intervention group: 17 %) (Table 2).

Psychosocial Intervention

In the intervention group, 60 % of patients reported re-experience and 56 % reported vigilance phenomena. For re-experience, patients would report either low (0/5) re-experience (40 %) or high (5/5) re-experience (60 %). Similarly, for vigilance, patients either reported low (0/5) vigilance (44 %) or high vigilance (56 %) (Table 3).

Table 1 Sex, race and employment distribution of maxillofacial trauma

	Non intervention (2006–2007)	Intervention (2008–2009)
Male	39 (80 %)	40 (80 %)
Female	10 (20 %)	10 (20 %)
Non-indigenous	18 (37 %)	22 (44 %)
Indigenous	31 (63 %)	28 (56 %)
Unemployed	24 (49 %)	21 (42 %)
Employed	25 (51 %)	27 (54 %)
Not recorded	0	2 (4 %)

Table 3 Referral to mental health nurse, re-experience, vigilance distribution of maxillofacial trauma

	Non intervention (2006–2007)	Intervention (2008–2009)
Referred to MH nurse	0	43 (86 %)
Not referred to MH nurse	0	7 (14 %)
High re-experience	0	27 (60 %)
Low re-experience	0	18 (40 %)
High vigilance	0	25 (56 %)
Low vigilance	0	20 (44 %)

Table 4 Predictors of post traumatic stress symptoms in maxillofacial trauma

Pre-intervention	High vigilance	Low vigilance
Male	21 (58.3 %)	15 (41.7 %)
Female	4 (44.4 %)	5 (55.6 %)
Indigenous	11 (45.8 %)	13 (54.2 %)
Non-indigenous	14 (66.6 %)	7 (33.3 %)
Employed	15 (62.5 %)	9 (37.5 %)
Unemployed	10 (52.6 %)	9 (47.3 %)
Assault	18 (49.7 %)	19 (51.3 %)
Fall	5 (100 %)	0
MVA	2 (100 %)	0
Alcohol involvement	16 (53.3 %)	14 (46.7 %)
No alcohol involvement	7 (70 %)	3 (30 %)
Post-intervention	High re-experience	Low re-experience
Male	23 (63.9 %)	13 (36.1 %)
Female	4 (44.4 %)	5 (55.5 %)
Indigenous	13 (54.2 %)	11 (45.8 %)
Non-indigenous	14 (66.6 %)	7 (33.3 %)
Employed	16 (66.6 %)	8 (33.3 %)
Unemployed	11 (57.9 %)	8 (42.1 %)
Assault	19 (51.3 %)	18 (49.7 %)
Fall	5 (100 %)	0
MVA	2 (100 %)	0
Alcohol involvement	16 (53.3 %)	14 (46.7 %)
No alcohol involvement	8 (80 %)	2 (20 %)

For employment: 2 not recorded

For alcohol: 3 not recorded

Males displayed high vigilance (58 %) and high re-experience (64 %). Higher proportion of non-indigenous patients experienced high vigilance (67 %) and re-experience (67) as compared to indigenous patients (high vigilance 46 %) and high re-experience (54 %). Patients who were employed experienced high vigilance (63 %) and high re-experience (67 %). In addition, no alcohol involvement at time of injury was associated with high vigilance (70 %) and high re-experience (80 %) (Table 4). The only statistically significant correlation ($p < 0.05$) was found in the degree of vigilance and trauma aetiology.

Injury Recurrence

The recurrence rate of maxillofacial injury in the non-intervention group was 17 % (7 patients) compared with 4 % (2 patients) in the intervention group at the end of the three year follow up period. Furthermore, patient records were also studied for previous presentation of maxillofacial injuries (prior to admission noted in this study). Thirty-three per cent of patients in pre-intervention group had previous presentation with maxillofacial injuries while 25 % of patients in intervention group had previous admission for management of maxillofacial injuries.

Discussion

The demographic profile of a patient admitted to the Royal Darwin Hospital maxillofacial unit for facial trauma is typically an indigenous male, aged between 15–34 years, who lives in Darwin. These results correlate well with Victorian findings that indicated the highest frequency of maxillofacial trauma occurred in males aged between the 15–24 year age group [1]. Indigenous patients are over-represented in this study highlighting that strategies to reduce maxillofacial trauma need to focus on the indigenous population [7, 8].

This study also supports similar findings by other investigators that alcohol is a significant influence in maxillofacial trauma [9, 10]. There is rising trend in alcohol involvement as evident by higher proportion of alcohol involved assault cases in the intervention group. It appears that the typical maxillofacial trauma patient admitted to the Royal Darwin Hospital is an indigenous male who may receive their social security benefits mid-week that facilitates purchase of alcohol that places them at risk of assault. If an injury occurs to the maxillofacial region, it is principally to the jaw. This raises the question that psychological screening and intervention services should be scheduled mid-week to help prevent risk of maxillofacial trauma. Clinical audit in a tertiary trauma unit is an important tool in determining trend and impact of trauma presentation which aids in appropriate distribution of hospital resource and education and training of the

medical staff. Equally important is that results of such clinical audit can lead to better identification and targeted education of at risk patient groups.

Maxillofacial trauma causes considerable psychological morbidity. Maxillofacial injury can have adverse effect on personal relations, employment and the law, and can lead to addiction, and poor satisfaction with life [11]. It will cause acute psychological stress even in patients with stable background [12]. Moreover, variables associated with predicting higher risk of developing PTSD have been reported to include female sex, older age, past history of psychological distress, unmet social supports and pain from injury in one study [11]. This study identified patients at risk of developing PTSD following maxillofacial injuries in Darwin. Patient groups at risk of developing post traumatic symptoms in this study included male, bring a victim of assault, non-indigenous population, employed group with no alcohol involvement. This reinforces the view that patients from stable background are in particular at risk.

Patients treated at the Royal Darwin Hospital for maxillofacial trauma have high risk of developing post traumatic stress symptoms, in particular re-experience and hyper vigilance. These findings confirm earlier findings by researchers that maxillofacial trauma has a significant association with development of post-traumatic stress symptoms [3, 5, 6]. Considering the morbidity associated with this condition, it would seem that psychological intervention to manage PTSD following maxillofacial trauma would be warranted for all facial trauma patients.

A recent survey reported less than half of the surgeons (45 %) believed that their patient's psychological problems were adequately addressed at the hospital and the majority (95 %) believed that a psychosocial aftercare program was required [12]. Moreover, the surgeons identified that such a program would decrease the risk of re-injury and promote compliance with follow up. However, they also stated that although such a program was warranted, the most significant barriers to implementation were lack of financial resources and trained personnel [12]. Further evidence from multi-agency prevention in the United Kingdom support the concept of combining psychological services with surgical trauma services [13]. This study argues that violence should be considered as a disease and is preventable. As the most frequently selected target body region in assault on adults, health professionals such as the Oral and Maxillofacial surgeons have "the responsibility to orchestrate holistic care that takes into account mental health needs" [13].

Although improved patient outcomes could be achieved with the utilization of psychosocial services by trauma units, there is no level 1 research evidence supporting to this intervention. A review of the Cochrane database identified 1 systematic review that analysed "domestic

violence screening and intervention programs for adults with dental or facial injury." The review observed that no eligible randomized control trials were identified. Accordingly, the authors stated that, "there is no evidence to support or refute the usefulness of intervention programmes in reducing and/or preventing domestic violence in adults with dental or facial injury." However, the report recognised the need for randomised controlled clinical trials to investigate the effectiveness of domestic violence intervention programmes and screening strategies [14].

Current evidence points to the importance of providing psychological support to suitable patients and at a suitable time. As facial injuries often leave permanent scar and disfigurement, these sufferers benefit greatly from psychological support. This further emphasises the role of a trauma doctor to not just treat the condition, but also to provide a patient-centred approach, in a collaborative environment. The acute environment in which these patients present gives the clinician a "teachable moment" to educate these patients on harm minimisation strategies with the long term goals to reduce harmful drinking behaviour and to reduce the risk of re-injury [15–17]. This study reported lower recurrence rate of maxillofacial injuries in patient group which received psychosocial support compared with patient group which did not receive psychosocial support at three year follow up. This further emphasizes the golden window of opportunity at the time of trauma to administer an intervention strategy.

Different intervention strategies for trauma patients in the immediate period following injury have been described in literature. Oral and Maxillofacial trauma unit in Darwin has a staff mental health nurse who has special interest in provide a brief alcohol intervention and was able to effect such program. In busy emergency departments and other acute settings such as surgical wards and outpatient clinics, lack of time and resources and support from trained staff are some obstacles in implementation of such programs. Other methods of intervention reported by other studies to overcome such barriers include use of computerised information and advice and telephone follow up after patient discharge. Efficacy of such methods is not universally accepted therefore highlighting some areas that warrant further studies [18–20].

There are limitations in aspects of this study. The control and intervention groups were randomly selected from two consecutive periods in time. The study is thus not a double blinded and randomised control trial. Review of literature did not identify eligible randomised control trials on this topic. RCT measuring benefit of psychological intervention may not be possible on ethical ground as such intervention has been reported to have positive effects on patients. Another limitation of this study is reporting/medical history documentation of alcohol involvement in

recruited patients. There was a difference in percentage of patients with alcohol involvement in the two time periods. This could be due to more vigilant history taking in later time period.

Conclusion

Patients who suffer from maxillofacial trauma are likely to develop symptoms of post traumatic stress disorders. Predictors of post traumatic stress disorder include male, unemployment and a victim of assault. This study indicates the importance of identifying at risk patients and providing them with psychological support. This study also finds high injury recurrence rate in patients who did not receive psychological intervention. Maxillofacial trauma has been reported as potentially recurrent disease which may be preventable through appropriate patient education.

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Compliance with Ethical Standards

Conflict of interest The authors declares that they have no conflict of interest.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

References

- Shahim FN, Cameron P, McNeil JJ (2006) Maxillofacial trauma in major trauma patients. *Aust Dent J* 51(3):225–230
- Glynn SM, Asarnow JR, Asarnow R, Shetty V, Brown KE, Black E, Belin TR (2003) The development of acute post traumatic stress disorder after orofacial injury: a prospective study in a large urban hospital. *J Oral Maxillofac Surg* 61(7):785–792
- Bisson JJ, Shepherd JP, Dhutia M (1997) Psychological sequelae of facial trauma. *J Trauma* 43(3):496–500
- Laski R, Ziccardi VS, Border HL, Janal M (2004) Facial trauma: a recurrent disease? The potential role of disease prevention. *J Oral Maxillofac Surg* 62(6):685–688
- Shepherd JP, Qureshi R, Preston MS, Levers BG (1990) Psychological distress after assaults and accidents. *BMJ* 301(6756):849–850
- Hull AM, Lowe T, Devlin M, Finlay P, Koppel D, Stewart M (2003) Psychological consequences of maxillofacial trauma: a preliminary study. *Br J Oral Maxillofac Surg* 41(5):317–322
- Population distribution, aboriginal and torres strait Islander Australians. Australian Bureau of Statistics ABS (2006)
- Buchanan J, Colquhoun A, Friedlander L, Evans S, Whitley B, Thomson M (2005) Maxillofacial fractures at Waikato Hospital, New Zealand: 1989–2000. *N Z Med J* 118(1217):U1529
- Lee K (2009) Trend of alcohol involvement in maxillofacial trauma. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 107(4):e9–e13
- O'Meara C, Witherspoon R, Hapangama N, Hyam DM (2012) Alcohol and interpersonal violence may increase the severity of facial fracture. *Br J Oral Maxillofac Surg* 50(1):36–40
- De Sousa A (2008) Psychological issues in oral and maxillofacial reconstructive surgery. *Br J Oral Maxillofac Surg* 46(8):661–664
- Zazzali JL, Marshall GN, Shetty V, Yamashita DD, Sinha UK, Rayburn NR (2007) Provider perceptions of patient psychosocial needs after orofacial injury. *J Oral Maxillofac Surg* 65(8):1584–1589
- Warburton AL, Shepherd JP (2002) Alcohol related violence and the role of the maxillofacial surgeon in multi-agency prevention. *Int J Oral Maxillofac Surg* 31(6):657–663
- Coulthard P, Yong SL, Adamson L, Warburton A, Worthington HV, Esposito M, Sharif MO (2004) Domestic violence screening and intervention programs for adults with dental or facial injury. *Cochrane Database Syst Rev* 2:CD004486
- Monti PM, Colby SM, Barnett NP, Spirito A, Rohsenow DJ, Myers M, Woolard R, Lewander W (1999) Brief intervention for harm reduction with alcohol-positive older adolescents in a hospital emergency department. *J Consult Clin Psychol* 67(6):989–994
- Maier RV (2005) Controlling alcohol problems among hospitalized patients. *J Trauma* 59:S1–S2
- Longabaugh R, Minugh PA, Nirenberg TD, Clifford PR, Becker B, Wooland R (1995) Injury as a motivator to reduce drinking. *Acad Emerg Med* 2:817–825
- Karlsson A, Johansson K, Nordqvist C, Bendtsen P (2005) Feasibility of a computerized alcohol screening and personalized written advice in the ED: opportunities and obstacles. *Accid Emerg Nurs* 13(1):44–53
- Lotfipour S, Howard J, Roumani S, Hoonpongsimanont W, Chakravarthy B, Anderson CL et al (2013) Increased detection of alcohol consumption and at-risk drinking with computerized alcohol screening. *J Emerg Med* 44(4):861–866
- DiGuseppi C, Goss C, Xu S, Magid D, Graham A (2006) Telephone screening for hazardous drinking among injured patients seen in acute care clinics: feasibility study. *Alcohol Alcohol* 41(4):438–445