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Quality of life in treatment of mandibular fractures using closed reduction and maxillomandibular fixation in comparison with open reduction and internal fixation – A randomized prospective study

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ABSTRACT

Treatment of mandibular fractures by open reduction and internal fixation (ORIF) is often assumed to be superior to treatment by close reduction and maxillomandibular fixation (MMF) because patients managed by ORIF seem to be rehabilitated earlier according to functional and social aspects. This assumption is often from surgeon's perspective, not taking into account patient's view point. This study highlights a comparative assessment between ORIF and MMF from the patients' perspective.

Fifty six patients with mandibular fractures within the tooth bearing areas of the mandible were prospectively studied in a randomized controlled pattern for postoperative Quality of Life (QoL) after ORIF versus MMF. Both groups were analyzed preoperatively, at 1 day, 6 and 8 weeks regarding their QoL using the General Oral Health Assessment Index questionnaire (GOHAI). No significant statistical difference was found between the groups regarding overall QoL. Patients managed by MMF were more affected by psychosocial and physical domains whereas patients managed by ORIF were more affected by the pain domain.

The results demonstrate that the treatment affects the psychosocial, physical and pain domain differentially. When both treatments are possible the patient's should be enlightened on the advantages and disadvantages of both treatment modalities to guide their choice of treatment.

1. Introduction

Quality of life can be defined as peoples' perception of their position in life in the context of their culture and value systems, also in relation to their goals, expectations, standards and concerns (WHO, 1996). QoL as it applies to medicine is specifically known as Health Related QoL (HR-QoL) or subjective health status (O'Boyle, 1992; Olschewki et al., 1994; Infante-Cossio et al., 2009). QoL studies measure the effect of illness, disease and its treatment on patients' welfare by going beyond the physician dominated indicators of patient's progress. These studies also allow patients to define those aspects of the disease condition or treatment they consider most distressing and to take part in therapeutic decisions. A QoL study to compare different treatment modalities of mandibular fractures was carried out in Kano, Nigeria.

HR-QoL and its assessment have become increasingly important in health care, especially in the field of maxillofacial surgery. There are several studies about the quality of life of head and neck cancer patients but only few studies on HR-QoL of patients treated for mandibular fractures (Atchison et al., 2006). There are however studies on QoL in patients treated for condylar fractures (Worsaae and Thorn, 1994; Kommers et al., 2013), as well as studies that assess the psychological response of patients' to mandibular fracture treatment (Shepherd, 1992; Gironda et al., 2009). QoL studies confirm that the quality of life of patients following facial surgeries is often affected since there may be resultant facial disfigurement (Dropkin, 1999; Katz et al., 2003). Similarly vital functions such as

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speaking, swallowing or chewing might be affected (Mignogna et al., 2001; Van Cann et al., 2005; Guntinas-Lichius et al., 2007). A low quality of life can also lead to a low survival rate (Osthus et al., 2011; Tarsitano et al., 2012) and due to this reason it is important to support patients with a low quality of life.

A search of the literature found only one study on QoL of various types of mandibular fracture (Atchison et al., 2006), which showed that the patients whose mandibular fractures were managed by MMF reported fewer problems and had a better immediate post-operative QoL compared to the ORIF group. To the best of the authors' knowledge, there is no prospective study comparing QoL of patients treated by ORIF or MMF in the tooth bearing region of the mandible.

Mandibular fracture may be defined as a breach in the continuity of any part of the mandible as a result of injury (Mosby, 2005). Mandibular fractures are worldwide in distribution and account for about 36–59% of all maxillofacial fractures (van Hoof et al., 1977; Brook and Wood, 1983; Ellis and Moos, 1985). These fractures are often the result of road traffic accidents, assaults, falls, missiles, sports injuries and occasionally from pre-existing pathologies (Sojot et al., 2001).

Mandibular fracture treatment aims to restore form and function, and it involves reduction, immobilization and fixation of the fractured mandible. Reduction is the re-apposition of the fracture segments to their normal anatomic forms; immobilization is the restriction of movement at the temporomandibular joints while healing occurs while fixation is the maintenance of the fracture segments in the reduced position to prevent displacement during healing. Reduction techniques in mandibular fracture treatment may be classified as open or closed based on the presence or absence of direct visual access to the fracture site (Iizuka and Lindqvist, 1992). Closed reduction allows manipulation of the fracture segments taking advantage of dental occlusion without direct visual access whereas open reduction involves direct visual access to the fracture site through a surgical incision. Closed reduction and maxillomandibular fixation may be performed using splints in the form of bonded orthodontic brackets, arch bars, direct wires or eyelet wires (Iizuka and Lindqvist, 1992). Open reduction and internal fixation involves the use of wires, plates and other hardwares placed directly across the fractured site via a surgical access.

Treatment of mandibular fractures by ORIF is often assumed to be superior to treatment by MMF in a simple fracture that can be indicated for either modality. Patients managed by ORIF have the advantage of immediate or early postoperative joint mobilization, ability to clean all aspects of their mouth postoperatively and an absence of limitation in choice of food to eat. They are also noted to return earlier to work and normal life. This assumption of superiority is often from surgeon's perspective not taking into account the patients view point which is equally a critical element in determining success of surgical treatment. The aim of the study was to assess patients' perspective, identifying patients' expectations and determining aspects of mandibular fracture treatment that affect patient's QoL. It will enhance evidence-based practice in management of mandibular fractures.

2. Material and methods

This study was a randomized prospective cross sectional comparative analysis of health related quality of life following treatment for mandibular fractures that occurred within the tooth bearing portions of the mandible. A comparison of ORIF versus MMF at Aminu Kano Teaching Hospital (AKTH) Kano from January to December 2012 was undertaken. Ethical approval for the study was obtained from the Research and Ethics Committee of Aminu Kano Teaching Hospital Kano (AKTH/MAC/SUB/12A/P-3/VI/957). Also written informed consent was obtained from each patient before their enrollment into the study. Inclusion and exclusion criteria for the study are shown in Table 1.

Table 1
Inclusion and exclusion criteria for the study.

Inclusion criteria	Exclusion criteria
Mandibular fractures only within the tooth bearing region of the mandible.	Fractures outside the tooth bearing region of the mandible.
Fractures bounded on either side by periodontally healthy teeth.	Comminuted mandibular fractures.
Fractures treatable by closed reduction/MMF.	Fractures which were absolutely indicated for ORIF.
Mandibular fracture of one week duration or less.	Patients whose medical condition precluded treatment with MMF.
	Patients below the age of 14 years.
	Patients who declined to participate in the study.
	Patients with other facial fractures in addition to mandibular fracture, with a history of psychiatric illness, with pathological mandibular fractures, with mandibular fractures from missile or blast injuries, with dentoalveolar fractures.

2.1. Study protocol

Patients who met the inclusion criteria were recruited into the study from the accident and emergency unit and the maxillofacial surgery unit of the hospital. All patients had prophylactic scaling and polishing by dental therapists retrained for the purpose of the study to ensure standardization prior to treatment. Mandibular fracture treatment was paid for by the patients and commenced after routine preoperative investigations were carried out to ensure fitness for surgery.

The patients were randomly allotted into 2 groups (Group A and B) representing those to be treated by MMF or ORIF techniques respectively. A research assistant balloted for the first patient into one of the two groups and allotted subsequent consecutive patients to the opposite group in alternation until exhaustion of patients who met the inclusion criteria for the comparative study. Patients who were randomized into open reduction were only required to pay the cost for closed reduction. Healthy patients' relatives or friends matched for age and sex were recruited as controls for the study at the last inquiry period 8 weeks postoperatively.

Maxillary and mandibular Erich type arch bars were employed in patients treated by MMF and was maintained for 6 weeks while Indian type 2 mm stainless steel mini plates using screws of length 10 mm at the lower border and 8 mm at the sub-apical region for the patients treated by ORIF. The patients treated by ORIF had intraoperative trial occlusion using tie-wires anchored on maxillary and mandibular eyelet wires. These were removed following insertion of osteosynthetic plates.

General Oral Health Assessment Index questionnaire (GOHAI; original English version) adopted from Atchison et al. (Atchison et al., 2006) was completed preoperatively to obtain a pre-treatment score and post-surgery scores on day 1, 6 weeks and 8 weeks respectively. The respondents independently filled the questionnaires in the maxillofacial clinic during their admission and postoperative reviews. Also 28 healthy people were assessed once at the inquiry period 8 weeks postoperatively for comparison using the same GOHAI questionnaire.

GOHAI questionnaire assesses the oral health function of the patient in three domains namely physical, psychosocial and pain