

IS THERE ANY DIFFERENCE IN THE TREATMENT OUTCOME OF MAXILLOFACIAL FRACTURES FOLLOWING USE OF RIGID OR SEMI-RIGID OSTEOSYNTHESIS?

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ABSTRACT

The objective of this study is to assess the clinical outcomes of patients with maxillofacial fractures treated with rigid and non-rigid osteosynthesis and to compare the outcomes of both treatment protocols.

The study design is descriptive and retrospective. The method involved the retrieval and assessment of all cases of 'pure' maxillofacial fractures treated with plates (rigid) and wires (non-rigid) protocols for a two and a half year period between (January 2009 and June 2011). Information of interest includes demographics, types of fracture, treatment done and outcome of treatment.

Retrieved data showed that 462 specific diagnoses of maxillofacial fractures were made in 207 patients. 105 of patients treated with rigid osteosynthesis and 102 treated with non-rigid osteosynthesis. 43 unsuccessful outcome measures were identified in the post-operative review period, made up of 5 in patients treated with rigid osteosynthesis, 38 in patients treated with non-rigid osteosynthesis. This was statistically significant ($P < 0.05$) and odds ratio (OR) of 11.9 was calculated.

This audit reveals a better clinical outcome of treatment of maxillofacial fractures, using rigid osteosynthesis compared with the traditional method of non-rigid protocol. It could be concluded that risk for unsuccessful outcome was about 12 times in patients receiving treatment with non-rigid protocol and suggests an appropriately designed comparative study for a wholesome evaluation of the outcomes of maxillofacial fractures, using both treatment protocols.

INTRODUCTION

Fractures of the facial bones are common and despite seat belt and alcohol legislations maxillofacial trauma still remains a common health problem and significant workload in many maxillofacial units¹. Facial trauma is common in accidents and assaults and can be accompanied by distressing psychological

sequelae¹⁻³. The goals of a fracture treatment are to restore position (alignment, rotation, and length) to the bone or joint, to decrease pain, to prevent later deformity, and to encourage healing and normal use of the bone³. The operative protocol for the treatment of maxillofacial fractures include one or a combination of the following: a) Use of stainless steel wires, that may be i) non-rigid fixation that include 2 to 6 weeks of maxillomandibular fixation, ii) non-rigid but functionally stable fixation (semi-rigid) and b) rigid fixation using plates⁴⁻⁸.

KEYWORD:

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The use of plates and screws has several advantages over the traditional method of wire osteosynthesis and maxillomandibular fixation. When properly employed, plates ensure a stable anatomical reduction and allow immediate/early restorations of functions. In spite of this great advantage, plates and screws have remained unpopular in our environment. The main reasons being economic and lack of training. Hence the use of transosseous wires in management of fractures has remained very popular among maxillofacial surgeons; and in most centers go on alongside rigid osteosynthesis.

Clinical audit is the process that supports continuous quality assessment and improvement programmes. It is a quality improvement process that seeks to improve patient care and outcomes through systematic review of care against explicit criteria, identification from the review, of actions to improve clinical practice and the implementation of those actions. Aspects of the structure, processes, and outcomes of care are selected and systematically evaluated against explicit criteria. Where indicated, changes are implemented at an individual, team, or service level and further monitoring is used to confirm improvement in healthcare delivery. A narrower definition was given in a Cochrane review, as "The provision of any summary of clinical performance over a specified period of time. The summary may include data on processes of care, clinical endpoints and clinical practice recommendations⁹⁻¹¹.

Clinical audit is one of the "keystones" of clinical governance. A surgical department that subjects itself to regular and comprehensive audit should be able to

provide data to current and prospective patients about the quality of the services it provides, as well as reassurance to those who pay for and regulate health care. Well-organized audit should also enable the clinicians providing services to continually improve the quality of care they deliver. There is much concern about the quality of care provided to our patients with the society becoming very vigilant and critical about the standard of patients care outcomes. A clinical audit design can be prospective and/or retrospective. The audit information can be obtained from national, hospital, and surgeon-specific data. A clinical department benefits from a clear audit plan and the audit improves patient outcome¹².

Having employed the traditional wiring and new era plating protocols side by side for some thirty months, it is time we audited our records to assess the quality of treatment in the field of maxillofacial surgery, using specific and quantifiable outcome measures. The findings will be invaluable in the area of patients' education particularly as it affects informed consent as a subject matter. From the foregoing, this audit is justified by need to support, maintain, and enhance patients' safety and the quality of patient care.

This study is therefore aimed at assessing the treatment outcome of patients with maxillofacial fractures treated with titanium plates and stainless steel wires regimens in the Department of Maxillofacial Surgery, University of Benin Teaching Hospital, Benin-City.

PATIENTS AND METHODS

This study is a retrospective one and involves all cases of 'pure' maxillofacial fractures treated with plates (rigid) and wires (non-rigid) protocols for a two and a

half year period between (January 2009 and June 2011). All patients with fractures outside the maxillofacial skeleton were excluded. The cases were assessed by retrieving information from the case files. Pretest of the data collecting proforma led to data collection up to a maximum of sixteen weeks post-operative, as virtually no case file has entry beyond sixteen weeks after surgery. Information of interest includes demographics, aetiology and type of fracture, treatment done and outcome of treatment.

Outcome measures considered were: a) Successful outcomes with (i) radiographic evidence of bone union, (ii) acceptable occlusion (iii) absence of symptoms. b) Unsuccessful outcomes with (i) evidence of mal-union or non-union, (ii) Unacceptable occlusion and (iii) presence of symptoms. Data was subjected to descriptive statistics and results are shown in the form of simple frequency tables and charts. $P < 0.05$ was considered significant.

RESULTS

Retrieved data showed that 471 specific diagnoses of maxillofacial fractures were made in 214 patients. Seven cases of incomplete case histories were seen; failed to meet the inclusion criteria and were excluded from the study. Therefore 462 specific diagnoses of maxillofacial fractures made in 207 patients with complete case history were included and considered in this study. One hundred and five of patients were treated with rigid osteosynthesis and a hundred and two treated with non-rigid osteosynthesis.

Table 1: Shows the age and gender distribution of the patients. Age ranged

Table 1: Age and Gender Characteristics of Patients

Age (Years)	Females n(%)	Males n(%)	Total n(%)
≤ 10	03 (1.5)	05 (2.4)	08 (3.9)
11-20	21 (10.2)	32 (15.4)	53 (25.6)
21-30	35 (16.9)	56 (27.1)	91 (44.0)
31-40	09 ((4.3)	23 (11.1)	32 (15.4)
41-50	07 (3.4)	10 (4.8)	17 (8.2)
≥ 51	04 (1.9)	02 (1.0)	06 (2.9)
Total	79 (38.2)	128 (61.8)	207 (100.0)

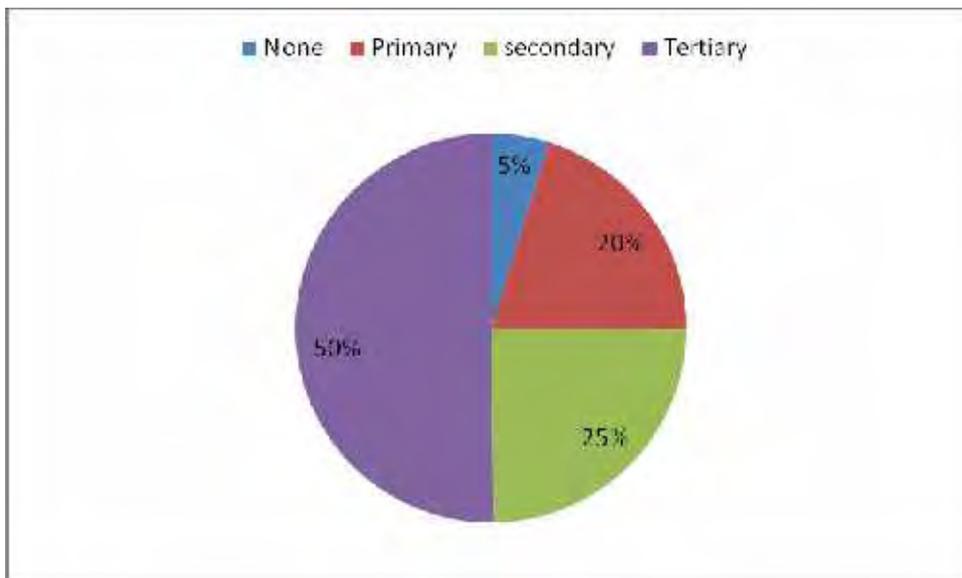


Figure1: Educational Status of Patients. Most patients were educated to the tertiary level.

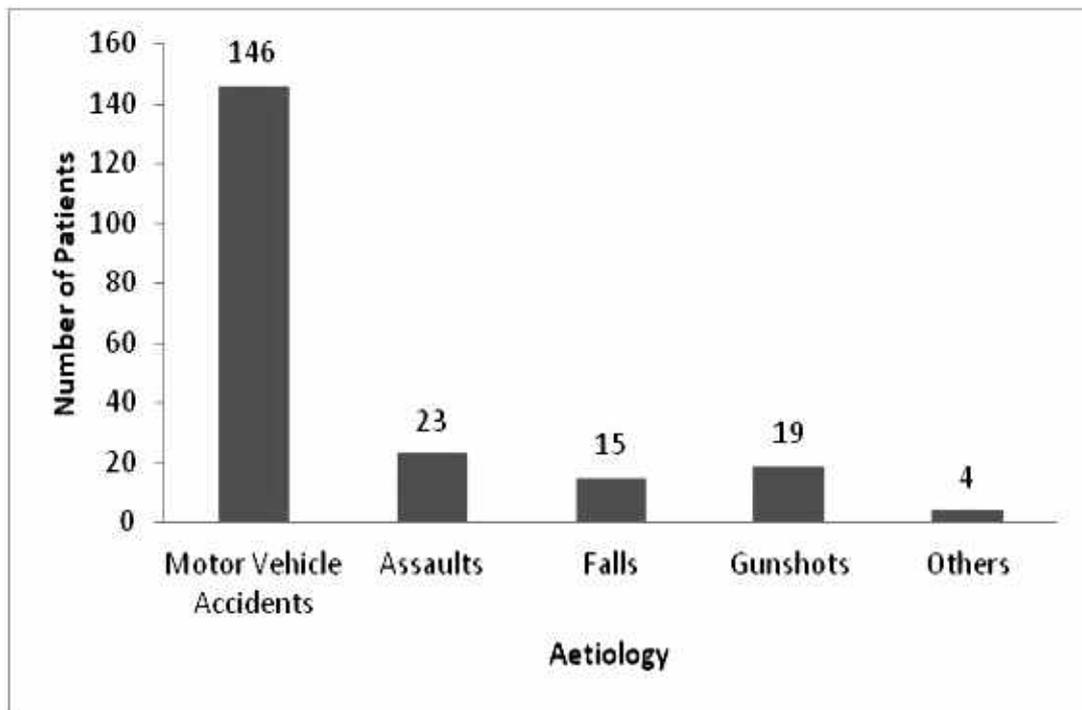


Figure 2: Aetiology of Fractures in the Patients Treated. The most common aetiological factor was motor vehicle accident.

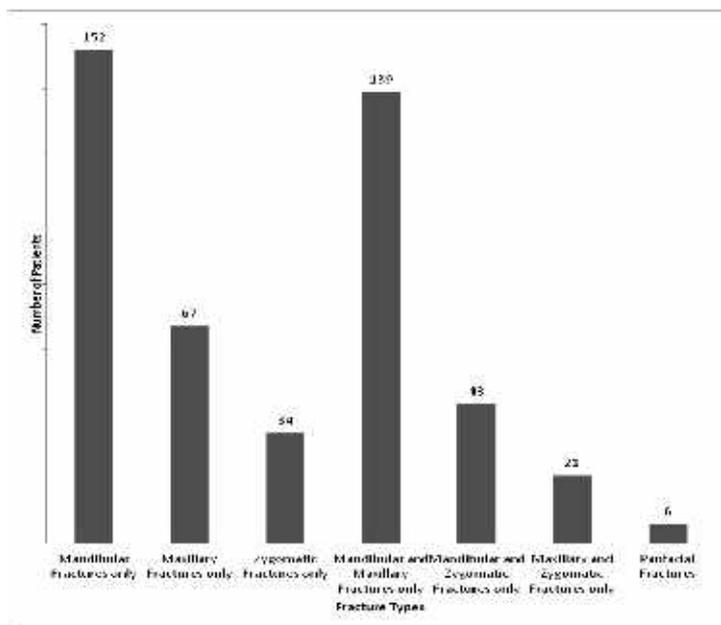


Figure 3: Combinations of Fractures Seen in the Patients. The single most fractured bone was the mandible and jaws fractures (mandible and maxilla) were the commonest combination.

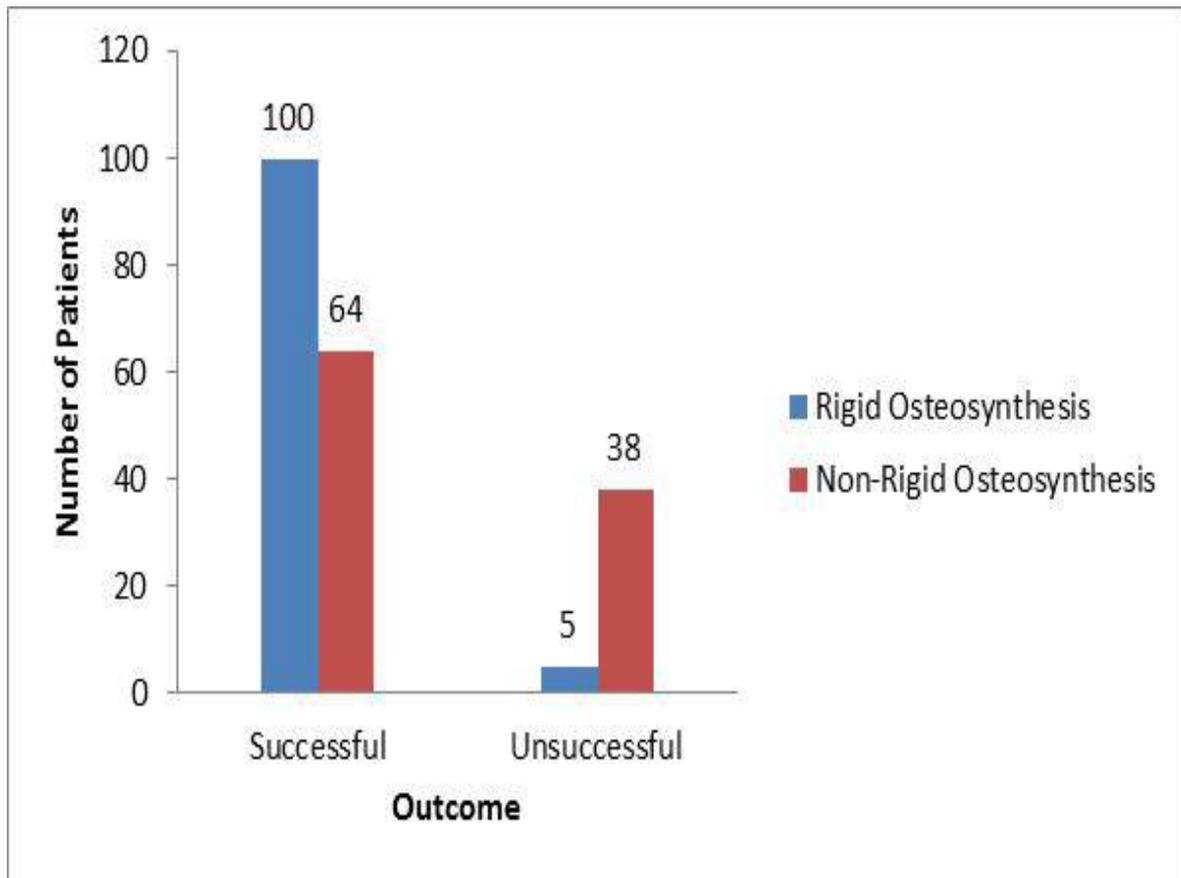


Figure 4: Treatment Outcomes. While there were 5 cases of unsuccessful outcome measures for the rigid osteosynthesis protocol, there were 38 for the non-rigid protocol ($P < 0.05$, $OR = 12$).

DISCUSSIONS

Maxillofacial trauma has remained a menace in the healthcare industry, contributing significant workloads in many maxillofacial units and stretching the meager human and material resources. This burden becomes readily appreciable when the socioeconomic effects and impact on the quality of life (QoL) of those afflicted are considered. Trials in laboratory animals suggests that when prudently used, titanium plates have a great deal of advantages over the traditional use of wires, including immediate/early restoration of functions; but these do not preclude its shortcomings which include higher expense, tooth sensitivity, infection, neurologic injury and root trauma⁶. The foregoing cannot over emphasize the need for audit, particularly of an emerging treatment protocol.

Findings of the audit reveals that the age range of patients were 5-69 years, mean (SD) equals 26.2 (0.4) years. Seventy-nine are females and a hundred and twenty-eight are males, giving a female to male ratio of 1:1.6. The incidence peaked in 21-30 age group (Table 1) consistent with the finding in a review by Adeyomo et al¹³ in 2005 and Furtado et al¹⁴ in 2009; but differs from the finding of Abiodun et al¹⁵ 2012, where a peak of 31-40 was recorded.

The finding of this audit is an involvement of more males than females. This is similar to findings in a World Health Organisation report in 2011¹⁶ and Ghaffarra et al¹⁷ and that of an earlier retrospective study in the same centre¹⁸. A higher male involvement is attributable to the fact that in our environment, men are often the primary bread winners of the family; tend to socialize more than the female folks and tend to remain outdoors for a large period of time, thus making them susceptible to

trauma in general and maxillofacial trauma in particular.

Half of the patients were educated to tertiary level (Figure 1). While the location of the area in an elite environment may have informed this, it brings to mind the loss in terms of human and material resources that accompanies maxillofacial trauma. The fact that motor vehicle accident is the commonest cause of injury among highly educated patients seems to suggest that factors not primarily related to the patients play significant roles in these accidents. These factors could be weather, terrain and possibly non availability of road signs to warn motorists of impending hazards.

The finding of road traffic accident as the commonest aetiology of maxillofacial fracture in this audit is in tandem with that of similar studies by Abiodun and co-workers in Abuja, central Nigeria¹⁵ and in other developing nations like india¹⁹. A lot of factors could be responsible and these range from use of illicit agents, through disregards for road signs and cautions to unfriendly weather and terrible terrains through which motorist navigate to reach their destinations.

The single most fractured bone is the mandible. One hundred and fifty-two, representing 32.9% of the four hundred and sixty-two defined fracture lines in the two hundred and seven patients studied were in the mandible. This could be ascribed to the prominent and mobile nature of the bone and also because of the inherent weakness conferred on it by the alveolar sockets. This finding is in consonance with findings of earlier studies in this environment^{13,20-24} and contradicts some account that reported the nose as the most fractured, of the facial bone²⁵. The use of plate system, from findings of

this audit appears superior to the use of stainless steel wire osteosynthesis, with about eight undesirable outcomes in the later protocol for every one recorded in former protocol. All unsuccessful outcome cases were re-treated with earlier protocol but information on outcome of retreatment was not explored in this study.

No study was available to the best knowledge of the authors to compare findings with; however bearing in mind, the costs of both protocols, and other possible confounding factors be they morbidity, economic, cultural, psychosocial or otherwise; the authors suggest a well-designed holistic comparative study of both protocols to serve as guide to decision making in the clinic and in policy designs.

ACKNOWLEDGEMENT

This paper was presented at the annual scientific conference of the School of Dentistry, College of Medical Sciences, University of Benin, Benin-city in August, 2012.

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