

# Evaluation of using ultrasound welding process of biodegradable plates for fixation of pediatric mandibular fractures

W.H. El-Saadany\*, A.A. Sadakah, M.M. Hussein, K.A. Saad

*Oral and Maxillofacial Surgery Dept., Faculty of Dentistry, Tanta University, Egypt*

Received 27 September 2014; revised 4 July 2015; accepted 12 August 2015

Available online 30 November 2015

## Abstract

**Purpose:** This study was planned to evaluate, both clinically and radiologically, the efficacy of using ultrasound based welding process by (Sonic weld Rx) for fixation of biodegradable plates in pediatric mandibular fractures. Patients and methods: This study comprised 8 patients, their ages ranged from (2) to (10) years with mandibular fractures treated with open reduction and internal fixation using poly-D and L-lactic acid (PDLA) plates by SonicWeld Rx through an intra-oral approach.

Preoperatively patients were examined clinically by inspection and palpation both extraorally and intraorally. Radiographic examination via orthopantomograph and computed tomography (CT).

Postoperatively patients were evaluated clinically immediately, at two weeks, and at one, three and six months. Radiographically by Panoramic radiographs immediately and at one, three and six months and Quantitative computed tomography (CT) after one and three months.

**Results:** The results revealed primary wound healing in six patients with no signs of infection or dehiscence and two patients exhibited scarring in the repaired wound, proper occlusion, postoperatively except one patient had minor occlusal discrepancies corrected by elastics and all cases showed stability of the fractured segments.

Radiographic examination for all patients at the different follow up periods statistically revealed significant bone healing.

**Conclusion:** We can conclude that Ultrasound based welding process by (Sonic weld Rx) for fixation of PLDLA plates and pins was effective in pediatric mandibular fractures.

© 2015, Hosting by Elsevier B.V. on behalf of the Faculty of Dentistry, Tanta University.

*Keywords:* Pediatric; Mandibular fracture; Biodegradable plates; Sonic weld Rx

## 1. Introduction

Mandibular fractures are the most common facial fractures seen in children represent 75–90%. The most

common mandibular injuries were condylar fractures 31%, body fractures 21%, fractures of the canine region 14%, dento-alveolar and angle fractures were 12%, while fractures of symphyseal region were 9.5%. Falls, sports-related injuries and road traffic accident constitute the most frequent causes of facial fractures in children [1–4].

The general principles of treatment do not differ essentially from those described for adults, but with

\* Corresponding author. Tel.: +20 1003366597.

E-mail addresses: [wesamelsaadany@yahoo.com](mailto:wesamelsaadany@yahoo.com) (W.H. El-Saadany), [sadakah@hotmail.com](mailto:sadakah@hotmail.com) (A.A. Sadakah).

Peer review under the responsibility of the Faculty of Dentistry, Tanta University.

children, certain problems associated with the anatomical development of the mandible and eruption of the teeth especially during mixed dentition period, also the lack of understanding and apprehension of the child makes co-operation with the operator difficult [5].

When formulating a plane of treatment for pediatric patients with facial trauma, a number of elements must be considered. These include the age of the patient (to maximize growth and development), the anatomic site (to optimize form and function), the complexity of the injury (displacement, comminution and the number of sites), the time elapsed since injury (ideal to treat within 4 days), concomitant injury (fitness for anaesthesia and duration of surgery), and the surgical approach (closed versus opened) [6].

Maxillo-mandibular fixation difficult to be used in children because of deciduous teeth may either be insufficient in number or their roots may be resorbed and permanent teeth may be incompletely erupted. The shape of the deciduous crown is also not favorable for retention of wires and splints, being bell-shaped with little undercut area [5]. Maxillomandibular fixation with closed reduction may not permit accurate anatomic reduction. Although nutrition and airway are concerns, child tolerance and subsequent compliance are the major drawbacks of this technique [6].

Internal metal fixation of mandibular fractures in children, however, can be complicated by a mixed dentition that can occupy the entire vertical dimension of the bone and places of the teeth and the inferior alveolar nerve at risk during screw insertion. In addition, on going development of the mandible poses risk of intrabony translocation of metal plates and screws, risking potential growth and teeth disturbances, difficulty with secondary removal if needed [7]. For these reasons, the use of resorbable fixation implants in developing facial bones is particularly appealing [8].

Biodegradable plates and screws are used increasingly in oral and maxillofacial surgery. These biodegradable plates and screws have several advantages over conventional titanium plates and screws including: no need for a second intervention to remove the devices, no interference with imaging or radio-therapeutic techniques, no possible growth disturbance and no thermal sensitivity [9].

However, the use of biodegradable plates and screws also has introduced several disadvantages: the bone holes need to be tapped before the screws can be inserted is time-consuming, the biodegradable plates and screws represent inferior mechanical strength and stiffness compared with conventional titanium plates and screws. To resolve these disadvantages, a new biodegradable osteofixation system, SonicWeld Rx has been developed [10].

A new biodegradable osteofixation system, SonicWeld Rx has been developed. In contrast to conventional osteofixation systems, tapping of the corticalbone layer is not necessary before inserting the SonicWeld Rx biodegradable pins. A biodegradable pin is placed onto an ultrasound-activated sonic electrode, called a sonotrode, and inserted into the bone-hole. As a result of the added ultrasound energy, the thermoplastic biodegradable pin will melt, resulting in a flow of biodegradable polymers into the corticalbone layer and the cavities of the cancellous bone. There is no cellular reaction due to thermal stress during insertion. The biodegradable plate and pin head fuse at the same time. Theoretically, the fusion of plate and pinhead will result in superior mechanical device characteristics in comparison with conventional biodegradable plates [11].

## 2. Patients and methods

Eight children with displaced mandibular fractures treated with open reduction and internal fixation, their

Table 1  
Clinical data of the patients involved in our study.

No.	Age	Sex	Etiology	Fracture site	No of plates used
1	7 y	Male	Sport accident	Left parasymphiseal	Two
2	2 y	Male	Fall	Right parasymphiseal	Two
3	7 y	Male	Fall	Right parasymphiseal	Two
4	5 y	Female	Fall	Symphiseal, right angle	Two
5	7 y	Male	R.T.A.	Left body	One
6	10 y	Male	R.T.A.	Right parasymphiseal	Two
7	8 y	Male	R.T.A.	Left parasymphiseal	Two
8	2 y	Male	Fall	Symphiseal, right condylar	Two

R.T.A. = Road Traffic Accidents.

Download English Version:

<https://daneshyari.com/en/article/3179623>

Download Persian Version:

<https://daneshyari.com/article/3179623>

[Daneshyari.com](https://daneshyari.com)