

# Evaluation of using microplates osteosynthesis for pediatric mandibular fractures

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## Abstract

**Objective:** The purpose of this study was to evaluate both clinically and radiographically using of two microplates in treatment of displaced pediatric mandibular fractures.

**Materials & methods:** This study included ten children had displaced mandibular fracture with age ranged between (4–11) years were treated using two microplates and microscrews through intraoral approach. All children were examined preoperative clinically and radiographically by panoramic view and computed tomography (CT) or lower occlusal view. All children were evaluated postoperative clinically at one week, one and three months for wound healing, occlusion, infection, nerve affection and stability of fracture and radiographically by panoramic view at second postoperative day, one and three months and by quantitative CT at one and three months to evaluate the accuracy of reduction and bone healing at fracture line.

**Results:** Clinically there were no complications in all cases overall follow up period except for two cases showing occlusal discrepancy treated with guiding elastics. Radiographic results showed that good alignment of fracture segments horizontally and vertically without displacement and significant increase in bone mineral density gain after one and three months.

**Conclusion:** Titanium microplates provide adequate stability for fracture segments in treatment of pediatric mandibular fracture. Low profile and malleability of microplates allow adaptation to mandible easily and minimize the possibility of trauma to teeth buds.

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**Keywords:** Pediatric; Mandibular fracture; Titanium microplates

## 1. Introduction

Excluding the nasal bones, the mandible is the most frequently fractured facial bone in the pediatric patient. One third of pediatric trauma patients with facial fractures have a mandibular fracture [1,2].

Less than 15% of all facial fractures occur in the pediatric population. They are very rare below the age of five (0.6–1.4). The incidence rises as children begin school and peaks during puberty and adolescence, with increased unsupervised physical activity and sports [3].

Boys are more commonly affected than girls in all age groups. The male predilection has been attributed to more dangerous physical activities among boys [4].

When planning treatment for fractures in children, the choice of therapeutic option depends on the

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

No	Age	Sex	Etiology	Fracture site	Direction of fracture displacement which fixed
1	11y	Male	RTA	Rt parasymphysial	Vertical
2	7y	Male	Falls	Lt parasymphysial and Rt intracapsular condylar	Horizontal
3	11y	Male	RTA	Rt parasymphysial	Horizontal
4	5.5y	Male	RTA	Symphysial	Vertical and horizontal
5	9y	Male	RTA	Lt body	Vertical and horizontal
6	6y	Male	RTA	Rt parasymphysial, Lt body and Lt subcondylar	Vertical
7	4y	Male	Animal kick	Lt parasymphysial and Rt body	Vertical and horizontal
8	6y	Male	RTA	Rt parasymphysial, Lt body and Lt subcondylar	Vertical and horizontal
9	7y	Male	Animal kick	Lt parasymphysial and Rt intracapsular condylar	Vertical and horizontal
10	4y	Male	Falls	Symphysial, bilateral subcondylar and Rt coronoid	Horizontal

RTA:- Road Traffic Accidents.

inherent characteristics of the fracture, the complexity, the patient age, the state of dental development and the associated injuries. Furthermore, one should consider other factors like the smaller size of the mandible in relation to the elasticity of the bone, possible injury in the mandibular condylar of the growth center, great osteogenic potential and rapid healing rates observed in these patients [5].

Pediatric mandibular fractures are treated by a wide variety of fixation methods such as acrylic splint with circummandibular wiring, intermaxillary fixation (IMF), transosseous wiring and internal fixation. Displaced fractures are better served by open reduction and internal fixation [6].

The primary and early mixed dentitions have numerous anatomic challenges associated with placement of IMF devices. The crowns of the teeth are short, squatty, and bulbous, and can be loose. In addition, replacement of teeth as a normal process of the succedaneous dentition leads to edentulous areas awaiting full eruption [7].

Later open reduction and rigid internal fixation (ORIF) has become the standard of care for management of displaced fractures. ORIF provides stable three-dimensional reconstruction, promotes primary bone healing, shortens treatment time and eliminates the need for or permits early release of IMF [8].

Microsystem for internal fixation of maxillofacial fractures was introduced because of a growing demand for smaller systems and the improved technical ability to produce them [9]. Microdimensioned osteosynthesis plates have the advantage that they can anatomically fix small bone pieces, which was not possible with the earlier wiring techniques or the larger miniplate systems [10].

These smaller plating systems could only be used where torsional forces from muscles of mastication would not disrupt the reduction [11]. Hardt and

Gottsauner [12] stated that microplates are often sufficient in children because of lesser torsional force applied on broken segments in children.

Microplate technique is performed with minimal effort, more convenient access and less stripping of surrounding periosteum. Their low profile and tiny screws decrease the chance of neurovascular injury so less postoperative paresthesia and possible damage to adjacent teeth [13]. They also decrease the interference with current imaging modalities such as radiography, magnetic resonance imaging or computed axial tomography [14].

The objective of this study was to evaluate using two titanium microplates in fixation of displaced pediatric mandibular fractures both clinically and radiographically.

## 2. Patients and methods

This study included ten children with displaced mandibular fracture. They were all males, their ages ranged from 4 to 11 years with a mean age of 7 years, (Table 1). The patients were selected from the Out-Patient Clinic of Oral and Maxillofacial Surgery Department, Faculty of Dentistry, Tanta University .

Five cases had displaced parasymphysial fractures case no. (1, 2, 3, 6 and 9) three cases had displaced body fractures case no. (5, 7 and 8) and two cases had displaced symphysial fractures case no. (4 and 10). All cases were treated using two 0.6 mm thickness titanium microplates<sup>1</sup> and 1.5 mm diameter center drive screws (4–7 mm) in length using a drill 1.1 mm in diameter.

Fracture of condyle and non displaced fracture were treated conservatively in all cases.

<sup>1</sup> KLS Martin co., Tuttlingen, Federal Republic of Germany.

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