



RESEARCH ARTICLE

ORTHODONTIC BRACKET SYSTEM AS MEANS OF TREATMENT OF TRAUMATIC  
MANDIBULAR FRACTURES: CASE STUDY

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ABSTRACT

Intermaxillary fixation is an essential part of treatment of fractures of the facial bones. The procedure ensures an adequate interrelationship of occlusive surfaces and is applicable for both the independent conservatively-orthopedic treatment and in the course of a surgical fixation (osteosynthesis) of jaw bones fragments as a compulsory component of pre-, intra- and postoperative management. The common and conventional methods of maxillomandibular splinting, and dental wiring techniques in particular, as well as the ligation of teeth have proven to be highly disadvantageous in terms of the severe damage of periodontal tissues, low hygiene, uneven load on chewing muscles, painful and stressful procedure overall. All these have urged the doctors to seek alternative methods of intermaxillary fixation. Present article is the case study and reports the results and outcomes of treatment of a bilateral traumatic mandibular fracture with orthodontic bracket system for a prolonged maxillomandibular immobilization. We analyse the benefits of a suggested method and compare it with conventional procedures of intermaxillary fixation.

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INTRODUCTION

Despite the current trend in maxillofacial surgery to treat mandibular fractures with, mainly, "rigid" or functionally-stable fixation of bone fragments with various fixation devices such as mini plates, compression screws or combination of both, conservative treatment with prolonged (up to 3-4 weeks) intermaxillary fixation still has a considerable share in treatment plans of traumatic mandibular fractures. Intermaxillary fixation ensures correct positioning of occlusive surfaces and immobilizing of a mandible, which is the main precondition for bone healing. However, conventional methods of maxillomandibular splinting, and dental wiring techniques in particular, as well as the ligation of teeth have proven to be highly disadvantageous in terms of the severe damage of periodontal tissues, low hygiene, uneven load on chewing muscles, painful and stressful procedure overall, which gives rise to the need for alternative methods of intermaxillary fixation (Lello et al, 1988; Thor et al, 2001).

Case report

The patient, G. (year of birth - 1989), referred to the the Department of Maxillofacial surgery of Lviv National Medical University on 08.08.12, with pain in mandible, especially when

eating/chewing or opening his mouth, numbness of a left corner of a lower lip and mouth bleeding. According to the case history, he was in the street fight the night before and got a strong blow into his face. After the clinical and radiological examination, he was diagnosed with "Traumatic open bilateral mandibular fracture; in the left angular area and right body area, without fragments displacement" (Fig.1). By the method of electric pulp testing we revealed also the partial loss of sensitivity in the 45th tooth which was located in the fracture gap. In accordance with the bioethic regulations, the patient signed the formal consent for a suggested treatment and was advised on the mouth hygiene procedures to be performed while in hospital and at home.

On 09.08.12 we performed the surgery on reduction and fixation of mandible bone fragments, under local anesthesia. In the course of the surgery we used brackets within the 16-26 and 35-46 teeth and sidelong intermaxillary elastics (rings) (Fig. 2). We used the brackets of Victory series with hooks (characteristics 0\* TQ, 0\*ANG, 022) of 3M Unitek (USA), which were fixed to teeth by a standard procedure (etching enamel, apply the adhesive, fix the brackets with light-curing material). Then the bracket was affixed with a series of 3 elastic layered O-arch wire ligatures (0,21-0,22 diameter) and elastic rings. The intermaxillary fixation itself was performed by means of connecting opposite bracket hooks with elastics in correct occlusal relationship.

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## Postoperative care

The patient was injected with painkillers on request (Analgin (Metamizole) 50%, 2 ml), he was prescribed with antibiotics (Dalacin C 300 mg, 3 times a day during 5 days), mouth wash with chlorhexidine solution. Follow ups were conducted on the 1,3,7,14,21,30 and 60 days after the fixation.



**Fig.1** Ortho-panoramic X-ray of the patient G., at initial examination. Diagnosed with "Traumatic open bilateral mandibular fracture; in the left angular area and right body area, without fragment displacement"



**Fig.2** Intraoral examination imaging. Patient G., with fixed brackets within 16-26 and 35-46 teeth and sidelong intermaxillary elastics



**Fig. 3.** Control ortho-panoramic X-ray taken 20 days after the surgery



**Fig. 4.** Patient G., occlusion on the day of detachment of brackets

## RESULTS

The post-operation period went without any complications. During the treatment we twice observed the detachment of brackets from the teeth surface, which had to be re-attached with light-curing material and did not influence the course of treatment in any way. The patient did not complain about any complications with hygiene maintenance neither in terms of the oral cavity nor bracket system. Control panoramic X-ray taken 20 days after the surgery did not visualize almost any fracture line (Fig.3). Bimanual palpation did not reveal any mobility of bone fragments; patient returned to normal occlusion (Fig.4). After detachment of brackets the patient had the vestibular teeth surface polish; he was prescribed with remineralization treatment. Electric pulp testing, conducted on the 20 day after the fixation, revealed that the 45 tooth (which was in the fracture gap) regained its sensitivity.

## DISCUSSION

The prototype of existing methods of mandibular fractures treatment with orthodontic elements can be seen as re-positioning and stabilizing of bone fragments with modified dental band splints which were fixed to the vestibular surface of teeth with adhesives (cements), first described in 1988 and later presented as findings of remote clinical studies, with the cohort of 127 patients with mandibular or alveolar ridge fractures and dental dislocation, with application of a standard band splint Lorenz Surgical (USA). (Baurmash *et al*, 1988; Baurmash, 1993). The use of non-removable orthodontic appliances of Liebinger system (Germany) for pre-operational fixation of bone fragments and intermaxillary immobilization was described by Dutch scientists in 1990.(Sindet-Pedersen *et al*, 1990). The methods of fixation to teeth surface was prototypical to those which are used in orthodontic practices and was done through the selection and adaptation of a relevant fragment of orthodontic titanium band splint, etching and air-drying of a vestibular tooth surface, adhesion of the splint with acrylic cement. Then the hooks were connected with the elastics or wire ligature. Those series of studies were followed by A.T. Smith, who, in 1993, described the methods of intermaxillary immobilization with modified orthodontic arch bar and elastomeric orthodontic chain, which differed from the above-mentioned only by the fact that after fixation of dental arch to teeth surface, the doctor "tied" jaws with orthodontic elastomeric chain, which is commonly used in

orthodontics for relocation of separate teeth by applying relevant torque to them. (Smith, 1993) The main advantage of the described method in accordance with the author, was the possibility to apply directed force to bone fragments and their compression by means of various chains and their torque.

### Conclusions

Use of non-removable orthodontic appliances for fixation of bone fragments in the course of treatment of traumatic mandibular fractures, in spite of quite limited range of clinical and radiological indications, can be seen as a potential alternative for current methods of intermaxillary fixation with all their downsides. Intermaxillary immobilization with bracket systems, under the condition of patient's following the protocol, facilitates the re-establishment of anatomical and functional status of a mandible. Also, due to the completely different positioning of fixating elements, it simplifies the hygienic procedures and has very inconsiderable influence on periodontium, does not require any anesthesia, is not painful, makes it possible to individualize the use of separate teeth groups for even occlusion load or vice versa- correct the occlusion through directed elastics.

Among main advantages of the suggested method, some authors point to time-efficiency of the procedure and minimal risks of cutting injuries for the operator.

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