

Advantages of intraoral osteosynthesis in jaw bones fractures



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Introduction

Intraoral osteosynthesis has established itself in recent years as a method for treatment of mandibular fractures and when it's indicated – for some fractures of the other facial bones. The reason for this, apart from the absence of surgical scar of the skin and the smaller surgical wound, is also the lower probability of nerve and blood vessels damage, accordingly – faster healing process.

Methods

1. Intraoral wire osteosynthesis

Lately, it has been almost displaced by plate osteosynthesis. It is more difficult to place, especially via intraoral approach – two bony surfaces must be presented (vestibular and lingual) and it doesn't have the necessary strong fixation to prevent fragments from displacement – especially in the cases with mandibular fractures. Therefore, it is recommended to drill four crossing holes, use thicker ligature wire (0,5–0,6 mm), as well as combine this method with additional intermaxillary fixation (IMF) for 3–4 weeks.

The mandibular symphysis and the frontal segments of mandibular body are suitable for intraoral approach. The method is appropriate for "fresh", mono-fragment, single fractures. After revealing the fracture, four holes per fragment are drilled onto the vestibular and lingual surface. The ligature wires must be placed as perpendicular to the fracture as possible and must be tightened after accurate reposition of the fragments. When drilling two holes per fragment, one wire is used - it is passed under the lower edge of the mandible in the shape of „figure-of-eight“. The ligature wires are not removed unless it's indicated.

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2. Intraoral fixation (indirect osteosynthesis)

Cerclage (from French „encirclement”, „hooping”, „banding”) – a wire ligature, indirect osteosynthesis, circumferential wire ligature.

It is used in oblique mandibular fractures, edentulous areas or edentulous mandible. In this method, with the help of a needle, two or more ligature wires are passed through closely to the mandible, vestibular and lingual, without removing the needle, and are tightened to the patient's prosthesis or to other device, made specifically for the purpose – dental splint, or plate, made from fast-polymerizing plastic. [1] It is suitable for treatment of fractures in kids because in other methods there is risk of damaging the germs of permanent teeth, also placing splints on temporary teeth isn't possible and this method is characterized with fast execution. Also, it's suitable for adults, especially with prosthesis, and can be administered with local anesthesia.

Suspension wiring („suspensorium” – from latin „bandage”; „specific bandage”). In this method one or two circumferential wire ligatures are attached to the lateral lower edge of piriform aperture or anterior nasal spine. We prefer the last one – to use one wire ligature. Due to insufficiently stable fixation the method has very narrow indications and is applied only when other methods are inapplicable.

3. Osteosynthesis with metal plates and screws

Plates and screws ensure sufficient stability of the fragments, which in most cases makes additional intermaxillary fixation redundant. The plates are made from titanium, chrome-nickel, molybdenum alloys and other highly tolerable biological materials. Both plates and screws are made of resorbable materials, which degrade after a certain period. After reponating the fragments, the plate is bent with specific instruments, in order to follow the contour of the mandible, and is placed onto the vestibular surface of the jaw bone, which is followed by drilling two or more holes on fragment and inserting the screws. The anterolateral regions of the mandible are operated intraorally, while the angle is operated through point incisions and requires using trocar, through which the jaw bone is drilled and the screws are inserted. Intraoral osteosynthesis of the mandibular rami is difficult, but fortunately these fractures are rare. As disadvantages

of the osteosynthesis with plates and screws are that they are not covered by the NHIF and in cases with multiple fractures the cost can be high. Other disadvantages are presence of activities, which are not closely related to the surgical operation – money transfer to bank accounts, transfer plates and screws through delivery companies, the lack of regular deliveries, etc.

4. Osteosynthesis with screws

Screws without plates can be used for fixation only in oblique mandibular fractures. The screws should be longer than usual and placed perpendicular to the fracture if possible, which is difficult to achieve via intraoral approach. There is a lack of sufficiently strong immobilization, which narrows the indications for use.

Intraoral osteosynthesis of maxillary fractures

It is used in fractures of the alveolar process, palatine bones, total fractures Le Fort type I and II (in some indications). Mini plates and self-tapping screws are designed for maxillary fractures – they can be placed without drilling.

It is not necessary to achieve osteosynthesis in all fracture lines, in the case of maxillary and zygomatic osteosynthesis, but only in the reference points – supraorbital rim, sutura zygomaticomaxillaris, apertura piriformis.

Intraoral wire osteosynthesis

Intraoral wire osteosynthesis has less frequent application. The craniofacial osteosyntheses are an exception – ligature wires are attached to the maxilla and healthy bones of the facial or skull skeleton. The Lesney method can be considered as an intraoral method when used for fractures from type I and type II. In the latter, using a needle, wires are passed superior and inferior to the zygomatic arch and are taken out in the oral cavity, followed by tightening on previously placed splint or on the upper molars bilaterally. [2]

Intraoral osteosynthesis of zygomatic fractures

Even though it's applicable in some indications, currently it does not find wide practical application.

Discussion

A total of 34 patients with jaw bone fractures are treated in the last year (from August 1, 2022 till August 1, 2023) in our ENT clinic at UMHAT „D-r Georgi Stranski”, 23 from whom with mandibular fractures and 11 with fractures of the cheek bones and maxilla. 6 patients with mandibular fractures are treated on an outpatient basis – all of whom with standard dental splints and elastics for one month. Also 4 patients in the neurosurgery department and 1 patient in the orthopedic department with cheek bones and maxillary fractures were treated surgically.

From the mentioned above, only 2 patients were not operated with the method of intraoral osteosynthesis – the first patient was treated with wire osteosynthesis due to fracture in the mandibular angle and the second one with extraoral osteosynthesis in order to achieve proper fragment reposition due to the multifragment fracture. In all patients nasotracheal intubation was used. In all patients, standard dental splints were placed preoperative or intraoperative – in order to achieve proper osteosynthesis of the fragments intraoperative and postoperative bite adjustment with elastics. The elastics are held for 7 days, while the dental splints are removed after the 20th day if there are no complications.

Things are a bit different for the maxillary fractures – we have 3 cases with total fractures type I, in which intraoral osteosynthesis was used – bilateral, using mini plates. In these cases, with maxillary fractures, we usually place standard dental splints and elastic fixation for around 1 week. In the majority of cases of zygomatic and maxillary fractures extraoral approach was applied – using mini plates, placed in the region of superior and inferior orbital rim, or Milton Adams technique for craniofacial osteosynthesis.

Conclusion

In conclusion, we can point out that intraoral osteosynthesis, especially the one using titanium plates, has established itself as a main method of treatment of almost all mandibular fractures. The disadvantage of the method is the lack of visual control during fragments reposition, which makes the method hardly applicable in fractures of the mandibular ramus and multifragment fractures.

Some of the disadvantages of the method are using specific toolkit and consumables, which are not covered by the NHIF, encountering difficulties when transferring money via bank transfer to the importing company, returning back the invoice to the delivery company, the irregular plate supply, etc. Surgeons with less experience encounter difficulties applying this type of osteosynthesis. We should not give up on using extraoral osteosynthesis, regardless of the fear of leaving a big skin scar in the mandibular angle region or the fear of facial nerve damage. When there are enough indications, however, intraoral osteosynthesis is the first choice of approach.

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