MANDIBULAR FRACTURES

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Abstract: *After the nose, the mandible is the second most commonly fractured facial bone. A mandibular fracture is one of the most common facial fractures necessitating treatment. Additionally, the mandible's mobility and its role in mastication, swallowing, and speech make the surgical management and rehabilitation of the mandibular fractures difficult. The mandible articulates with the skull base at the paired temporomandibular joints and is suspended by a complex ligamentous and neuromuscular apparatus. Because of this unique, bilateral articulation with the skull base and the vector of forces contributing to mandibular trauma, a bilateral fracture pattern is commonly observed. The anatomic components of the mandible include the symphysis, parasymphysis, body, angle, ramus, coronoid process, condyle, and alveolus. Anatomic locations with an increased risk for fracture include the third molar area (especially if the third molar is impacted), the mental foramen region, and the condylar neck.*

Cuvinte cheie: *fractură, mandibulă, traumatism, chirurgie,articulație*

Rezumat: *Dupa nas, mandibula este al doilea cel mai frecvent os al fetei fracturat.Fractura de mandibula este una dintre cele mai frecvente fracturi faciale care necesită tratament. În plus, mobilitatea mandibulei şi rolul său în masticație, înghițire, şi vorbire face realizarea chirurgicală şi recuperarea fracturilor de mandibulă dificilă. Mandibula articulează cu baza craniului la nivelul articulațiilor temporomandibulare şi este susținută de către un aparat complex ligamentar şi neuromuscular. Din cauza acestei articulații unice, bilaterale cu baza craniului şi vectorul forțelor care contribuie la traumatismul mandibulei o fractură bilaterală este frecvent observată. Componentele anatomice ale mandibulei includ simfizele,parasimfizele, corpul, unghiul, ramura, procesul coronoid, condilul, şi alveola. Localizarile anatomice cu un risc crescut de fractură includ zona molarului 3(mai ales daca este afectat al treilea molar), regiunea foramenului mental, si colul condilului.*

INTRODUCTION

Biomechanically, the mandible can be considered a cantilever beam. The beam is suspended at two points, which represent the temporomandibular joint (TMJ) attachments. The muscles of mastication produce forces that act on this beam, and the teeth act as fulcrums. In the mandibular body and angle, forces produce zones of relative tension or distraction along the superior border and compression along the inferior border. Mandibular tension-compression stress distribution is more complex than a simple cantilever beam, however, and stress distribution can vary dramatically, depending on the magnitude and point of force application. In the symphyseal area, the situation is more complicated when the mandible is viewed and tested as a three-dimensional model. Compression is produced at the upper border, and tension and torsional forces exist along the lower border. These three-dimensional stress relationships are important to understand, because tension and compression forces dictate the type of fixation applicable to a particular fracture.

Pain and mal-occlusion after a blow to the lower face strongly suggest mandibular fracture.Additional symptoms include anesthesia or paresthesia of the lower lip and chin caused by trauma to the inferior alveolar nerve as it courses through the mandibular canal. Fractures of the symphysis-parasymphysis and body can be accompanied by hematoma in the floor of the mouth, palpable tenderness, altered sensation, laceration of the attached gingiva adjacent to the teeth, or loss of normal facial contours. Mobility of fractures in these locations is often identified with palpation. Trismus is a relatively common finding with mandibular fractures, but it also occurs after zygomatico-maxillary complex fractures and with facial contusions without evidence of fracture. The maximal interincisal opening (MIO) of a patient with a mandibular fracture can measure 35 mm or less secondary to muscle splinting or impinging fragments. The lower limit of normal for MIO in a healthy adult is 40 mm.

MATERIAL AND METHOD

These fractures necessitate antibiotic prophylaxis starting as soon as possible after the injury as well as intraoperatively. Topical oral antiseptics also help minimize the bacterial inoculum of the fracture site. Marked displacement of jaw fragments is uncomfortable, impairs oral hygiene and alimentation, and grossly soils the exposed bone with bacteria-laden saliva. Although delay of fracture repair for a short duration does not markedly increase the infection or complication rate, consideration of patient comfort and prolonged environmental exposure warrants timely intervention.

Most favorable fractures in adult patients can be managed by means of closed reduction with arch bars or other means of intermaxillary fixation (IMF). Considerable variation among experts exists regarding the length of fixation time necessary for adequate union. Four to six weeks of intermaxillary fixation is generally considered appropriate for the symphysis, angle, and body. The duration of IMF for condyle fractures differs widely. Some believe that no IMF is needed; others believe in occlusal guidance with the use of arch bars and elastics, whereas others argue that a full 6 weeks of IMF is necessary (2). A period of 4 to 6 weeks of IMF, however, can lead to poor range of motion or ankylosis at the TMJ with

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associated muscle atrophy and loss in interincisal opening (2). Weight loss, poor oral hygiene, and impaired social interaction are other considerations. Although controversy still exists in some areas, closed reduction techniques are still commonly used for grossly comminuted mandible fractures, fractures lacking adequate soft tissue coverage, fractures in children involving the developing dentition, and in many types of condylar fractures. Simply stated, closed reduction should be utilized for cases in which an open reduction is either not indicated or is contraindicated (3).

Internal fixation can be classified as being rigid (reconstruction plates, compression plates, lag screws), semirigid (miniplates), or nonrigid (interosseous wires). Most rigid and semirigid techniques obviate prolonged IMF. This is an especially important consideration among patients with epilepsy, diabetes, alcoholism, psychiatric disorders, or severe disability, who may not tolerate IMF. Rigid or semirigid internal fixation requires more hardware and greater cost. More extensive periosteal stripping and more manipulation of soft tissues are also required. Because more holes have to be drilled, a higher incidence of damage can occur to the teeth and nerve injury in inexperienced hands (4).

The classic indication for open reduction and rigid internal fixation is inability to reduce or stabilize the fracture with a closed technique. Other indications include associated condylar fractures, IMF is either contraindicated or not possible, to preclude the need for IMF for patient comfort, and to facilitate the patient's return to work or other activities. The fundamental principles of rigid internal fixation include accurate anatomic reduction, stable internal fixation, early mobilization, and careful tissue handling with preservation of the neurovascular supply.

In comminuted and infected fractures, large reconstruction plates using 2.4-mm or 2.7-mm screws are considered . Reconstruction plates ideally require placement of at least three to four screws on the stable portions of the mandible adjacent to the fracture. Locking reconstruction plates retain their yield load, yield displacement, and stiffness even when imprecise contouring to the bone has occurred, whereas nonlocking reconstruction plates demonstrate significant differences in these factors even with as little as 1 mm of displacement from the bone (7). For this reason, many now prefer the use of locking reconstruction plates to avoid the introduction of unwanted displacing forces during open reduction or internal fixation of the fracture as well as the possibility of loosening of hardware with resultant complications.

DISCUSSIONS

Recently, endoscopic techniques have allowed excellent reduction and repair of a subcondylar fractures using an intraoral incision, extraoral trocars, and a mandibular plate with at least two screws in the proximal segment.

Results of research on the efficacy of resorbable rigid fixation materials may soon provide head and neck surgeons with an ideal mandibular fixation device. Resorbable fixation of mandibular fractures is an attractive option in the treatment of pediatric mandibular fractures and is currently under investigation.

CONCLUSIONS

Almost all fractures of the mandibular angle are unfavorable and necessitate open reduction. Bilateral fractures of the mandibular body, especially in edentulous patients, can allow the anterior arch of the mandible to fall posteriorly and obstruct the airway. When malocclusion is detected immediately after open reduction with rigid fixation, revision surgery usually is needed to correct the error in fragment alignment.

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Table no. 1. Options of treatment for the adult patients

The fracture¢s spot	Reducere deschisă cu fixare internă	Closed reduction	Observations
Mentonier symphiseal and the parasymphiseal area	Inferior plates and wire ligature Inferior fixation or the nonfixation of the mandibular plate of 2,0 mm and the tension band at the superior limit monocortical microplates of 2,0 mm (8) Two screws (9)	Is not a good option	Is not a good option
The mandibular body	Inferior plate and wire ligatures Plates of reconstruction with inferior fixation or no fixation at all. Two microplates of 2,0 mm	Is not a good option	Is not a good option
The mandibular angle	One microplate malleable plased at the superior limit (11) Two monoplanar or biplanar microplates (12)	Is not a good option	Is not a good option
The ram and condyle of the Mandibles	A microplate of 2,0 mm	Wire ligatures with elastic guide strencht and physiotherapy	If it is unilateral,it is not replaced with normal oclussion