

Osteosynthesis of condylar process: methods and indications

Gor Zalyan

Department of Surgical Dentistry, Yerevan State Medical University, Armenia

ABSTRACT

Mandibular fractures, accompanied by condylar process injuries are the most difficult from the viewpoint of their diagnostic and treatment. Such kind of fractures are quite common, especially in combination with mandibular body injuries of different localization. The orthopedic and surgical treatment indications of the above-described fractures have not been detected in literature. Inadequate treatment of condylar process fractures leads to serious post-traumatic complications such as TMJ arthro-arthritis, ankylosis, false joint etc. In the present work a thorough analysis of methods of condylar process osteosynthesis and their usage indications are given.

KEYWORDS: *osteosynthesis, condylar process, mandible, fracture*

Treatment of patients suffering from condylar process fractures is one of the hardest tasks in maxillofacial surgery. It could be explained by high frequency of fractures with given localization, shifting of fractures due to effects of blow and traction of masseter muscles. The latter is the heaviest injury and treatment of such kind of fractures is much more difficult.

Of all mandibular fractures, 45% are the double fractures (Y.I. bernadski 1973, 1985; B.D. Kabakov, V.A. Malishev 1981). According to the data of these authors, among double fractures of mandible, 41% are presented by fractures of mandibular body and condylar process.

Different position of surgeons concerning the treatment methods at such kind of fractures often leads to unjustified traumatic methods of treatment (osteosynthesis, replantation, alloplasty in the region of mandible branches) or incomplete - conservative therapy with further complications (open bite, lateral occlusion, disorder of motor function of mandible, arthritis etc.). In special literature, absence of concrete data describing rational methods of treatment of patients with double-sided fractures complicates usage of these methods in clinical practice.

According to the group of authors, indications for operational treatment of patients with double-sided mandibular fractures, one of them localized in the region of condylar process, is limited and rare (B.D. Kabakov, V.A. Malishev 1981; O. Herfert 1961; Weiskorf 1967).

Relatively good results of orthopedic treatment allowed some physicians to remark against surgical methods of treatment of patients with the above-mentioned fractures (A. Kalza 1961; N. Brandt, C. Brandt 1969).

Along with that, many authors prefer only surgical method of treatment – osteosynthesis (K.S. Malikov, A.A. Pulatov 1975; Y.D. gershuni 1986; W.R. Koberg 1978). According to these authors, double-sided fractures of mandible in the region of condylar process and mandibular body are the direct indication for osteosynthesis despite localization and degree of fragments' shifting.

Proceeding from the aforesaid it is clear that there is disunity in choice of treatment methods of double-sided mandibular fractures. All of the above-mentioned has served as the major reason for our investigations.

MATERIAL AND METHODS

Material for investigation was thorough analysis of special literature, archive material of more than 200

patients underwent treatment course in our clinic from 1992 to 1999 years. Of 28 patients who were under observation, 25 were men and 3 women with the age range from 5 to 62 years.

Patients were subjected to clinical, laboratory and X-ray examinations. On the basis of these investigations the diagnosis of double-sided mandibular fractures in the region of condylar process has been stated.

DISCUSSION

First of all we would like to discuss in details the methods and diversity of osteosynthesis being used in the region of condylar processes of mandible

The simplest method of osteosynthesis is the method of placing of wire suture. It is technically easy performed and reliably fixing that does not require special instruments and equipments however, usage of this method is possible only in case of low-positioned fractures of condylar process.

Although, the more steady and firm, than bony suture, fixing of fragments provide metal plates on screws and plats, this method has not been used widely due to its hard fixing technique and necessity of repeated surgical intervention for removal of plate. This method has not been used in case of high-positioned fractures as well.

With development of chemistry of polymers, in case of surgical treatment of condylar process fractures for fixing the agglutinative materials have been used. The glue, under the name "Osteoplast" has been elaborated for connection of bony fragments without suture. The method of bones' agglutination is known as "Chemical osteosynthesis".

Further works and experience have shown the negative sides of chemical osteosynthesis. The side effects were manifested by destructive changes developed in bone tissue as a result of hemocirculatory disorders at the ends of fragments agglutinated with osteoplast. Moreover, the osteoplast practically does not dissolve in tissue and as the foreign body results in formation of aseptic granuloma.

With development of surgical techniques, methods of fixing of bony fragments in case of condylar process were improved. First in our country V.I. Lukianenko (1957) used metal rod and Kirschner steel wire. However, intraosteal insertion of wire in articular process is quite difficult due to insufficiency of spongy substance and possible axial rotation of small fragments. Although, many authors have

processed this method, it had not been used widely due to its technical difficulties.

In the latest decade, with development of metal physics, creation of miniaturized apparatus for compression treatment of mandibular fractures supporting process of regeneration of bone tissue is possible. Has been stated that compression itself does not stimulate process of regeneration of bone tissue. For shortening of time needed for reparative regeneration of bone, first of all conditions of complete immobilization, perfect reposition of fragment, their close contact and compression are necessary.

Has been elaborated lot of methods and apparatus for compression osteosynthesis however, in case of condylar process fractures, they were quite massive, heavy and operational intervention – traumatic due to agglutination of large areas of bone tissue.

From this point of view, more acceptable are various stirrups that are applied using the sewing device. They are “П”-like steel or tantalum stirrups, elaborated by M.I. Jadovski. They have rectangle sections and thorns of sphenoid form. The width of stirrups – 16-18 mm, length – 6-10 mm. These stirrups have no negative effects on bone tissue and provide exact mechanical fixation of fragments.

I.J. Karapetyan used apparatus for sewing of fragments with metal stirrups made of chrome- cobalt alloy. Ends of these stirrups have close resemblance with fishing hook. The apparatus allows producing sufficient compression and then sewing bones with stirrups maintain close contact of fragments.

In case of fractures, A.P. Yanovski has suggested the method of osteosynthesis using “П”-like stirrups with attenuated titanic legs. At this method periosteum detaches from inner and outer surfaces and fragments put together. With matched nozzle the hole is applied and with the use of elaborated apparatus stirrups are placed either two - in parallel each other, or crosswise.

The above-listed stirrups are quite miniatures, but their placing apparatus have great size and consists of enormous details; are inconvenient and uncomfortable in use, requires great operational field. Moreover, stirrups don't provide continues compression of mandibular fragments' edges. That's why, fragments are not completely immobilized and there is no fast consolidation of fragments respectively.

V.K. Polenichkin (1986, 1987, 1989 years) has suggested fixer. We use these fixers in everyday practice. Advantages of these nickel-titanium fixers against traditional are: portability (low weight), technical aesthetics, maintenance of compress efforts required for support of stable mutual resistance of healing bony fragments throughout the treatment period, absence of necessity for screwing, usable at condylar process fractures of any localization, and simplicity at usage.

RESULTS

The results of investigations have shown that condylar process fractures are of following localizations:

1. Fracture of process head (intra-articular fracture) – 1 patient
2. Fracture of process neck – 16 patients

3. Fracture of condylar process basis – 12 patients (All of these fractures were combined with mandibular fractures of different localization)

Proceeding from the variety of fractures and our observations the following indications for osteosynthesis in the region of condylar process has been determined:

1. Fractures in the region of neck or basis of condylar process
2. Fractures with obvious shifting of condylar process
3. Complete or incomplete (absence of molars) adentia, which resists and interferes with orthopedic methods of treatment.
4. Olden fractures with shifting in the region of articular process and mandibular body
5. Impossibility of putting together and fixation all of three fragments of mandible at such kind of fractures; i.e. if fragments of fracture fix in the region of dentition with the use of over-teeth plate, the effort of reposition of condylar process fracture with the use of linings leads to shifting of mandibular body fragments.
6. When treatment of articular process fracture with the use of linings does not provide good fixation of fragments that eventually leads to arthrosis, arthritis etc.

Osteosynthesis at high intra-articular fractures of condylar process is practically impossible. In case of intra-articular fractures, intra-capsular hematomas are expected, which in turn organizes and lead to union of articular surfaces. That's why patients are immediately subjected to active mechanotherapy.

As for fractures without shifting, they don't require operational interventions. They need only reliable fixation with the use of over-teeth plates.

Patient DDD, 22 year, applied to maxillofacial surgery department in 23.04.2004 with diagnosis - double side fracture of mandible in the region of dentition on the right and condylar process (neck) on the left with shifting. Clinically were expressed facial asymmetry at the expanse of disordered bite, painful and restricted opening of mouth till 2,0 cm. At palpating observation through the external auditory passage the movement of articular head on the right side was not detected. The articular region on touch was painful. Lateral movement of mandible was impossible. On X-ray film the significant shifting of fragments (1,0 cm) in the region of condylar process was detected that prevented orthopedic treatment with the use of over-teeth plates.

Patient was subjected to operation – double sided osteosynthesis. Next day after operation patient underwent to the mechanotherapy with physiotherapy. On the 7th day after operation sutures were removed. Wound healed by first intention. In postoperational period mandibular function was restored.

CONCLUSION

According to the aforesaid could be concluded that treatment of fractures accompanied with condylar process injuries requires individual approaches of treatment and depends on localization of fracture, character of fragment shifting, presence of teeth state and time passed from the moment of fracture.

REFERENCES:

1. Матропс-Таранец И.Н., Калиновский Д.К., Алексеев С.Б., Дадонкин Д.А. – Новые методы оперативного лечения переломов мышечного отростка нижней челюсти // Журнал «Травма», Украина №2, т. 1, 2000
2. Lindahl – Condylar fractures of the mandible. I Classification and relation to age, occlusion and concomitant injuries of teeth and teeth-supporting structures, and fractures of the mandibular body // Int. J. Oral Surgery, 1977, 6:2-21
3. Koberg WR., Momma WG. – Treatment of fractures of the articular process by functional stable osteosynthesis using miniaturized dynamic compression plates // Int. J. Oral Surgery, 1978; 7:256-62
4. Sargent L., Green J. – Plate and screw fixation of selected condylar fractures of the mandible // Ann. Plast. Surgery, 1992; 28:235-41

Остеосинтез мышечного отростка: методы и показания

Гор Залян

кафедра хирургической стоматологии Ереванского государственного медицинского университета, Армения

РЕЗЮМЕ

Переломы нижней челюсти, сопровождающиеся повреждением мышечного отростка, являются наиболее сложными с точки зрения их диагностики и лечения. Подобные переломы встречаются довольно часто, особенно в сочетании с повреждением тела челюсти различной локализации. В литературных источниках отсутствуют четкие показания проведения ортопедических и хирургических методов лечения данных переломов. Неадекватное лечение переломов мышечного отростка приводит к таким осложнениям как развитие артрозо-артритов, анкилозов ВНЧС, развитию ложного сустава и т.д. в данном исследовании приводится подробный анализ методов остеосинтеза мышечного отростка, а также показания его применения.

Ключевые слова: остеосинтез, мышечный отросток, нижняя челюсть, перелом

□ International committee of medical journal editors. Uniform requirements for manuscripts submitted to biomedical journals. Ann Intern Med 1997;126:36-47.

The following general observations may help editors and others dealing with this problem.

Differences in Analysis or Interpretation

Journals would not normally wish to publish separate articles by contending members of a research team who have differing analyses and interpretations of the data, and submission of such manuscripts should be discouraged. If coworkers cannot resolve their differences in interpretation before submitting a manuscript, they should consider submitting one manuscript containing multiple interpretations and calling their dispute to the attention of the editor so that reviewers can focus on the problem. One of the important functions of peer review is to evaluate the authors' analysis and interpretation and to suggest appropriate changes to the conclusions before publication. Alternatively, after the disputed version is published, editors may wish to consider a letter to the editor or a second manuscript from the dissenting authors. Multiple submissions present editors with a dilemma. Publication of contending manuscripts to air authors' disputes may waste journal space and confuse readers. On the other hand, if editors knowingly publish a manuscript written by only some of the collaborating team, they could be denying the rest of the team their legitimate coauthorship rights.

Differences in Reported Methods or Results

Workers sometimes differ in their opinions about what was actually done or observed and which data ought to be reported. Peer review cannot be expected to resolve this problem. Editors should decline further consideration of such multiple submissions until the problem is settled. Furthermore, if there are allegations of dishonesty or fraud, editors should inform the appropriate authorities.

The cases described above should be distinguished from instances in which independent, noncollaborating authors submit separate manuscripts based on different analyses of data that are publicly available. In this circumstance, editorial consideration of multiple submissions may be justified, and there may even be a good reason for publishing more than one manuscript because different analytical approaches may be complementary and equally valid.

Members of the International Committee of Medical Journal Editors: Linda Hawes Clever, Western Journal of Medicine; Lois Ann Colaanni, U.S. National Library of Medicine; Frank Davidoff, Annals of Internal Medicine; Richard Glass, JAMA; Richard Horton, The Lancet; George Lundberg, JAMA; Magne Nylenna, Tidsskrift for Den Norske Ilegeforening; Richard G. Robinson, New Zealand Medical Journal; Richard Smith, BMJ; Bruce P. Squires, Canadian Medical Association Journal; Robert Utiger, The New England Journal of Medicine; Martin Van Der Weyden, The Medical Journal of Australia; and Patricia Woolf, Princeton University.