

# Treatment of mandibular subcondylar fractures by open reduction and internal fixation

Selim ÇELEBİOĞLU, Abdulmuttalip KESER, Ömer ŞENSÖZ,  
Ahmet YAZICI, Ali Teoman TELLİOĞLU, Uğur KOÇER

2<sup>nd</sup> Plastic and Reconstructive Surgery Clinic, Ankara Numune Hospital, Ankara, TURKEY

*Open reduction of condylar neck fractures is a contentious issue. The majority of these fractures have been treated conservatively. There are, however, specific situations, where open reduction is indicated. In our clinic, from 1992 to 1994, 22 mandibular subcondylar fractures were surgically reduced. 14 patients from this group were located for follow-up at an average interval of 3 months. In this paper, our clinic experiences as to open reduction and their results presented. [Turk J Med Res 1995; 13(6):204-209]*

Key Words: Fractures, Internal fixation, Mandibule

Processus condylaris is the one of the anatomically weak portions of mandible and its fractures are common. Condylar fractures had been treated conservatively previously and successful results had been documented radiologically in children and adolescents (1-5). Meanwhile, some surgeons had insisted on open reduction and they had reported that surgical treatment was necessary in some specific conditions as displacement of caput condylaris out of glenoidal fossae, and they had classified absolute and relative indications for open reduction in every age groups (6-10). Thus, the treatment of condylar fractures are controversial and it had been discussed for sixty years (11) and there has not been reached a solution, yet. But there is a growing interest to the method of open reduction and internal fixation, because of having some advantages as, no need maxillo-mandibular fixation (MMF), saving temporomandibular joint (TMJ) functions, and giving a correct anatomical reduction. Our results of open reduction and internal fixation in 22 cases for last two years have been discussed in this article.

## MATERIALS AND METHODS

22 cases of mandibular subcondylar fractures were treated by the method of open reduction and internal

fixation in in the 2<sup>nd</sup> plastic and reconstructive surgery department in Ankara Numune Hospital between 1992 and 1994. Nine patients were women and 13 patients were men. Mean age was 27 years (6-70 years). All of fractures were unilateral and seven patients had multiple fractures in mandible or other bones of their faces (Table 1). The main cause of fractures were car accidents.

Fractures were evaluated panoramic mandible and Towne graphy. Fractures localised above of a line crossed to the level of deep point of sigmoid to the ramus were accepted as subcondylar fractures. Open reduction and internal fixation method was applied to the fractures displastic, dislocated or deviated deeply. In upper and middle level fractures of condyl we used preauricular incision. In lower level fractures of condyl, we used one of the preauricular, intraoral and sub-mandibular incisions and reached to the fracture line. At the beginning, we tried to make osteosynthesis by wire, but, it was quite difficult to pass the wire in a limited area of the fracture, as mentioned before by some authors (6,12). We made rigid fixation by using mini-plate-screw having four hole in 22 cases (Figure 1). Arch-bar wire was applied to the patients before operation in order to stabilize the jaw closed during the fixation procedure. When there had been another fractures, first of all these fractures fixated by using plaque screw, and then, condyl fracture was manipulated. Distal fragment was retracted downward by using a hook inserted angulus mandibulae or lower side of the fragment and, the proximal fragment of the condyl was positioned anatomically. Mini plaque having four hole was inserted on the proximal frag-

Received: July 7, 1995

Accepted: Oct 31, 1995

Correspondence: Selim ÇELEBİOĞLU  
Ankara Numune Hospital, 2<sup>nd</sup> Plastic  
and Reconstructive Surgery Clinic

*This study had been reported in the XVI<sup>th</sup> Turkish Plastic and Reconstructive Surgery Congress*

**Table 1.** The analyses of patients which open reduction were applied and followed up

Case	Age/Sex	Concomittant fracture	Incisions	Fixation	Complications
1	70/M	symphysis	intraoral	plaque-screw	
2	38/M	symphysis angulus, zygoma	intraoral	plaque-screw	cross-bite
3	25/M	—	submandibular	plaque-screw	—
4	35/F	symphysis	preauricular	plaque-screw	—
5	6/M	—	preauricular	plaque-screw	—
6	34/M	symphysis, ramus	intraoral	plaque-screw	—
7	36/M	maxilla	preauricular	plaque-screw	—
8	16/F		submandibular	plaque-screw	transient paralysis in marginal mandibular nerve, and partial resorption in proximal segmen infection
9	27/M	—	intraoral	plaque-screw	transient paralysis in frontal nerve
10	30/F	—	preauricular	plaque-screw	—
11	19/F	zygoma	preauricular submandibular	plaque-screw	—
12	23/M	—	preauricular	plaque-screw	—
13	28/M		preauricular	plaque-screw	transient paralysis in frontal nerve
14	55/M	—	preauricular	plaque-screw	—

ment by two screws. After then, the jaw was occluded by retracting rubbers circulating Arch-bar wires and the distal two hole of the plaque were screwed on the distal fragment. Hence, the fixation procedure was completed. The incision was closed anatomically and covered by gauze with compression. Arch-bar rubbers were taken off in the 1 to 3 day postoperatively and started to mastication exercises.

The patients were followed by panoramic mandible and Towne graphies in a tri-month-period. Eight patients couldn't followed. During the control examinations; the patients were evaluated by the view of; maximal mouth opening, protrusion or lateral movement range of the jaw (fixated, limited, normal), occlusion complication of the jaw (as; open bite, cross bite), injury of the facial nerve or its branches, pain and click in temporomandibular joint, resorption of proximal segments in panorex graphy and subjective complaints of the patients.

## RESULTS

Fourteen of 22 patients could had been followed regularly. Eight patients were excluded from this study for inadequate follow up. The postoperative follow up results were listed in Table 1. There was a little limitation of mouth opening in the early postoperative period in some patients. But, a maximum mouth opening over 36 mm had been reached by making jaw exercise in all patients in a 8 week period. Normal mouth opening range is 36-38 mm (13).

There was no complete loss of protrution and lateral movement of jaw in any patients. There was a

little limitation in all patients but this was not causing any complaint. An excellent jaw occlusion have been reached in all patients (Figure 2,3) but only in one bearing multiple mandible fractures. A cross-bite occlusion deficient developed in this patient. A transient loss of function of facial nerve had occurred due to compression and traction in three patients. A transient paralysis developed in two patients approached preauricular incision in the frontal branch of facial nerve and in one patients approached submandibular incision, in the marginal mandibular branch of facial nerve. But all kind of functional losses disappeared and normal functions came back. This was corrected with electromyographic studies. There was no pain in

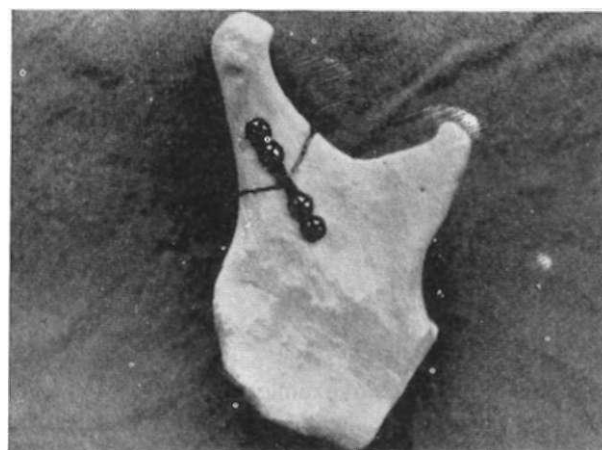
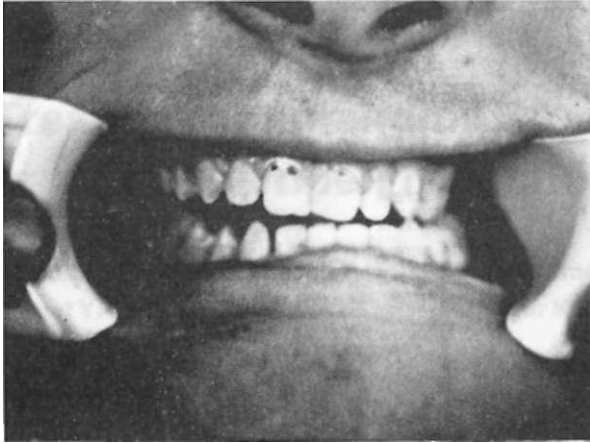
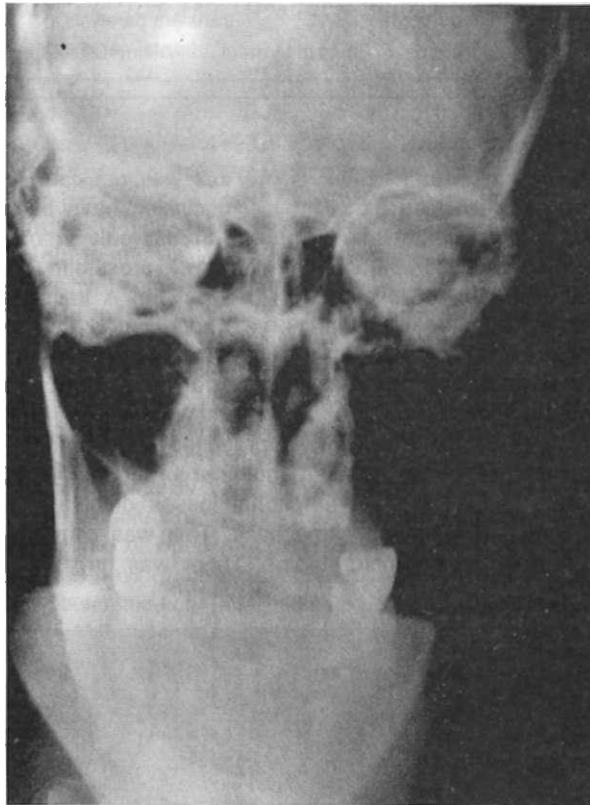


Figure 1. The sample of fixation with four hole-mini-plaque screw.



**Figure 2a.** Occlusion deformity due to subcondyl fracture of mandible.



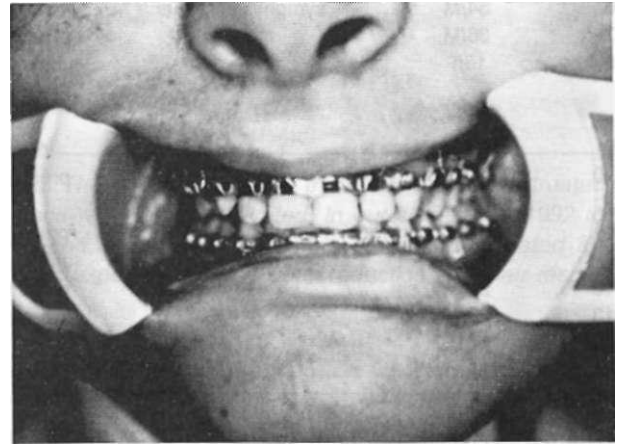
**Figure 2b.** Radiological appearance of fracture in the same patients by townes graphy.

temporomandibular joint in all patients and there was also no crepitation in examination. In one patient, there was a partly resorption in proximal segment, at in panorex graphy. Infection occurred in one patients approached intraorally in the postoperative period and it took more time then one week.

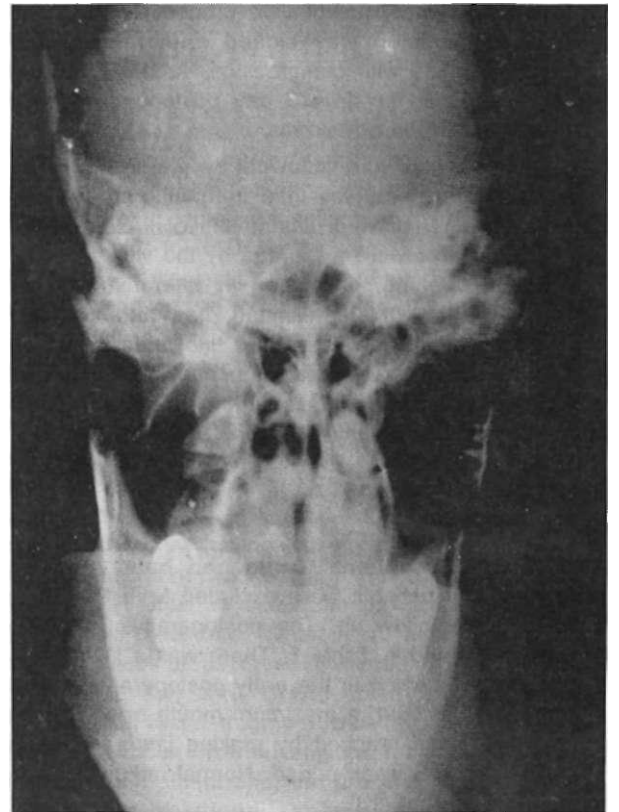
The patients aged 6 years was reoperated for the drainage of the abscess and the plague was taken off in the third month of postoperative period.

## DISCUSSION

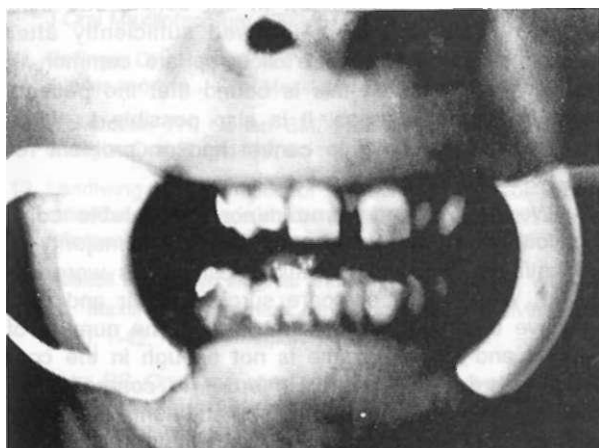
It is essential to define the fractures before starting the treatment in subcondylar fractures of mandible. The diagnosis of the fracture localisation and the degree of



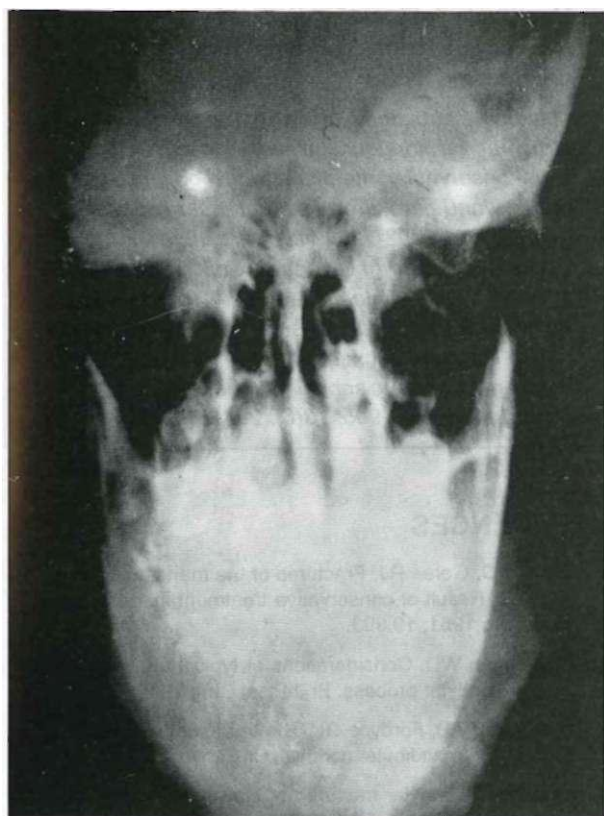
**Figure 2c.** Immediate postoperative appearance. Normal occlusion.



**Figure 2d.** Radiological appearance of fracture fixated with mini plaque screw.



**Figure 3a.** The appearance of limited opening due to left subcondyl fracture of mandible.



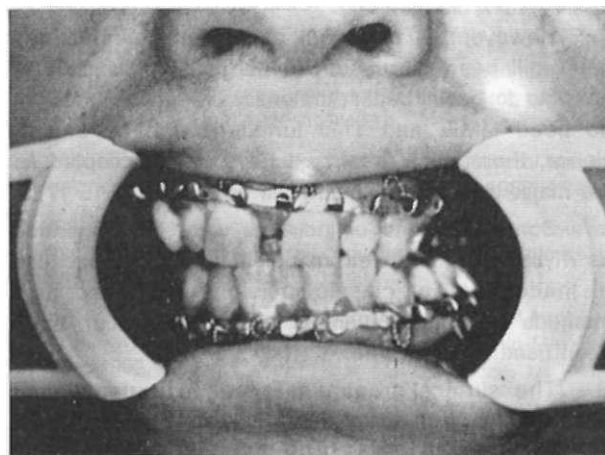
**Figure 3b.** Radiological appearance of the fracture in the same patients by tomne grahy.

deformity is important to make a correct decision for the treatment and incision line. Subcondylar fractures are defined as below: The fractures between a line starting sigmoid sulcus and reaching to the middle of ramus mandibulae, and the joint capsule are considered subcondylar fractures (14). But in spite of this definition, it is not easy to discover the division of subcondyl and ramus. This area are divided upper, middle

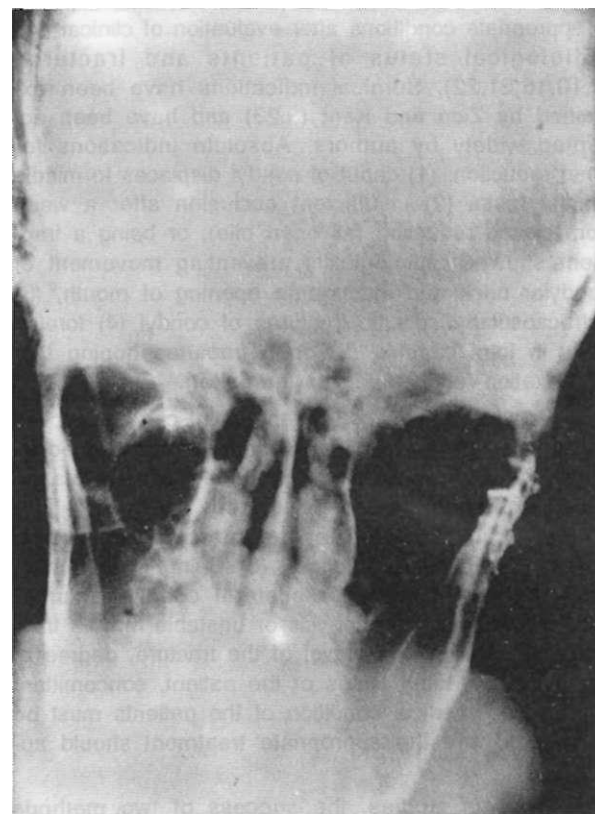
*Turk J Med Res 1995; 13 (6)*

and lower parts. If the open reduction is necessary; It was reported that; preauricular incision was suitable for upper part fractures and intraoral or submandibular incisions were suitable for middle or lower parts fractures (9).

We used preauricular incisions for the three levels fractures and there was no difficulty. These frac-



**Figure 3c.** The immediate postoperative appearance of a patients. Normal occlusion.



**Figure 3d.** Radiological appearance of a fracture fixated with mini plaque-screw.

tures were also classified according to the degree of deformity as deviated (angulated), displaced and dislocated fractures. The ends of fracture contact to each other but there is an angulation in the deviated fractures. In the displastic fractures, the ends slide but the caput of condyl is still in glenoid fossa. In the dislocated fractures, the caput of condyl is out of the fossa. Open reduction were recommended for angulation over 45 degrees, severe displastic fractures and dislocated fractures (9).

However the treatment of subcondylar fractures have still been discussed, in surgical approach it is possible to get a better anatomical reduction, there is no need MMF, and TMJ functions can be saved. Hence, the surgical treatment have been accepted as the major choice for subcondylar fractures (12,15-17).

Some new kind of incisions were recommended as rhytidectomy and retromandibular incision, because of inadequacy of classic incisions (18), and new methods for rigid fixation as lag screw fixation have been used (19).

The surgical treatment needs experience and concentration. The facial nerve and its branches must be saved from any injury. The reduction and fixation of fracture ends with plaque, screw or wire is difficult (6,12,20). For this difficulty, many surgeons are not desirous for surgical repair and they prefer conservative methods. But, surgical repair should have applied in appropriate conditions after evaluation of clinical and radiological status of patients and fractures (9,10,16,21,22). Surgical indications have been explained by Zide and Kent (8,23) and have been accepted widely by authors. Absolute indications for open reduction: (1) caput of condyl displaces to middle cranial fossa (2) insufficient occlusion after a week from closed reduction (as open bite), or being a fragment showed radiologically preventing movement of condylar neck and inadequate opening of mouth, (3) extracapsular displastic fractures of condyl (4) foreign body in joint capsule (5) open fractures hoping that rigid fixation reduces fibrosis (gun shot).

Relative indications: (1) any splint can not applied for the reason of alveolar wedge atrophy in edentulous or partial dentulous mandible with displastic caput condyl, or absence of any splint, (2) The patients can not tolerate the intermaxillar fixation period (epileptics, alcoholics), (3) Being concomittant fractures as unilateral or bilateral condil fractures, pieced fractures of symphysis or unstable maxilla fractures. In addition; age, level of the fracture, degree of the deformity, teeth status of the patient, concomittant injuries and medical condition of the patients must be considered and the appropriate treatment should applied.

In some studies, the success of two methods have been compared and no differences was found (24,25). But postoperative follow up time of these

studies were not enough (9). In our series; one third of patients couldn't have followed sufficiently after operations. The difficulty of follow up are common in the literature (17) and this is bound that the patients came from distant areas. It is also possible to think, the patients not comig to control had no problem related to fracture.

We have found some minor, acceptable complications in followed patients. But, in the majority of the patients, clinical and radiological results were excellent. We couldn't compare surgical repair and conservative treatment results, that is why, the number of patients and follow up time is not enough in the conservative treatment group. In order to compare two method, we need more patients and long follow up time and it is impossible to answer many questions till randomized and controlled prospective studies would have been performed.

#### **Mandibula subkondil kırıklarının açık redüksiyon ve internal tespit yöntemi ile onarımı**

*Mandibula subkondil kırıklarının açık redüksiyonu tartışmalı bir konudur, bu kırıkların büyük çoğunluğu konservatif yöntemlerle tedavi edilmiş ve açık redüksiyonu gerektiren özel durumlar bildirilmiştir. Kliniğimizde 1992-1994 yılları arasında 22 mandibula subkondil kırığı vakasında açık redüksiyon ve intemal tespit yöntemi ile tedavi uygulandı. Bu hastalardan ondördü üçer ay aralıklarla takibe alındı. Bu yazıda açık redüksiyon ve internal tespit uygulamalarımız ve sonuçları değerlendirildi. [Turk J Med Res 1995; 13(6): 204-209]*

#### **REFERENCES**

1. Blevins C, Gores R.J. Fractures of the mandibular condyloid process: Result of conservative treatment in 140 patients. J Oral Surg 1961; 19:393.
2. MacLennan WD. Considerations of typical fractures of mandibular condylar process. Br J Plast Surg 1952; 5:122.
3. Macgregor AB, Fordyce GL. The treatment of fracture of the neck of the mandibular condyle. Br Dent J 1957; 102:351.
4. Lindahl L. Condylar fractures of the mandible III. Positional changes of the chin. Int J Oral Surg 1977; 6:166.
5. Dahlstrom L, Kahnberg KE, Lindahl L. 15 years follow-up on condylar fractures. Int J Oral Maxillofac Surg 1989; 18:18.
6. Cesser E.J. A simplified method for fixation of the fracture mandibular condyle. J Oral Surg 1972; 30:442.
7. Zecha J.J. Mandibular condyle dislocation into the middle cranial fossa. Int J Oral Surg 1977; 6:141.
8. Zide MF. Open reduction of mandibular condylar fractures: Indications and techniques. Clin Plast Surg 1989; 16:69.
9. Klotch DW, Lundy LB. Condylar neck fractures of the mandible. Otolaryngol Clin North Am 1991; 24:181.

10. Hayward JR, Scott RF. Fractures of the mandibular condyle, *J Oral Maxillofac Surg* 1993; 51:57.
11. Bellinger DH, Henny FA, Peterson LW. Fracture of the mandibular condyle. *J Oral Maxillofac Surg* 1943; 1:48.
12. Richardson TH, Cohen BM. Fractures of the mandibular condyle. *Oral Surg* 1953; 6:1149.
13. Landtwing K. Evaluation of the normal range of vertical mandibular opening in children and adolescents with special reference to age and stature. *J Maxillofac Surg* 1978; 6:157.
14. Haskell R. Applied surgical anatomy. In: Rowe NL, Williams JL. Maxillofacial injuries. Newyork: Churchill Livingstone 1985;1-42.
15. Shira RB. Open reduction and internal rigid fixation of subcondylar fractures via an intraoral approach. *Oral Surg Oral Med Oral Pathol* 1991; 71:257.
16. Takenoshita Y, Oka M, Tashiro H. Surgical treatment of fractures of the mandibular condylar neck. *J Cranio-Max-FacSurg* 1989; 17:119.
17. Songur E, Gencosmanoglu R, Ulgen 6. Surgical treatment of subcondylar fractures of the mandible. *Eur J Plast surg* 1989; 12:255.
18. Ellis E, Dead J. Rigid fixation of mandibular condyle fractures. *Oral Surg Oral Med Oral Pathol* 1993; 76:6.
19. Krenkel C. Axial 'anchor' screw or 'slanted-screw' plate for osteosynthesis of fractures of the mandibular condylar process. *J Cranio-Max-Fac Surg* 1992; 20:348.
20. Stewart A, Boverman E. A technique for control of the condylar head during open reduction of the fractured mandibular condyle. *Br J Oral Maxillofac Surg* 1991; 29:312.
21. Habel G, O'Regan B, Hidding J et al. A transcoronoidal approach of fractures of the condylar neck. *J Cranio-Max-Fac Surg* 1990; 18:348.
22. Macarthur CJ, Donald PJ, Knowles J et al. Open reduction-fixation of mandibular subcondylar fractures. *Arch Otolaryngol Head Neck Surg* 1993; 119:403.
23. Zide MF, Kent JN. Indications for open reduction of mandibular condyle fractures. *J Oral Maxillofac Surg* 1983; 41:89.
24. Konstantinovic VS, Dimitrijevic B. Surgical versus conservative treatment of unilateral condylar process fractures. *J Oral Maxillofac Surg* 1992; 50:349.
25. Hitting J. Surgical versus nonsurgical treatment of fractures of the articular process of the mandible. *J Cranio-Max-Fac Surg* 1992; 20:345.