Journal of Cranio-Maxillofacial Surgery (2005) **33**, 169–179

doi:10.1016/j.jcms.2005.01.008, available online at http://www.sciencedirect.com

The periauricular transparotid approach for open reduction and internal fixation of condylar fractures

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SUMMARY. Introduction: **Treatment of fractures of the mandibular condyle fractures varies among centres as there still is no general consensus. The aim of this paper was to determine the safety and efficiency of surgical treatment using a transparotid approach for direct plating.** Patients and methods: **A prospective clinical study was conducted on 34 patients with 36 fractures of the condyle. All 36 fractures were displaced, and 14 (39%) of them were fracture dislocations. The fractures were treated surgically with a transparotid facelift or retromandibular approach using miniplates and screws for fixation. Patients were carefully followed up and were asked to answer a survey paper 2–39 months postoperatively.** Results: **Occlusion practically identical to the pretraumatic condition was achieved in 31 out of 33 dentate patients (94%). Postoperative interincisal distance was 30–61 mm (mean 44 mm), 4 patients (12%) had postoperative deflection to the side of injury during mouth opening. Facial symmetry was achieved in all of the patients. Eight out of 36 cases (22%) had a transient weakness of certain ipsilateral facial muscle groups, lasting for 4–8 weeks. In one of these patients, a mild weakness of the upper lip and lower eyelid persisted after 13 months. There were 5 cases of miniplate fractures (14%), all of them in patients in whom 1.7 or thinner miniplates were used. There were 5 cases of salivary fistulae (14%), all of them in patients where the parotid capsule was not closed in a watertight fashion. According to the postoperative survey completed by 32 patients, 30 of them (94%) were very satisfied with the outcome of treatment.** Conclusion: **If conducted properly, the transparotid facelift approach offers a safe and effective approach for direct fixation of condylar fractures. © 2005 European Association for Cranio-Maxillofacial Surgery**

Keywords: **Maxillofacial injuries; Condyle fractures**

INTRODUCTION

Few facial fracture treatments have been the subject of so much disagreement as that of the fractured mandibular condyle. Debates have been continuing for six decades with no general consensus as yet (*Takenoshita* et al., 1990; *Konstantinović* and *Dimitrijević*, 1992; *Hayward* and *Scott*, 1993; *Smets* et al., 2003). Advocates of conservative treatment consider the risks and morbidity of the surgical procedure too great to justify the procedure. They claim that the application of intermaxillary fixation (IMF) for approximately 3 weeks and mouth opening exercises afterwards achieve good results (*Takenoshita* et al., 1990; *Konstantinović* and *Dimitrijević*, 1992). Advocates of surgical treatment, on the other hand, argue that only precise open reduction and internal miniplate fixation can prevent unwanted long-term effects – shortening of the ramus, facial asymmetry, arthrosis of the temporomandibular joint (TMJ) and impaired masticatory and articular function. Rehabilitation is quicker with surgical treatment, enabling the TMJ and muscles of mastication to function normally faster (*Anastassov* et al., 1997; *Choi* and *Yoo*, 1999; *Devlin* et al., 2002).

The reasons behind this long-standing discussion are many, but probably the most important one is the complicated surgical procedure, as injury to branches of the facial nerve has to be avoided. The facial nerve exits the cranial base through the stylomastoid foramen, travels anteriorly towards the posterior rim of the mandibular ramus and then passes over its lateral aspect where it branches into several rami (*Ellis* and *Zide*, 1995a and b; *Anastassov* et al., 1997). The nerve branches have to be identified, dissected and retracted out of the surgical field. The fact that the facial nerve and its branches are within the parotid gland makes this procedure even more demanding. After the fracture site is exposed, reduction can be another serious problem, especially in medially displaced fracture dislocations, where the joint capsule is torn and the lateral pterygoid muscle exerts unopposed traction on the condylar head, displacing it medially out of the glenoid fossa.

Another reason is the healing capacity of the fractured condyle – pseudoarthroses only occur when there is no contact of the fractured bone fragments. As long as there is bony contact with the ramus, the condyle heals with bony union. As the TMJ is a loose hinge joint, the patient can tolerate quite a substantial degree of shortening and angulation (*Konstantinović* and *Dimitrijević*, 1992). In children, the condyle has a great capacity of remodelling even a severely angulated condyle into a functionally adequate articular process (*Dahlstrom* et al., 1989; *Takenoshita* et al., 1990; *Strobl* et al., 1999; *Güven* and *Keskin*, 2001). In adults, there is but little remodelling capacity, and the angulation and shortening often leave the TMJ permanently distorted (*Dahlstrom* et al., 1989). In due course, features of joint dysfunction can occur: clicking and crepitations within the TMJ, difficult and painful mouth opening, ipsilateral deflection of the mandible when opening, pain upon loading, arthrosis of the contralateral joint, as well as development of facial asymmetry.

For each fractured condyle, the decision about the mode of treatment has to be made individually (*Hayward* and *Scott*, 1993). A narrow set of absolute indications was advocated by *Zide* and *Kent* in 1983. These absolute indications, however, are clinical situations very rarely seen in practice. With evolving surgical techniques and the introduction of titanium miniplate osteosynthesis, the set of indications became wider. In every individual case of condylar fracture, there are several factors one has to consider: degree and direction of displacement, level of fracture, position of the condylar head in relation to the glenoid fossa, patient age, dental status, accompanying fractures of the facial skeleton, potential to obtain a good occlusion, and the patient's general condition (*Hayward* and *Scott*, 1993).

The goal of this prospective clinical study was to determine the efficacy and safety of surgical treatment of condylar fractures, as well as to describe the most common complications.

PATIENTS AND METHODS

In the period from June 2000 until September 2003, 34 patients with 36 extracapsular condylar fractures were treated with open reduction and internal fixation using miniplates and screws. There were 21 male (62%), and 13 female (38%) patients, range 14–64 years. The fractures were at the level of the condylar neck in 10 cases (28%), and subcondylar in 26 cases (72%). All the fractures were displaced, 14 of them (39%) being fracture dislocations, with the condylar head out of the glenoid fossa, and 22 (61%) displaced but not dislocated. Fractures were caused by assault in 11 cases (31%), bicycle accidents in 9 cases (25%), falls in 9 cases (25%), car accidents in 5 cases (15%) and sports accidents in 1 case (3%). In 11 patients (29%), the condylar fracture was isolated, 20 patients (59%) had accompanying fractures of the mandible (of these, 3 had a fracture of the contralateral condyle), and 3 (9%) had an accompanying fracture of the zygoma. The average delay between fracture and surgery was 4.6 days.

The criteria for surgical treatment and inclusion in this series changed with time. First, patients with less than 5 mm shortening of the ramus and less than 30° angulation at the fracture site were not considered for surgical treatment, but were treated with intermaxillary fixation for 3 weeks, and on a soft diet and exercises thereafter. Later, all condylar fractures in adult patients were operated upon, except high intracapsular fractures and undisplaced fractures. The reason for this were the good results and much shorter rehabilitation time in operated patients. Furthermore, fractures that appeared mildly displaced on radiographs had shown quite severe displacement upon open inspection.

Techniques

1. Diagnostics

After taking the patient's history and physical examination, radiological imaging of the mandibular ramus and condyle was performed. The following diagnostic images or combinations were used:

(a) orthopantomogram + mandible p.a. (or Towne's view); or
(b) oblique mandibular views bilaterally + mandible p.a. (or Towne's view); or
(c) CT scan (of the mandible).

Using any of these three imaging methods, complete information about the level and type of fracture, as well as degree and direction of displacement in all three dimensions, was obtained.

2. Surgical procedure

With the patient in general anaesthesia and nasotracheal intubation, skin markings were made for a periauricular facelift incision (Fig. 1). It was found to be easier to start with the retroauricular part of the incision, lifting a skin flap almost to the lobule with sharp dissection. At this stage, care is needed not to damage the greater auricular nerve. The preauricular part of the incision was performed up to the zygomatic arch. At the level of the tragus, the skin incision (point A in Fig. 3) can be placed pre- or posttrageally, to the depth of the retinacula cutis (point B). When joining the pre- and retroauricular incisions, the skin flap was elevated with sharp transsection in the plane of the retinacula cutis, to about 1 cm in front of the posterior rim of the ramus (points B to C).

For the retromandibular approach, the skin was incised just below the earlobe, with the incision continuing caudally, parallel to the posterior edge of the ramus for about 3 cm (Fig. 2). Here, the skin was also incised to the depth of the retinacula cutis (points A to B in Fig. 3), and then the dissection carried anteriorly in the same plane (points B to C). The subcutaneous dissection was thus practically identical in both approaches, albeit wider when using the facelift approach.

The SMAS and underlying parotid fascia were incised (point D), parallel and 5 mm anterior to the posterior rim of the ramus. As soon as the globular parotid tissue started emerging from the fascial

Fig. 1 – Facelift-transparotid approach. Periauricular skin incision (– – – and · · ·), area of subcutaneous undermining in the retinacula cutis plane (grey shade), and SMAS/parotid capsule incision (– · – · –).

Fig. 2 – Retromandibular transparotid approach. Retromandibular skin incision (– – –), area of subcutaneous undermining in the retinacula cutis plane (grey shade) and SMAS/parotid capsule incision (– · – · –).

incision, blunt dissection with a haemostat was employed, parallel to the anticipated direction of the facial nerve branches. The tough parotid septa

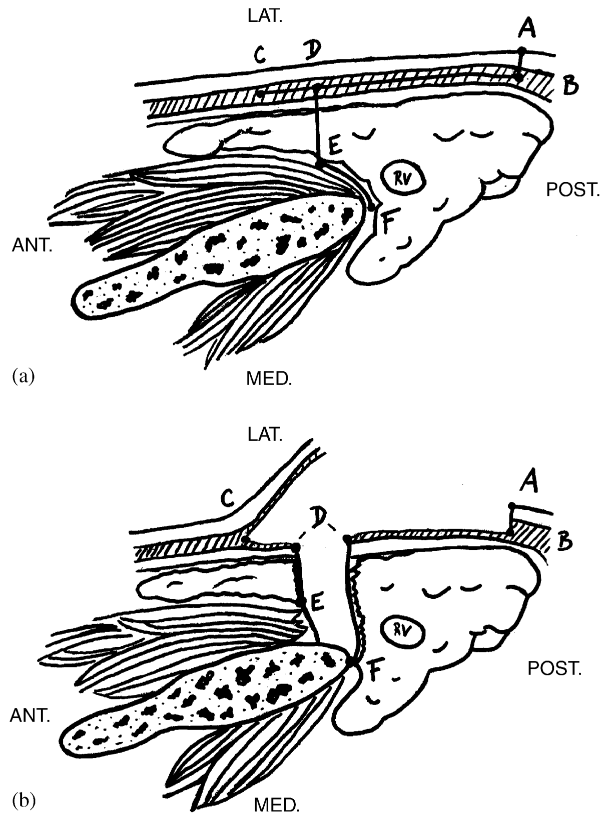

Fig. 3 – Cross section sketch of transparotid approach – right-sided ascending ramus superior to lingula. Layers of skin, retinacula cutis, SMAS and parotid capsule are shown, as well as the parotid gland, the masseter and lateral pterygoid muscles. (a) Plan of dissection; (b) dissection completed. A – point of pretragal skin incision; B to C – anterior subcutaneous dissection in the retinacula cutis plane; D – point of SMAS and parotid capsule incision; E – point of encountering masseter muscle; E to F – posterior dissection on the surface of masseter muscle; F – point of incision of pterygomasseteric sling; RV – retromandibular vein within parotid gland.

were divided with bipolar cautery, as they contain blood vessels.

When branches of the facial nerve were encountered (usually at least 5 mm deep to the parotid fascia) they were dissected anteriorly for about 10–15 mm and posteriorly for about 5–10 mm, which enabled retraction of the branches with very little tension. Beneath the retracted nerve branches, the masseter was soon encountered (point E). The dissection was now carried posteriorly, to the posterior rim of the ramus, and in this way, the retromandibular vein (RV) was avoided, as it was retracted posteriorly within the parotid parenchyma. The pterygomasseteric sling was incised on the posterior rim of the ramus (point F), and periosteal elevators were used to expose the fracture site. The fracture was reduced by pulling down the ramus, an assistant exerting traction on the mandibular angle with the aid of a transcutaneous bone clamp and/or digital pressure on the posterior molars (Fig. 4). At the same time, the surgeon manipulated the condyle

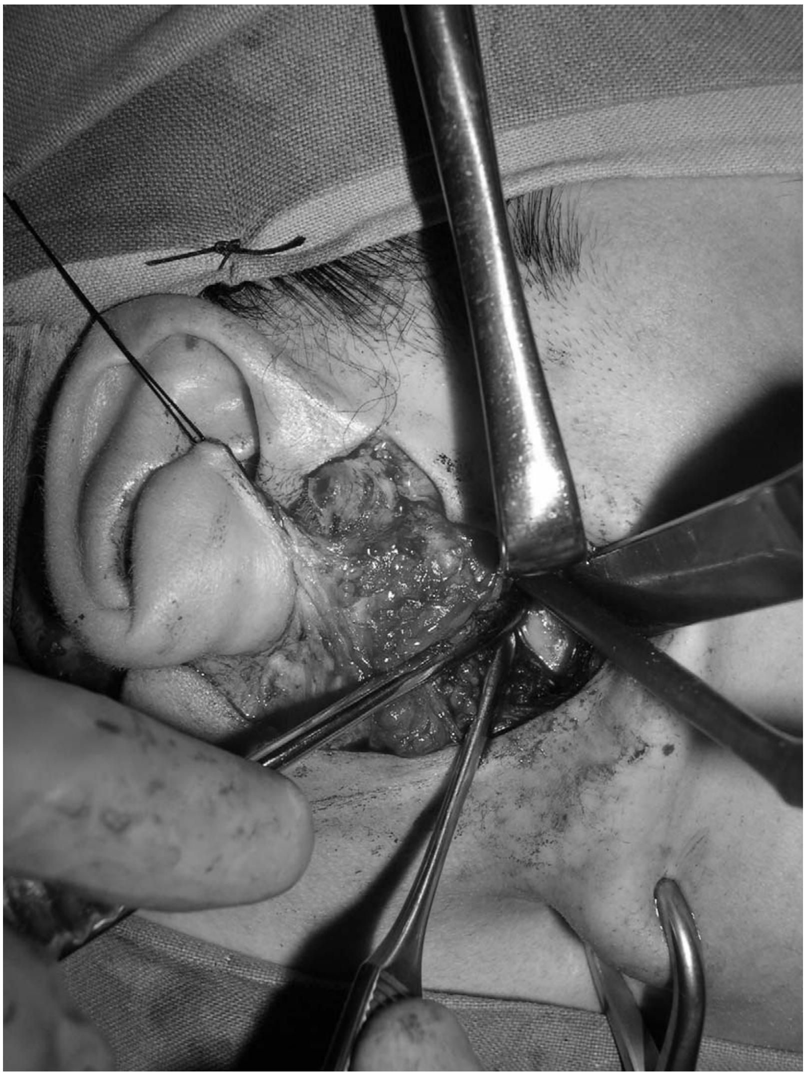

Fig. 4 – Surgical approach to condyle, skin flap lifted above SMAS, auricle retracted with suture. SMAS and parotid capsule incised, and parotid tissue with dissected facial nerve branches, as well as masseter muscle, retracted, enabling direct inspection of fractured condyle. Transcutaneous bone clamp used for traction at the mandibular angle (male patient aged 19 years).

back into its place. When reduction was achieved, the condyle was fixed with one or two titanium miniplates and monocortical screws (Fig. 5). Occlusion and mobility of the joint were checked.

The surgical field was then irrigated and inspected, followed by meticulous haemostasis. The pterygomasseteric sling was reconstructed using resorbable polyglactic 3/0 sutures. Branches of the facial nerve were carefully inspected. The parotid fascia and SMAS were repaired with a single ‘watertight’ running suture using polyglactic 3/0 or 4/0 sutures, to reduce the risk of a salivary fistula. Suction drainage was placed in the subcutaneous layer, and subcutaneous sutures were placed using polyglactic 4/0 sutures. The skin was closed using simple or continuous non-resorbable monofilament polypropylene 5/0 or 6/0 sutures. Postoperative IMF was not applied and arch bars, if present from the preoperative period, were removed.

3. Postoperative care and follow-up

Postoperatively, patients were recommended to take a soft diet for 4–6 weeks. They were immediately encouraged to practice mouth opening and closing. Check radiological imaging was performed, using the same views as preoperatively (Fig. 6). Drains were removed 1–3 days postoperatively, and patients were usually discharged 3–5 days postoperatively. Sutures were removed 7 days postoperatively. Subsequently, patients had regular follow-up checks 1, 3 and 12 months postoperatively (Figs. 7 and 8).

Final examination and survey

The following parameters were checked: maximal interincisal opening, lateral deflection, occlusal status compared with pretraumatic occlusion, joint tenderness (at rest, upon opening, loading or palpation),

Fig. 5 – Reduction of right-sided fracture dislocation complete, osteosynthesis with two 2.0 mm miniplates and screws in place. Zygomatic branch of facial nerve visible under cranial retractor. Fracture line visible (same patient).

palpable clicking or crepitus in the affected joint. Postoperative complications, i.e. facial nerve palsy, salivary fistula, auricular anaesthesia, wound infection, haematoma formation and miniplate fracture were also noted. Finally, patients were asked to state their overall satisfaction regarding the course and outcome of treatment. The final examination and survey were carried out on 32 of the 34 operated patients (94%).

RESULTS

In 31 (94%) out of 33 dentate patients from this series, the original, pre-injury occlusion was achieved (Fig. 9). This was assessed clinically by inspecting abraded surfaces of the teeth, as well as subjectively by the patients. The 2 patients in whom perfect occlusion was not achieved had multiple mandibular fractures. One patient was edentulous prior to injury.

Maximal postoperative interincisal distance was 30–61 mm (mean 44 mm). Vertical movement was equal to or more than 40 mm in 27 (84%) out of the 32 patients (Figs. 7 and 9). Two of the 5 patients with interincisal distances less than 40 mm had actually sustained miniplate fractures, two were still in the early (6 months) postoperative period, and one had had an intraarticular comminuted fracture of the contralateral condyle.

Twenty joints (59%) in 32 surveyed patients with 34 fractures of the condyle remained completely free of pain, 9 joints (26%) were tender on palpation (3 of them were still in the early postoperative period) and in 6 patients (18%) joints were somewhat tender upon loading (3 of them also being in the early postoperative period). All of the operated joints were pain free at rest (Fig. 9).

Seven patients (21%) had deflection upon opening, 4 of them (12%) to the side of the fracture, and 3 of them (9%) to the contralateral side. Lateral

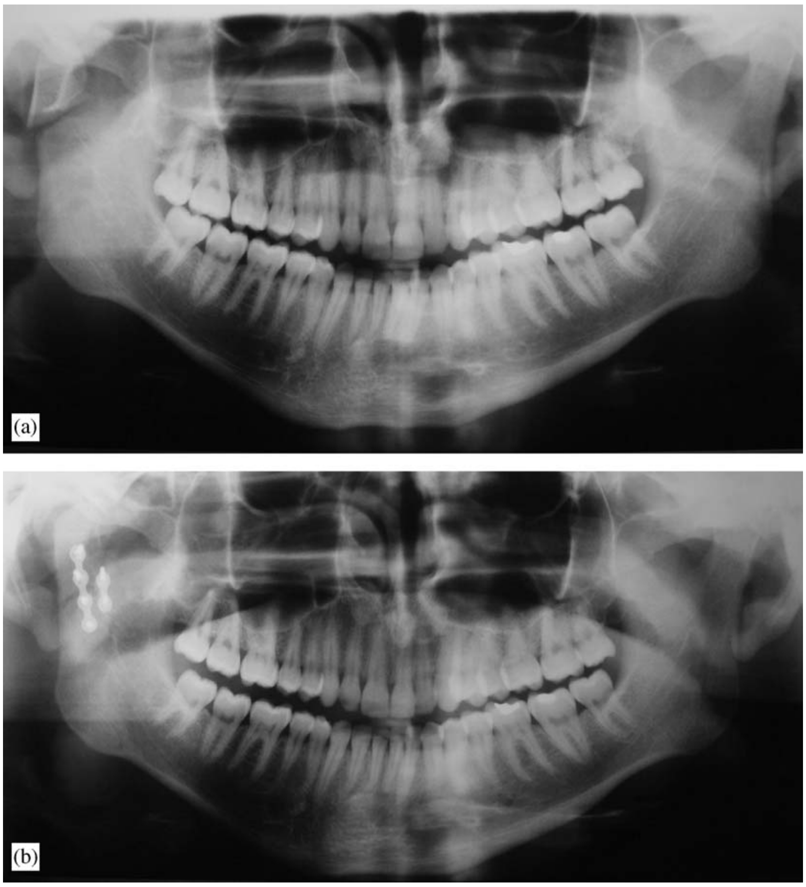

Fig. 6 – Right-sided fracture dislocation at condylar neck level (p.a. views are not shown). (a) Pre- and (b) postoperative orthopantomograms, reduction is anatomical, condylar height restored, fracture fixed with two 2.0 mm miniplates and screws (same patient).

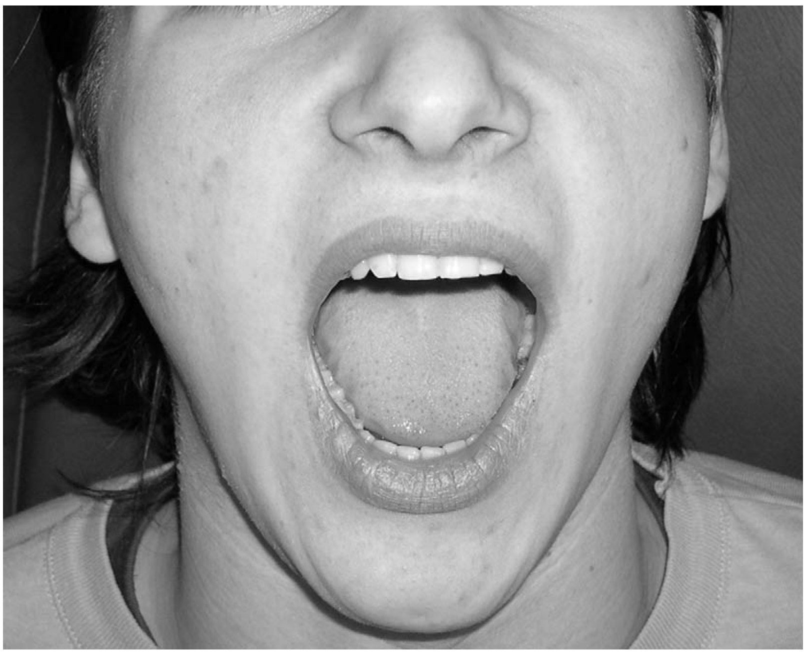

Fig. 7 – Mouth opening 5 months after surgical treatment of right-sided condylar fracture dislocation (52 mm of interincisal distance). Observe slight, 3 mm ipsilateral deflection (same patient).

Fig. 8 – Barely perceptible periauricular scar 5 months postoperatively (same patient).

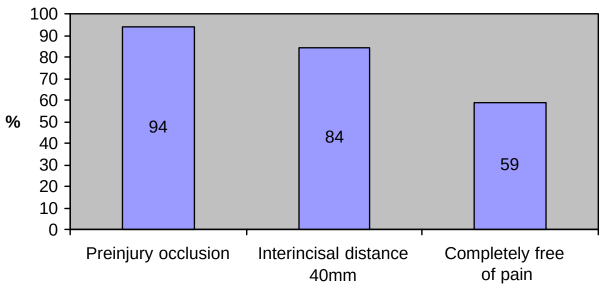

Fig. 9 – Percentage of patients with restored preinjury occlusion (94%), maximal interincisal distance of 40 mm or more (84%), and completely free of pain following surgically treated fractured condyles (59%).

deflections were of the order of 2–8 mm. Three of the ipsilateral deflections occurred in patients with miniplate fractures, the fourth was present in a patient in whom only 2 months had passed since the operation (Fig. 10).

Clicking upon opening or chewing was present in 5 (15%) out of 34 examined joints, 4 of these in patients with fracture dislocations (Fig. 10).

There were 8 cases (22%) with transient facial palsy, affecting the buccal or zygomatic branches or both. Seven of these 8 patients had fracture dislocations, which were extremely difficult to reduce, therefore the procedure had lasted longer, as did traction on branches of the facial nerve. The palsy lasted for 4–8 weeks, except in a younger female patient, where a discrete weakness of the lower eyelid and half of the upper lip remained 13 months after the procedure. There was no case of accidental transsection or tearing of a facial nerve branch (Fig. 11).

There were 5 cases (14%) of miniplate fractures, and in 3 of them, miniplate removal was necessary

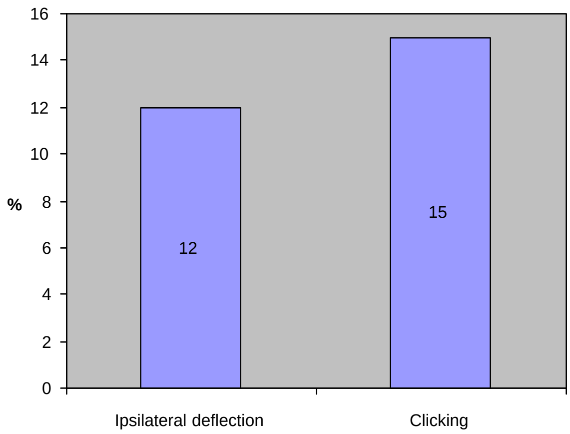

Fig. 10 – Percentage of patients with deflection to the injured side (12%) and clicking (15%) upon opening.

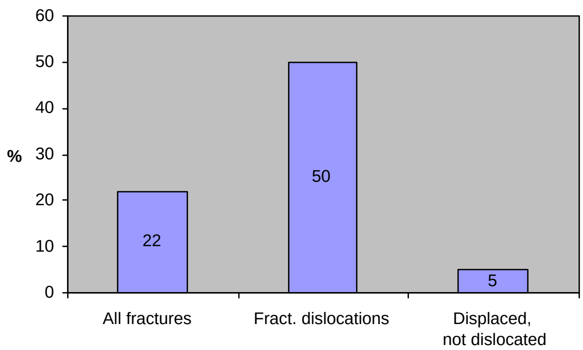

Fig. 11 – Percentage of transient facial nerve palsy in all of the 36 surgically treated condyle fractures (22%, 8 out of 36), in the category of fracture dislocations (50%, 7 out of 14), and in the category of displaced, but not dislocated fractures (5%, 1 out of 22).

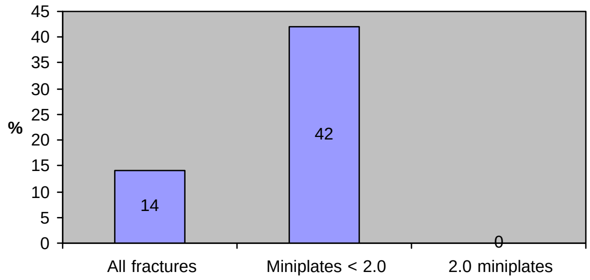

Fig. 12 – Percentage of miniplate fractures in all of the treated fractures (14%, 5 out of 36); in fractures where 1.7 mm or smaller miniplates were used (42%, 5 out of 12); and in fractures where 2.0 mm miniplates were used (none 0 out of 24).

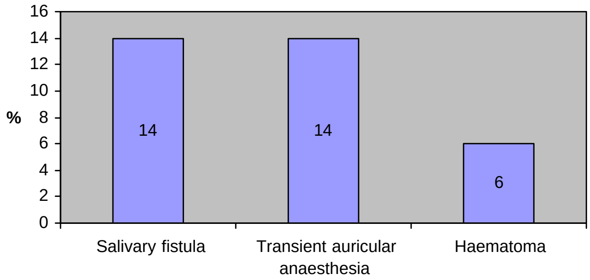

Fig. 13 – Percentage of patients with salivary fistula (14%), transient auricular anaesthesia due to injury of the greater auricular nerve (14%), and haematoma formation (6%).

due to pain. In all of these cases, 1.7 mm or thinner miniplates were used (Fig. 12). When using only a single 2.0 mm miniplate for fixation, postoperative angulation of the condyle was visible on the control orthopantomogram in one patient, although there were no adverse clinical symptoms or signs. There were no cases of miniplate fracture or angulation when two 2.0 mm miniplates were used.

Postoperative salivary fistulae developed in 5 cases (14%), and lasted for 1–4 weeks. In all cases, the fistulae closed spontaneously (Fig. 13).

There were 5 cases (14%) of transient auricular anaesthesia/paraesthesia, due to inadvertent injury of the greater auricular nerve, lasting from 1 to 6 months. All of them resolved spontaneously (Fig. 13).

There were 2 cases (6%) of postoperative haematoma. One of these patients was on anticoagulant treatment, and the other developed an infection of the haematoma. In both cases, the haematomas were drained and the patients given antibiotics, after which healing was uneventful (Fig. 13).

None of the patients suffered from postoperative bone resorption or condylar necrosis, as described by *Iizuka* et al. (1991). There was also no condylar shortening visible on check radiographs (Fig. 6b), except in cases of miniplate fractures and in the single case of angulation. There were a few cases of a slight postoperative open bite on the side of injury, which always resolved within 2 weeks.

None of the patients complained of postoperative facial asymmetry, nor was asymmetry observed in any of them. Six months following surgery, the periauricular scars were barely perceptible (Fig. 8).

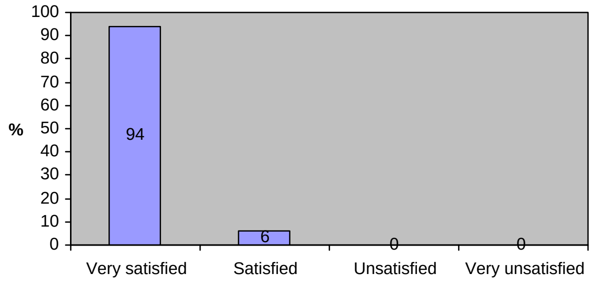

Fig. 14 – Percentage of patients in four different categories of patient satisfaction with the postoperative result.

In a survey answered by 32 patients (concerning 34 operated condylar fractures), 30 were very satisfied (94%) and 2 satisfied with the result (6%), whereas none were dissatisfied or very dissatisfied (Fig. 14).

DISCUSSION

Imaging

When performing diagnostic imaging, an orthopantomogram or an oblique view of the ramus and condyle clearly demonstrate the level of fracture and the degree of ramus shortening. An additional p.a. view or a Towne's view of the mandible provide information about lateral angulation and/or displacement of the fractured condyle. Fractures that appear to be minimally displaced on oblique views or orthopantomograms can actually prove to be badly displaced or even fracture dislocations on p.a. views. If CT scanning is performed, scans of the ramus in the coronal plane have to be made to obtain a good view of the fracture. Three-dimensional reconstructions of the ramus and condyle are also useful.

Indications for surgery

After a condyle fracture has been diagnosed and imaging completed, the decision whether to treat the fracture surgically or conservatively has to be made (*Hayward* and *Scott*, 1993; *Devlin* et al., 2002). If the occlusion is undisturbed and the fracture is undisplaced, a soft diet for 3–4 weeks with regular checks is sufficient. When there is minimal occlusal disturbance and a slight angulation of the condyle, which is often the case with greenstick fractures in children, the patient receives archbars and elastic traction in this department for 1–2 weeks. Children, in general, are treated conservatively, as the condyle has the capacity of remodelling (*Dahlstrom* et al., 1989; *Takenoshita* et al., 1990; *Strobl* et al., 1999; *Güven* and *Keskin*, 2001).

In displaced fractures of the condyle, *Eckelt* and *Rasse*'s (1995) criteria were first used when deciding on surgical treatment – medial angulation of the condyle of more than 30°, ramus shortening greater than 5 mm, or complete loss of bony contact between the fragments.

An interesting fact soon became obvious: patients in whom the risk for postoperative facial nerve palsy was highest were patients with the most severely displaced condyles, in whom surgery was an absolute indication. These were patients with fracture dislocations, with the joint capsule ruptured and the condylar head displaced medially, out of the glenoid fossa. Of the 8 patients with postoperative facial nerve palsy from this series, 7 had fracture dislocations (Fig. 11). In these cases, reduction was extremely difficult to achieve, and consequently traction on branches of the facial nerve lasted a long time – enough for neurapraxia or axonotmesis to occur (*Burgess* and *Goode*, 1994). In cases with no dislocation, transient postoperative facial nerve palsy occurred only in one patient, as reduction in these cases was rather simple, the procedure quick and the facial nerve branches retracted for a shorter time. Realizing this, more and more milder degrees of displacement were also operated on with good results.

This protocol is in direct disagreement with some authors, who advocate surgical treatment only in cases of severe displacement, fracture dislocation, or ramus shortening (*Takenoshita* et al., 1990; *Konstantinović* and *Dimitrijević*, 1992; *Smets* et al., 2003). However, if the surgical procedure is safe and relatively easy, why not perform it also in cases with milder displacement and thus spare the patient a prolonged period of IMF, an uncomfortable process? Post-IMF trismus is thus also avoided, making the period of rehabilitation much shorter. Moreover, with anatomical repositioning and height restoration of the condyle, the chances of developing TMJ problems may be reduced (*Anastassov* et al., 1997; *Choi* and *Yoo*, 1999; *Devlin* et al., 2002).

Surgical approach to the condyle

With the transparotid facelift approach, the condyle and fracture are exposed directly and allow for good inspection and reduction, as well as vertical screw placement, which is crucial for osteosynthesis stability (Figs. 4 and 5). This approach can be used in all kinds of condylar fractures, even high condylar neck fractures and fracture dislocations, as well as in ramus fractures. The retromandibular approach achieves a more limited exposure (*Ellis* and *Zide*, 1995a; *Devlin* et al., 2002; *Manisali* et al., 2003). The same is true for submandibular and transoral approaches, which are more suitable for lower condylar fractures, and often have to be combined with transbuccal screw placement and the use of an endoscope (*Chen* et al., 1999; *Güerrissi*, 2002). Special instruments are sometimes required (*Schön* et al., 2003).

Protecting the facial nerve

Regarding the branches of the facial nerve that have to be retracted out of the surgical field, another simple detail cannot be overemphasized. When the branches are identified within the parotid tissue overlying the ramus, they have to be dissected anteriorly for about 10–15 mm, and posteriorly for about 5–10 mm, as described above. After dissection, the branches can be retracted with less tension, and the danger of postoperative facial weakness is reduced (*Ellis* and *Zide*, 1995a and b; *Choi* and *Yoo*, 1999; *Ellis* et al., 2000).

Postoperative results and complications

The results of this series, concerning interincisal distance, deflection upon opening, occlusion and facial symmetry, were somewhat better than in reports on conservative treatment (*Takenoshita* et al., 1990; *Konstantinović* and *Dimitrijević*, 1992; *Smets* et al., 2003). It has to be stressed, however, that 39% of the patients from this series had fracture dislocations, which were not amenable to conservative treatment.

Only two patients (6%) reported a slight subjective change of their occlusion. Both of them, however, had suffered multiple fractures of the mandible, so that this change cannot be attributed to the fractured condyle alone.

Contralateral deflection upon opening, i.e. *away* from the fractured and surgically treated side, present in 3 patients (9%), cannot be attributed to the fractured condyle. Two of the contralateral deflections were probably present before injury, and one occurred in a patient with bilateral fractures of the condyle, in whom one condyle was treated surgically and the other (with a comminuted intracapsular fracture) conservatively.

The degree of postoperative transient facial palsy (22%) is comparable to that of other series (*Rodriguez* et al., 1997; *Choi* and *Yoo*, 1999; *Ellis* et al., 2000; *Manisali* et al., 2003). The only patient in whom a slight degree of facial weakness was still present after 13 months had had a fracture dislocation with an extremely medially displaced condylar neck fracture that took a long time to reduce. Moreover, she was among the first of the patients operated in this series and although the facial nerve branches were not directly injured, they were not dissected as thoroughly as described above. Traction on the nerve branches must have caused axonotmesis which did not recover completely (*Burgess* and *Goode*, 1994).

All cases of salivary fistula developed in patients where the parotid capsule was not sutured in a 'watertight' fashion (*Ellis* et al., 2000). In some cases, the reason for this was blunt dissection through the parotid capsule, which leaves the capsule torn and makes watertight closure impossible, and in others, injudicious placement of drains within the parotid tissue (*Ellis* et al., 2000). Opening of the parotid capsule should be made with a scalpel, leaving straight and firm wound edges, which enables watertight closure. Before closure of the capsule, haemostasis within the masseter muscle and parotid gland must be complete, to avoid haematoma formation within the parotid gland.

Postoperative parotid gland function was not assessed. Reports in the literature, in which sequential scintiscanning with technetium 99m pertechnetate was performed, showed good preservation of parotid gland function (*Choi* and *Yoo*, 1999).

Although the mandibular condyle is small, it acts as a fulcrum in mouth opening and closing, and there are a multitude of forces acting upon it, especially during mastication (*Meyer* et al., 2002). To achieve stable osteosynthesis, as well as to avoid miniplate fracture or angulation, all fractures at the level of the condylar neck and caudally to it are now fixed with two 2.0 mm miniplates in this department, which is in accord with other authors (*Devlin* et al., 2002; *Hyde* et al., 2002). No miniplate fractures or angulations were observed when using two 2.0 mm miniplates.

A slight degree of transient postoperative open bite on the injured side in some cases was most probably the consequence of intraarticular effusion or haemarthrosis, caused by the forces of trauma or intraoperative manipulation (*Umstadt* et al., 2000). In some cases, the open bite was allowed to resolve spontaneously and in others, elastic traction via arch bars was used for 1 week. The open bite resolved within 1–2 weeks in all cases.

If the facelift incision is planned carefully, the periauricular scar is very well camouflaged and practically invisible (*Peterson*, 1992; *Ellis* and *Zide*, 1995a; *Anastassov* et al., 1997, Fig. 8). Since the skin incision is the same as in a purely cosmetic facelift procedure, it certainly has its place in treatment of facial trauma as well. Apart from leaving a much less conspicious scar, the facelift approach also achieves a much wider, clearer and more direct exposure than the retromandibular or submandibular approaches. That is why the retromandibular incision was soon abandoned.

An endoscopically assisted transoral approach in reduction and fixation of the fractured condyle has been described by several authors (*Chen* et al., 1999; *Schön* et al., 2003). This approach, however, can only be employed in selected cases of low subcondylar fractures, and requires special instruments and additional training. Other than that, surgeons attempting to reduce and fix fractures endoscopically have to be perfectly familiar with the classical, open approach, as in all fields of endoscopic surgery.

CONCLUSION

On the basis of these clinical results as well as the degree of patient satisfaction, it may be concluded that surgical treatment of the fractured, displaced condyle achieves excellent results when using the transparotid facelift approach and two 2.0 mm titanium miniplates for internal fixation.

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Paper received 26 January 2004
Accepted 20 January 2005