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# Transoral vs. extraoral approach in the treatment of condylar neck fractures

Andreas Paul Boehle*, Eva Herrmann, Sharam Ghanaati, Alexander Ballon, Constantin Alexander Landes

*Department of Oral and Maxillofacial Surgery, Johann Wolfgang Goethe-University, Theodor-Stern-Kai 7, 60596 Frankfurt am Main, Germany*

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ABSTRACT

*Purpose:* The aim of this study was to assess a non-endoscopic transoral versus extraoral technique in the open reduction and internal fixation of displaced or dislocated fractures of the condylar neck.
*Material and methods:* A total of 104 patients, treated from 2007 to 2012 with 114 class II or class IV fractures according to Spiessl and Schroll were included in this study. Facial nerve function, scarring, pain and functional clinical parameters, such as protrusion, mediotrusion and maximum interincisal distance, were judged clinically (at 21 ± 12.1 months); repositioning and reossification were measured upon preoperative, postoperative and follow-up (at 8.8 ± 7 months) radiographs. Patient satisfaction was evaluated using the OHIP-G 14 questionnaire.
*Results:* In all, 36 patients (35%) with 43 fractures (38%) presented for clinical follow-up. Both treatment groups showed clinically and radiologically comparable results. Scarring was obvious in all extraorally treated patients, and hypertrophic scars occurred in four class IV cases (24%). One class IV patient (6%) had a persistent facial nerve palsy; temporary pareses were more frequent ($n = 4$; 24%).
*Conclusion:* The transoral approach did not jeopardize facial nerve function, and extraoral scars were avoided. Repositioning and fixation results and the frequency of revision operations were comparable. The transoral approach can be recommended generally in class II and class IV cases.


## 1. Introduction

Fractures of the mandibular condyle are frequent (Silvennoinen et al., 1992; Sharif et al., 2010) due to traumata to the anterior mandible and chin region (Inada et al., 1989; Rasse, 2000; Abdel-Galil and Loukota, 2010) causing shearing forces at the cranial base by an indirect fracture mechanism.

High fractures occur mostly combined intraarticularly and extraarticularly, whilst low fractures at the neck are located extraarticularly. Conservative treatment is becoming slowly obsolete except in patients who, due to their health condition, are generally unfit for open reduction and internal fixation, as the open reduction and internal fixation (ORIF) results are superior regarding long-term function and morphological restitution (Baker et al., 1998; Landes and Lipphardt, 2005; Stiesch-Scholz et al., 2005; Eckelt et al., 2006; Landes and Lipphardt, 2006; Landes et al., 2008a, 2008b; Nussbaum et al., 2008; Laskin, 2009; Abdel-Galil and Loukota, 2010; Liu et al., 2013).

Condylar neck fractures may receive ORIF by the extraoral or transoral approach; the latter does not jeopardize the integrity of the facial nerve, unlike all extraoral approaches. Moreover, extraoral visible scars can be avoided. In the 1980s, sporadic reports of transoral fixation were first published (Jeter et al., 1988; Wald et al., 1988).

Meanwhile several authors have since reported their experiences, but only as early experiences and in small case numbers (Kanno et al., 2011; Arcuri et al., 2012; Schiel et al., 2013).

This study evaluates a single-center experience comparing extraoral versus intraoral approach for the operative treatment of condylar neck fractures within a larger case number as a long-term study.

## 2. Material and methods

### 2.1. Inclusion criteria

After ethical board approval (no. 114/11, 24.05.2011), all unilateral and bilateral condylar fractures that were repositioned and

* Corresponding author. Praxis für Mund-, Kiefer- und Gesichtschirurgie, Dr. med. Dr. med. dent. S. Hauk, Königsteiner Str. 45, 65812 Bad Soden, Germany. Tel.: +49 177 5977766; fax: +49 6196 641560.
*E-mail address:* andboehle@gmail.com (A.P. Boehle).

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fixated transorally or extraorally at our centre between August 2007 and March 2012 were included retrospectively. After radiological classification, the patient collective was divided into six classes according to Spiessl and Schroll (1972). The Spiessl and Schroll classification is as follows:

- Class I: condylar neck fractures without displacement
- Class II: low condylar neck fractures with displacement
- Class III: high condylar fractures with displacement
- Class IV: low condylar neck fractures with dislocation
- Class V: high condylar fractures with dislocation
- Class VI: intracapsular capitular fractures

Radiograms were evaluated anonymously, and patients who presented for follow-up were included when they gave their written consent.

### 2.2. Exclusion criteria

Excluded were patients under the age of 18 years as well as adult patients without written informed consent, mostly due to lack of interest in participating in this study or when patients could not be contacted by either mail or telephone. Another exclusion criterion was an insufficient dentition to reproduce an occlusion and pre-traumatic dysgnathia.

### 2.3. Radiological examination

The vertical and angular fragment displacement or dislocation of the proximal fragment was evaluated retrospectively upon dental pantomograms and Towne views. The angular and vertical post-therapeutic position was assessed regardless of the surgeon by research fellows.

### 2.4. Orthopantomograms

Dental pantomograms were used to bilaterally measure the height of the ascending ramus from the mandibular angle to the most cranial circumference of the condylar head and the relative angulation of the condyle.

The pretherapeutic vertical distance to the non-fractured side was calculated tangential to the dorsal rim of the mandible. The height of the non-fractured side was subtracted from the height of the fractured side, but this was not possible in bilateral fractures. The angulation of the non-fractured condyle to the dorsal rim of the ascending ramus was defined as 0°, and the deviation of the fractured condyle was measured. In bilateral fractures, the angular and vertical distance as well as the angulation were compared against a mean value of all non-fractured ascending rami. This was done as previously reported (Landes et al., 2008a, 2008b).

For reasons of controlled radiation exposure, no further radiographs were made in clinical follow-up; however, family dentists were contacted for follow-up radiographs, i.e., in the course of dental implant treatment.

### 2.5. Oblique projections/Towne view

To measure displacement, the median or lateral angular dislocation was compared from the non-fractured to the fractured side. In cases of bilateral fractures, the grade of dislocation was compared to a mean value of all non-fractured condyles. Vertical dimensions were not evaluated on oblique projections.

### 2.6. Computed tomography

Several patients underwent computed tomography (CT), the scans of which were evaluated analogous to above standard conventional radiographs in selected image sections and analyzed in a similar way. The CT slices were chosen in either sagittal or coronary orientation in adapted magnification.

### 2.7. Image analysis and interpretation

Vertical and angular deviations were measured upon dental pantomographies (Fig. 7), Towne views, and identical virtual sections in the patients who underwent CT as described above. Negative values revealed anteromedian angulation and positive values laterodorsal angulation. A shortened collum resulted in negative values and an elongated collum in positive values.

### 2.8. Operative treatment

#### 2.8.1. Transoral repositioning

Under total anesthesia, vasoconstrictory local anesthetic (Ultracaine D-S forte, Articaine/epinephrine 0.006 mg/ml (1:200.000), Sanofi-Aventis, Frankfurt, Germany) was injected into the oral vestibule in the region of the ascending ramus. After mucosal vestibular marginal incision, the ascending ramus and the dorsal condyle fragment were exposed. Repositioning was performed transorally by cottle rasp and freer dissector. The fractures were fixated either by T.C.P.-plates (MODUS Trapezoid Condyle Plate; Medartis, Basel, Switzerland; Fig. 6) or four-hole plates beneath the semilunar incisure and at the dorsal ascending ramus. The bone and plate fixation device (Landes et al., 2007) proved helpful in attaching the fixation plates. Continuous resorbable suturing and postoperative application of cold packs followed. Cefuroxim antibiosis (Cephasaar, St. Ingbert, Germany) was applied intraoperatively. A soft diet was started immediately after the procedure (Kanno et al., 2011; Eckelt, 2014).

#### 2.8.2. Extraoral repositioning

Under total anesthesia, vasoconstrictory local anesthetic (Ultracaine D-S forte, Articaine/epinephrine 0.006 mg/ml (1:200,000), Sanofi-Aventis, Frankfurt, Germany) was injected into the marked incision line 1 cm dorsal to the ascending ramus. After skin incision, the ascending ramus was approached around the dorsal parotid gland, sparing the facial nerve.

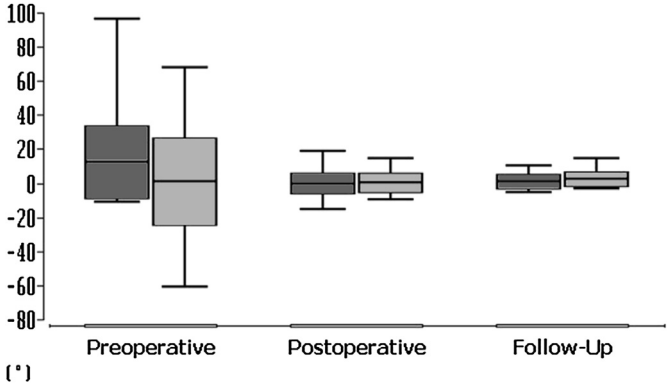


**Fig. 1.** Class II orthopantomograms: difference in angulation preoperatively, postoperatively, and at follow-up (8.8 months on average). Note: For each column, the left boxplot illustrates the transoral approach, and the right boxplot illustrates the extraoral approach.