



The assessment of fracture of the mandibular condyle by use of computerized tomography. Incidence of sagittal split fracture

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SUMMARY. A survey was carried out to clarify the incidence of sagittal splitting fracture of the mandibular condyle using computerized tomography. There were 33 patients, between 11 and 67 years of age, with displaced or dislocated mandibular condylar process fractures (41 cases), seen at our clinic between 1986 and 1992. The incidence of no displacement was 4.9%; deviation and displacement, 34.1%; dislocation, 46.3%; and complete avulsion, 4.9%. A sagittal splitting fracture of condyle occurred with an incidence of 9.8%. Conservative treatment was effective in the treatment of sagittal splitting fracture. Therefore, classification of fracture of mandibular condyle should include the sagittal split fracture, and investigations should include computerized tomography.

INTRODUCTION

Classification of condylar fractures with respect to condylar head to mandibular body is of importance in choosing the method of treatment, i.e., concerning conservative or open reduction, and has been based upon the classification by Bellinger¹ and MacLennan.² Previously, the sagittal split of condyle could not be identified because of overlapping images on the plain radiograph. However, sagittal splitting fractures of condyle have been discovered by the recent advances in evaluation of fractures using a computerized tomography scanning.³⁻⁶ Computerized tomography provides accurate information and is a useful diagnostic tool. The new finding of the fracture of condyle obtained using computerized tomography should be incorporated into their classifications.

METHOD

We examined 41 fractures of the condylar process in 33 patients, including 8 patients with bilateral fracture of the condylar process, seen in the Oral and Maxillofacial Surgery Department II, Matsumoto Dental College from 1986 through 1992. The patients were between 11 and 67 years old (mean: 26.8 years) at the time of injury. There were 25 males, and 8 females.

The images produced by computerized tomography (Toshiba, TCT-60A-EX) were evaluated in relation to the position of the fragments in the glenoid fossa. The type of fracture was recorded based on the classification of MacLennan.² Standard slices, 5 mm in thickness, were used for both axial and coronal scans with a scan time of 4 s per slice.

The mandibular condyle was evaluated also by the 3-dimensional CT photographs that were constructed

using a 3-dimensional software program (Toshiba medical, CTD-01B). Three-dimensional construction of the condyle was performed in three patients who had sagittal split fracture of the mandibular condyle. The method in those patients included non-enhanced CT with 2 mm contiguous sections for more sophisticated radiologic studies.

RESULTS

The fractures were classified according to the position of the condylar process in relation to the mandibular body and the glenoid fossa as shown by MacLennan.² No displacement of the condylar process was found in 2 cases (4.9%), deviation and displacement in 14 cases (34.1%), dislocation in 19 cases (46.3%), complete avulsion in 2 cases (4.9%) and sagittal splitting fracture in 4 cases (9.8%) (Table 1). Concerning the direction of the head of the fractured segment, 12 deviation and displacement cases were anteromedial in direction, and all dislocation cases were anteromedial in direction. The incidence of sagittal splitting fracture was 4 cases (9.8%) of fracture of condyle in 3 patients, of whom one patient had bilateral sagittal split condyle. None of the medial fragments of sagittal split cases were completely dislocated anteromedially from the mandible but were deviated and displaced anteromedially.

Figures 1-3 shows a representative sagittal splitting

Table 1 - Classification of the condylar fracture with respect to condylar head to mandibular body

| | | |
|--------------------------|----|-------|
| no displacement | 2 | 4.9% |
| deviation & displacement | 14 | 34.1% |
| dislocation | 19 | 46.3% |
| complete avulsion | 2 | 4.9% |
| sagittal splitting | 4 | 9.8% |

Number of condylar fracture: n=41.

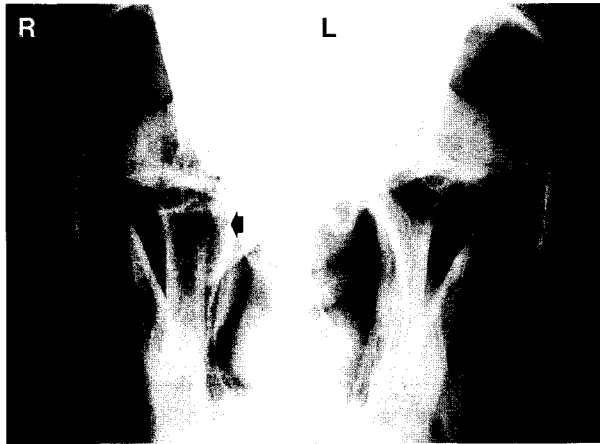


Fig. 1 – Orbitoramus projection revealing difference between the right side and the left side in the medial cortical line of the condyle, and the arrow indicating a break of the bone, but fracture is not seen clearly.

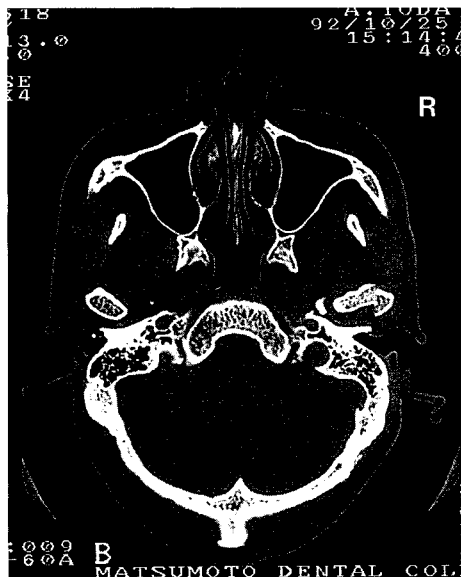


Fig. 2 – Axial CT scanning showing a right-side complete sagittal splitting fracture of the condylar head.



Fig. 3 – Three-dimensional CT photographs demonstrating a shelf-like appearance due to a significant displacement of the medial fragment of the sagittal splitting fracture.

fracture found in a 43-year-old male. The internal half of the condylar head was deviated or displaced anteromedially. The patient recalled that the injury followed a blow to the chin. He did not have an open bite, with 22 mm of maximal mouth opening and no difficulties in eating a solid diet. After 3 weeks conservative treatment he achieved 50 mm of maximal mouth opening in interincisal distance, and the lateral excursion of the mandible was 7 mm to the injured side, and 6 mm to the intact side. Three patients showed excellent healing by conservative therapy and functional exercise. This compensated for the loss of the lateral pterygoid muscle functions, and did not interfere with normal life.

DISCUSSION

Several classifications^{1,2} have been used in the treatment of the fractures of the mandibular condylar process. Our data showed deviation and displacement in 34.1%, and dislocation in 46.3% of the condylar fractures. The incidences of deviation and displacement were less than those reported earlier^{1,2} whereas that of dislocation was more than that in their reports. This suggests that many of the dislocation cases had the appearance of displacement on the simple radiographs, especially lateral projections. The plain radiograph of the orbitoramus projection, AP projection and oblique transcranial projection is often unable to visualize the structures of the internal minor fragment in detail. Salon et al⁴ noted that displaced supracondylar fracture on the medial aspect of the temporomandibular joint showed no evidence of fracture by orthopantomogram and multiple standard films, but was clearly defined by CT scanning. This may be due to the fact that the shadow of the minor fragment gives overlapping images with other radiopaque structures around the condyle such as the petrous portion of the temporal bone and/or the zygomatic bone. The direction of radiographic projection may restrict functional limitations in the mandibular condyle. Furthermore, no clear correlation was found between the manifestation of clinical findings and the extent of fragment displacement as demonstrated radiographically.⁷ Therefore, proper radiographic projections in different directions are necessary to diagnose the fracture of the condylar head. However, a split in the sagittal plane of condyle is not visible with a lateral, oblique or panoramic radiograph but only with anteroposterior, transorbital projections of temporomandibular joint. Therefore, the plain radiograph should be supported routinely by views in axial and coronal computerized tomography, if a sagittal split fracture of the mandibular condyle is suspected.

With regard to treatment, open reduction may be recommended in some of the dislocated fracture cases. However, the operative field is too narrow and restricted to treat the condylar head even if it is not markedly dislocated, especially anteromedially. It would seem from our experience of conservative therapy of intermaxillary fixation for 14 days that even if the condylar surfaces are sudden and odera-

tions, ankylosis does not occur, and conservative treatment gave satisfactory results. The condyle has its most obvious blood supply by way of the superficial temporal artery through its parotid branches and the maxillary artery through its deep auricular and pterygoid branches, and the condyle would be re-vascularized readily even if muscle fibers are stripped from the condylar head.⁸⁹ We believe that the split of the condyle should be treated by conservative therapy because it is impracticable to gain access to the internal minor fragment. The duration of intermaxillary fixation should be 14 days or less if there is no inflammation of the condylar head and the surrounding tissue. No change of occlusion will occur because there is an intact condylar head in the lateral part. The classification, including sagittal split of condyle, should assist in the choice of treatment for improvement in patient care. These findings, as well as some other reports,⁴⁻⁶ suggest satisfactory results can be obtained by conservative treatment.

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Paper received 14 January 1993

Accepted 15 June 1993