

CONSIDERATION OF 180 CASES OF TYPICAL FRACTURES OF THE MANDIBULAR CONDYLAR PROCESS

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FRACTURES of the mandibular condyle have been recognised and treated for almost 150 years. One of the most complete historical résumés on the subject is to be found in the article published by Thoma (1945). In all cases there are two considerations to be taken into account, (1) diagnosis and (2) treatment.

That advances in science have brought improvements in so far as technique is concerned there is little doubt, but one wonders whether the end results obtained are always commensurate with the technique employed. Can one, for example, always justify the treatment adopted by the result effected? It is to answer such questions as this that the present series of cases has been prepared and analysed. While it would be erroneous to suggest there is anything entirely original in the consideration of old cases, it is felt that only by the careful consideration of the facts emerging from such a statistical report can one justifiably draw conclusions with regard to the relative merits of the varying methods of treatment, and correlate these with the late results.

The incidence, as one would expect, shows that males and females are subject to fractures of the mandibular condyle in a ratio of 8 to 1. Again it can be seen that the main group, in so far as age is concerned, is that between 16 and 35 years (Table I). The especial significance of fractures of the condylar process in young children will be discussed later.

TABLE I

<i>Number of Cases—</i>	
Total number of cases	180
Male	159 (88·33 per cent.)
Female	21 (11·67 per cent.)
<i>Age Distribution—</i>	
Children under 10 years	5 (2·78 per cent.)
Children under 15 years	11 (6·11 per cent.)
Patients over 35 years	37 (20·56 per cent.)
Patients between 15 and 35 years	127 (70·55 per cent.)

It is significant, bearing the above in mind, that blows received in fights are directly responsible for the greatest number of mandibular condylar fractures. Industrial accidents and motor accidents come next in order of prevalence, while other causes are by no means so common. This agrees in the main with the findings of Stones (1948), but as one would expect, the incidence of fractured mandibular condyles from assault is considerably greater than is fracture of the mandible proper from the same cause.

Diagnosis is based on an accurate evaluation of signs and symptoms, the history, clinical examination, and interpretation of radiographs all playing their part. The tendency in the past has been to classify fractures on an anatomical rather than on a clinical basis, the fracture being considered first with regard to the level and line of fracture, and secondly with regard to the displacement presenting. The clinical approach necessitates consideration of the mandible as a whole—bony landmarks; muscle attachments and pulls, with influence on displacement of fracture fragments; and an appreciation of the normal and pathological conditions of the temporo-mandibular joint.

In the present series, the majority of fractures fall into the category of what is termed the low condylar fracture, that is, the fracture line running obliquely downwards and backwards from the sigmoid notch: the subcondylar fracture of James and Fickling (1940), or posterior oblique fracture of the ramus, as Walker (1942) prefers to call it. High condylar fractures, that is, fractures above the level of the sigmoid notch involving the anatomical neck of the condyle, have been

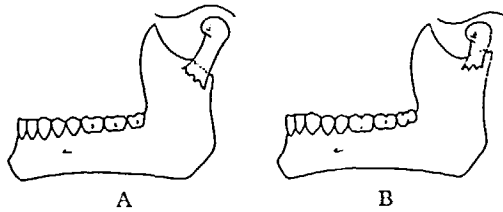


FIG. 1

- A, Low condylar fracture from base of sigmoid notch downwards and backwards.
 B, High condylar fracture, usually associated with dislocation, above level of sigmoid notch.

noted not only in the fracture-dislocation group, as suggested by Walker (1942), but also in fractures of the mandibular condyle in children (Fig. 1). Coincidentally or otherwise, in that small group, where damage to the condylar growth centre has affected future development, these children were under the age of 5 years at the time of injury.

A study of the influence of mandibular condylar fractures on the future development of the mandible in young children is a subject worthy of a separate investigation. It would appear, however, that damage to the mandibular condyle in young children does influence adversely the future growth of the ascending ramus of the mandible. As these cases in which condylar growth involvement leading to faulty mandibular development invariably show a marked degree of displacement, one is left in some doubt as to how much of the ensuing maldevelopment follows damage to the growth centre of the condylar region, and to what extent it is caused by inco-ordinated muscle pull and fibrosis (Brash, 1924; Rushton, 1944; Walpole-Day, 1951).

The site of fracture has little influence on the ultimate prognosis in mandibular condylar fractures; it is, indeed, the relationship of the fracture fragments to the remainder of the mandible which plays the greatest part in this respect. So it is that all classifications should recognise the importance of this latter fact. The majority of classifications do have this much in common that they recognise displacements and dislocations of the condylar process in respect of the mandible

proper (Thoma, 1945; Goodsell, 1947; Stones, 1948). It is felt that these should form the basis upon which to build a more complete picture. As no method of fixation or reduction can promise a perfect result, one would feel that the more simple and practical the classification, the more useful it is likely to prove. With the advent of the radiograph the task has been simplified, and a greater degree of accuracy assured (Table II).

TABLE II

Fracture deviation and displacement	110
Fracture dislocation	27
Fracture with no displacement	41
Complete avulsion of condylar process	2

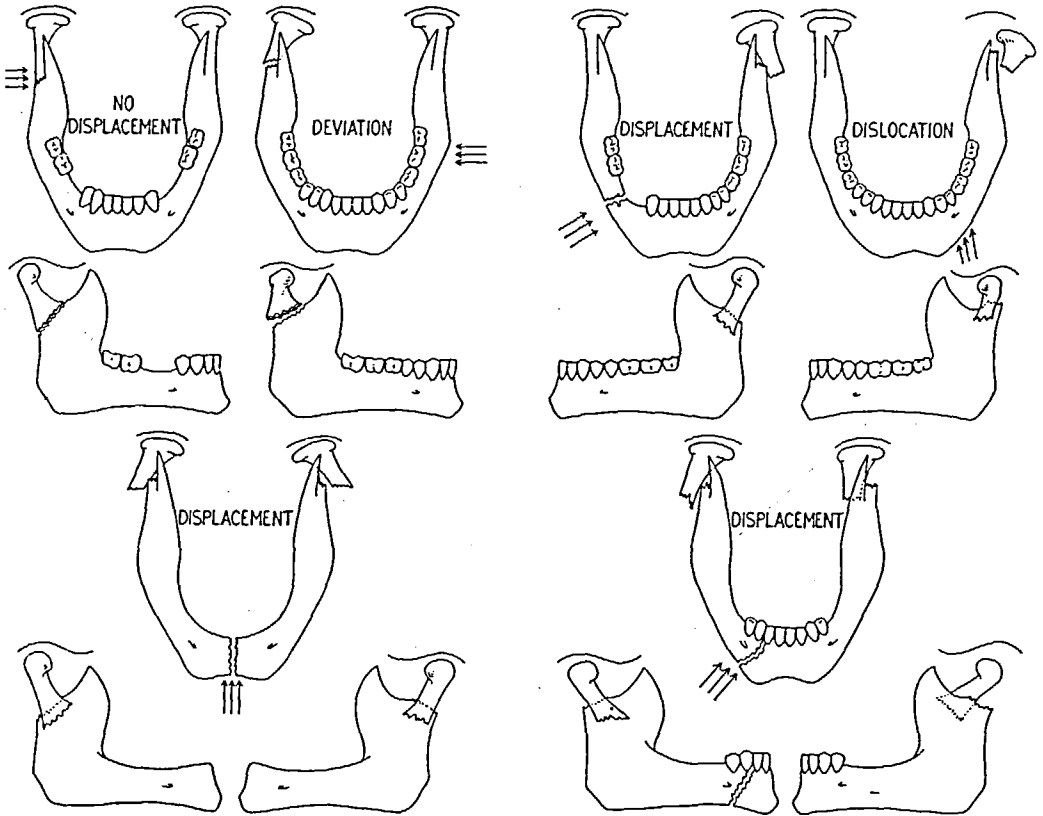


FIG. 2

Diagrams to show malpositions of condylar process in relationship to mandible. Arrows indicate site of trauma.

Deviation, displacement, and dislocation of the condylar process in relationship to the mandible have been the bases on which all preliminary observations have been made (Fig. 2). Deviation is simple angulation of the condylar process to the

major mandibular fragment. Displacement is an overlap of the condylar process and major mandibular fragments respectively ; while dislocation infers that the head of the condylar process has been disrupted from the articular fossa. The ultimate prognosis will be influenced by the following factors : (1) Age of patient ; (2) level of fracture ; (3) degree of malposition ; (4) dentition and occlusion ; (5) extent of damage to temporo-mandibular joint.

In the present series, 180 cases were followed up ; of these, sixty-seven were examined, and a further fifty-three were followed by correspondence. In all, a case history and radiographs were available from the time of injury. In the former group further radiographs were taken to include lateral oblique and antero-posterior views of the condylar process, and films to show the temporo-mandibular joints in the open and closed positions. While these films were the routine ones employed in the interest of uniformity, it must be understood that other films were made use of. In this respect the tomograph was, on occasion, the most helpful. The clinical examination entailed attention to such details as visual deformity, occlusion, range of mandibular movement, presence or absence of pain, and clinical interpretation of findings on both extra-oral and intra-oral palpation. In the latter group, namely, those cases which were followed by correspondence, the patient was, where possible, referred for radiographic examination to a local hospital.

The types of fractures can readily be followed, the uncomplicated fractures being single or bilateral and involving the condylar process alone, whereas those which are complicated have, in addition, fractures involving the remainder of the mandible. The miscellaneous group includes the gross compound comminuted fractures such as are present in gunshot wounds, and cases of complete avulsion of the condylar process, of which there were two (Table III). It is of interest that from the statistics available there is little doubt that the edentulous patient is more prone to the complicated unilateral and bilateral condylar fracture. Again it would appear that when the teeth are in occlusion and the patient " on guard," so to speak, blows directed on the body of the mandible lead to a medial deviation or displacement of the condylar neck, whilst a blow to the body of the mandible when the mouth is open is more likely to give rise to a lateral deviation or displacement. Blows directed over the condylar process itself usually effect a lateral displacement of the neck of the process in relationship to the major mandibular fragment.

TABLE III

Total cases followed up	180
Number clinically examined	67
Number followed by correspondence	53
<i>Types of Fracture of the Mandibular Condylar Process—</i>	
Single condylar (uncomplicated)	99
Bilateral condylar (uncomplicated)	7
Single condylar (complicated)	45
Bilateral condylar (complicated)	18
Miscellaneous	11

In the mandibular condylar fractures reviewed, the following signs and symptoms presented with a consistency which merits attention.

1. Pain and tenderness over the affected temporo-mandibular joint area.
2. Swelling locally, usually just below the zygomatic arch and in front of the lobule of the external auricle.

3. Limitation of mandibular movement, particularly on the lateral excursions.
4. Displacement of the mandible to the injured side, particularly on opening the mouth. (This is not to be confused with the so-called textbook deviation which will be alluded to later. Displacement in this context is a marked lateral movement of the mandible as a whole on opening, with return to the starting point on closure. This starting point is not necessarily the midline for the patient in his or her normal resting occlusion.)
5. Malocclusion of the teeth.
6. Masseteric spasm on the affected side, caused, no doubt, by the irritation of the nerve endings—an inflammatory response.

When considering the treatment required to deal with condylar fractures, one finds that there are two opposed schools of thought on the matter. The first of these considers that bony union is seldom if ever obtained, and therefore immobilises the fragments for a limited period of time only, accepting the principle that the creation of a fibrous union is the normal for such cases (Fry *et al.*, 1942). The other school, however, favours bony union and therefore immobilises the fragments until such time as bony union can be reasonably expected. This necessitates fixation and immobilisation for four to six weeks as a mean average (James and Fickling, 1940; Thoma, 1945; Becker, 1950). Both have been followed in the present series, and it remains to be stated that there is little doubt that even when there is a considerable degree of overlap of the fragments and malposition of the condylar process itself, union does occur in a high percentage of cases, giving a good functional result, regardless of the method of treatment employed (Table IV). The general feeling is that in the majority of cases union

TABLE IV

Method of Treatment employed in 120 Cases Observed—

Nil	6
Bandage	12
Intra-oral dental wiring	45
Cast metal cap splints	26
Gunning splints plus bandage	31
Direct wiring or pin fixation	None

is of the osseous type (McGregor, 1951). What then should be the aim in planning treatment? It should be understood that the aim and the ideal may not necessarily coincide. The ideal in all cases is to procure bony union in good anatomical position, with no functional impairment whatsoever. Short of open reduction, attempts at alignment of the fragments meet with a singularly inconsistent degree of success, although the position can in most cases be improved. Fixation is then a matter of personal choice and must vary from case to case, the type of injury, complexity of injury, and age of the patient influencing the operator. It would appear that in the majority of fractures of the mandibular condylar process immobilisation should be complete for a period of fourteen days (Table V), and that thereafter for a further period of fourteen days the movements of the mandible should be limited and controlled. This control can be ensured by elastic traction and/or a modified Manton bandage as required. Where necessary, a training flange can be utilised. Even in the gross fracture-dislocations of the mandibular condyle

it is seldom initially necessary to do other than effect complete immobilisation. When, after the intermaxillary fixation has been removed, there is continued limitation or ankylosis following, for example, a gross fracture-dislocation of the condyle, it may be necessary to consider condylectomy. It is felt that the importance of early correction of the occlusion and strict adherence to this policy of initial fixation, followed by graduated exercise, should in most instances take precedence over any attempt at an exacting correction of the alignment of the condylar and mandibular fragments themselves.

TABLE V

Period of Fixation in 120 Cases Observed—

Fixation period, 0 to 14 days	79
Fixation period, 15 to 28 days	42
Fixation period, over 28 days	9

Follow-up Period—

Least—1 year 2 months. Greatest—11 years 4 months.
Average—3 years 1 month.

The results following pin fixation and transosseous wiring do not seem to indicate that there is any advantage to be gained by pursuing such a course as a primary method of treatment. The obvious hazards from the employment of such techniques would appear to outweigh any doubtful benefit derived. To substantiate this view, further consideration of the complications arising in the cases under discussion will be undertaken (Table VI).

TABLE VI

Complications—

Pain	2
Limitation of movement	None
Deviation	29
Visual deformity	7
Radiographic deformity	73

It will be noted that while no cases were treated by the open reduction method, the complications were minimal. Of the two patients complaining of pain, the one had extensive facial injuries involving the middle and lower thirds of the face, with considerable soft tissue loss locally, while the other was a compensation case. Pain was considered as an established entity only if proven to be present nine or more months following the original injury. This reservation was made in respect of all the considered complications.

Textbook deviation was a common finding, but when one considers that in a control group of forty-nine tuberculosis patients with no known temporomandibular joint lesions no less than twenty-nine showed a deviation on opening and closing the mouth, the significance of the deviation factor is reduced.

The radiographic bony deformity in the condylar region is noteworthy as it confirms the fact that a large number of such cases do heal in malposition. Unfortunately there is no way of ascertaining the true nature of the union, other than by post-mortem examination of the area. Other available methods are hardly conclusive in themselves. Clinically, however, there is adequate evidence to show that in the majority of cases of condylar fracture deviation and displacement the

condyles do move, even although such movements may be asymmetrical. In fact, the injured side is characteristically flatter on palpation, with the condylar head less prominent.

SUMMARY

Fracture of the mandibular condylar process has been discussed with a view to formulating some opinion with regard to lines of fracture, consideration of the various positions taken up by the condyle in relationship to the mandible proper, and evaluation of the methods of treatment available which will give rise to the most completely stable, functional joint thereafter. A series of 180 cases has been examined for this purpose, and the main findings are:—

1. Most fractures of the mandibular condyle involve the neck and run downwards and backwards from the sigmoid notch—low condylar fractures.
2. High condylar fractures are usually associated with a fracture-dislocation of the head of the condyle, or are found in children.
3. Children below the age of 5 years would appear to be more prone to permanent growth changes following fracture of the condylar process. Such damage to the condylar growth centre is found to diminish in direct ratio to the age of the patient over the age of 5 years.
4. In diagnosis the position of the condylar process should always be considered in relationship to the remainder of the mandible.
5. Early re-establishment of normal occlusion should be the primary aim in planning treatment.
6. Regardless of the mode of treatment adopted, union of the fibrous or osseous type is generally established. The period of fixation, therefore, should not be unduly prolonged, provided a sound occlusion and an adequate range of mandibular movement are ensured.
7. Complications arising from fractures of the mandibular condyle are conspicuous by their absence.

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