

THE TREATMENT OF FRACTURES OF THE MANDIBLE BY EXTERNAL PIN FIXATION

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The purpose of this article is to describe a method of treatment which has been used in over 150 cases of fractures of the mandible admitted to the Edenvale Hospital during the past 10 years, comprising both European and non-European cases, but predominantly non-Europeans. Almost without exception the fractures in non-Europeans have been due to assault. The method of external pin fixation has been used on all cases requiring immobilization.

CLASSIFICATION OF FRACTURE SITES

For descriptive and practical purposes we divide fractures of the mandible into:

- A. *Fractures of the body*: 1. Incisor area. 2. Canine area. 3. Premolar area. 4. Molar area.
 B. *Fractures of the upper ramus*: 1. The coronoid process. 2. The condyloid process. 3. The portion of the ramus immediately below these two processes.
 C. *Fractures of the angle*, including fractures of the lower part of the ramus, and of the part of the body behind the last molar tooth.

An analysis has been made of the sites of fracture in our last 100 consecutive cases, and the results are as follows:

A. *Single Fractures*. There were 54 cases with single fractures, distributed as follows:

Incisor area 9, canine area 6, premolar area 4, molar area 17, angle 18.

B. *Double Fractures*. The remaining 46 patients had double fractures, with the following distribution:

Incisor + canine 1, incisor + premolar 1, incisor + molar 7, incisor + angle 5, incisor + upper ramus 5, canine + canine 1, canine + molar 7, canine + angle 5, canine + upper ramus 2, premolar + premolar 1, premolar + molar 3, premolar + angle 2, premolar + upper ramus 1, molar + molar 2, molar + upper ramus 1, molar + angle 1.

These figures show that the majority (65%) of single fractures occurred in the molar area and at the angle of the mandible. Another interesting fact that emerges is that fractures of the upper ramus were always associated with a second fracture elsewhere.

METHODS OF TREATMENT

Broadly speaking, the methods of treating fractures of the mandible may be divided into two groups, viz. (1) Inter-maxillary fixation and (2) external splintage. For reasons which will be discussed, we employ the technique of external fixation which was advocated by Roger-Anderson.

Fractures requiring fixation are in general as follows:

- (1) Any fracture of the body with displacement or mobility.
- (2) All fractures of the angle.

Fractures not requiring fixation are the following: (1) Fractures of the upper ramus. (2) Fine crack fractures of the body without mobility or displacement. The last group

are assessed by means of the 'bite test'; if the patient has the ability to bite firmly on a hard object without undue pain, fixation is not required.

Technique of External Pin Fixation

1. On admission, antibiotics are prescribed, because the fracture is nearly always compound into the mouth.

2. When the local swelling has subsided, i.e. after two or three days, and provided there is no infected wound or abrasion overlying the fracture, pinning is undertaken. The patient is given a general anaesthetic, with nasotracheal intubation and pharyngeal plugging.

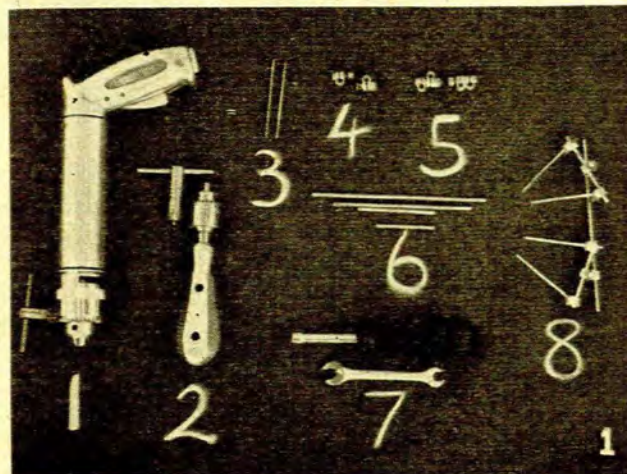


Fig. 1. The Roger-Anderson universal set. 1—air-driven power drill. 2—alternate manual introducer. 3—self-tapping pins. 4—single universal clamps. 5—double universal clamps. 6—cross bars of varying lengths. 7—spanners for tightening clamps. 8—2 units assembled.

3. The Roger-Anderson universal set, as illustrated in Fig. 1, is used.

4. The pins are driven by means of a power drill into the lower part of the body of the mandible, about $\frac{1}{2}$ inch above its inferior border. The outer cortex is penetrated and the inner cortex engaged by the self-tapping thread of the pin.

5. Two pins are driven into each fragment (the nearer being about $\frac{3}{4}$ inch from the fracture line), and their distal ends are then clamped to a short cross-bar, to form a unit. The cross-bar carries a double clamp between the pins, which is left free at this stage. The two pins comprising a unit are separated by about 1 inch, and are placed obliquely so as to have an included angle of about 60° . This

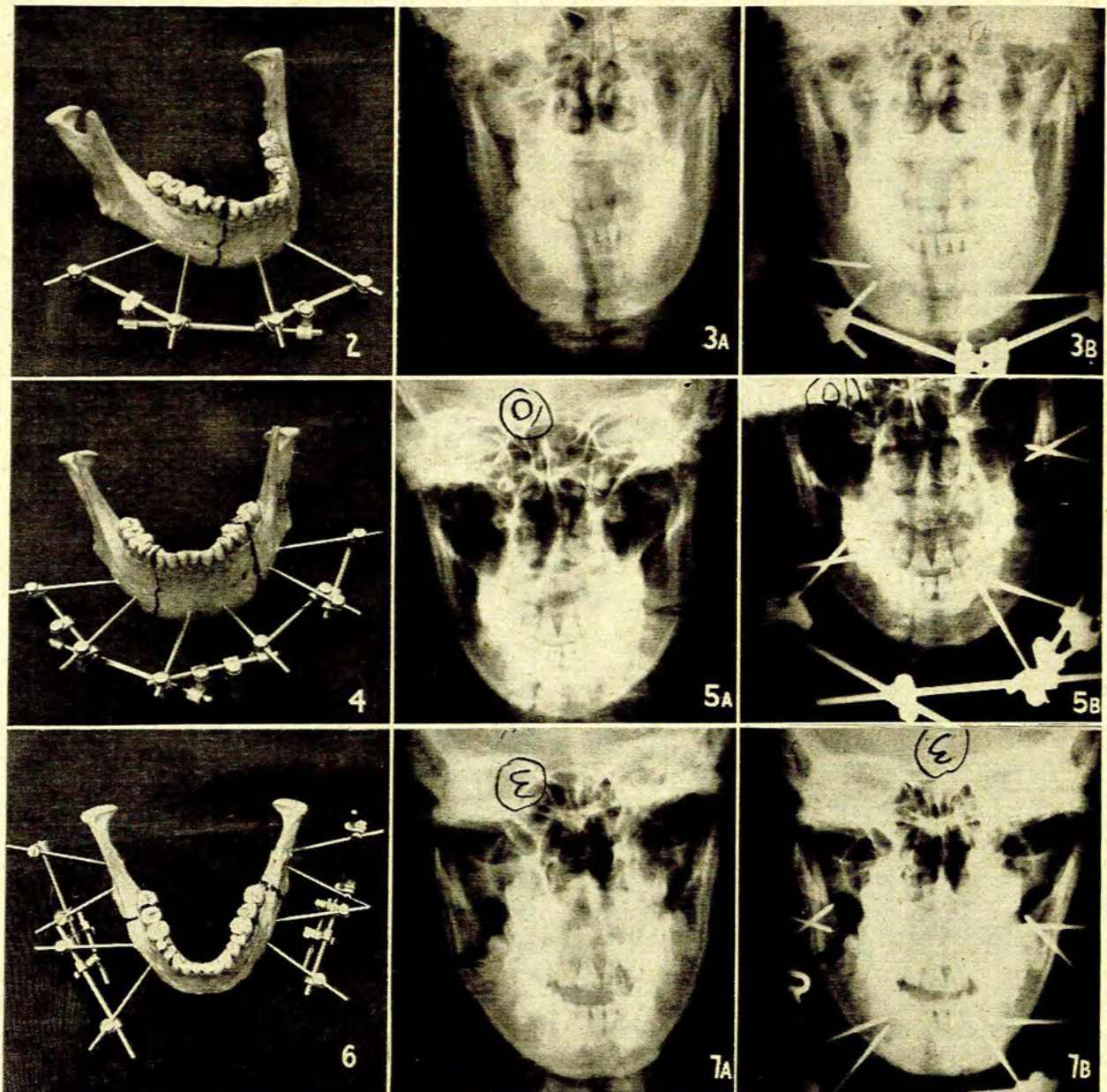


Fig. 2. Use of external fixation apparatus for single mandibular fracture. Figs. 3A and 3B. X-rays of single fracture of mandible without and with external fixation. Fig. 4. Use of external fixation apparatus for a double mandibular fracture, 3 universal sets being utilized. Figs. 5A and 5B. X-rays showing double mandibular fractures with and without external fixation. Fig. 6. Widely separated double mandibular fractures requiring four universal sets. Figs. 7A and 7B. X-rays of widely separated double mandibular fractures with and without external fixation.

is illustrated on a model of a mandible (Fig. 2), and in the X-rays of an actual case (Figs. 3A and 3B).

6. A cross-bar of suitable length is engaged in the double clamp of each unit, and after manipulation of the fracture, and whilst the teeth are held in accurate occlusion, the clamps are tightened.

7. Where 2 fractures are to be immobilized, 3 units generally suffice, the cross-bar of the middle unit then carrying 2 double clamps (Figs. 4, 5A and 5B). Where, however,

the fractures are widely separated (e.g., left angle and right molar region), the fractures are immobilized individually, 4 units being used (Figs. 6, 7A and 7B).

After-care

The patient is discharged 2-4 days after application of the splint (Figs. 8A, 8B, 8C and 8D). He is followed up weekly as an out-patient at the Fracture Clinic. If there is any malalignment of fragments or malocclusion, re-



Figs. 8A, 8B, 8C and 8D. Patient soon after application of external fixation apparatus. Note wide-open mouth and good teeth occlusion.

manipulation under general anaesthesia is carried out by loosening and re-tightening the clamps.

Occasionally a loose tooth in the fracture line, or one interfering with normal dental occlusion, needs extraction.

The pins are removed in the clinic after 6 weeks, and the patient discharged. There is firm fibrous union at this stage, although bony union does not occur for 12 months or longer.

Advantages of the Technique

1. The period of hospitalization is only 6 or 7 days.
2. The patient is able to enjoy a normal diet immediately the splint has been applied, because with this technique the fracture is immobilized without the mandible being immobilized (Figs. 8).
3. The patient is able to return to manual labour within a few days; this aspect is particularly important in non-Europeans, who are frequent victims of this injury and cannot afford to be off duty for any length of time.

Complications

These are few, and consist of occasional subcutaneous infection or osteitis. No case of osteomyelitis has occurred. In a few cases the pins have loosened in their tracks, but this has occurred at a late stage and has not interfered with the end-result. Such complications as may occur from infection along the pin track are negligible compared with the advantage that the patient is able to eat normally and return to his job within a week.

DISCUSSION

Intermaxillary fixation in one form or another carries the following drawbacks:

1. Inability to eat normally. Sometimes healthy teeth have to be sacrificed to allow of tube feeding.
2. Inability to hawk or expectorate, with consequent damming back of bronchial secretions and chest discomfort.
3. Excessive loss of weight due to inadequate diet.
4. Inability to perform heavy manual duties because of poor diet and inanition.
5. There is some difficulty in removing the wire fixation.
6. Should the patient require emergency surgery whilst the mandible is immobilized, the anaesthetic would present serious difficulties.

The criticisms that are levelled at the technique of external pin fixation in standard text-books on maxillo-facial injuries are (1) That the degree of immobilization of the fragments achieved is inadequate to guard against mal-union, and (2) that the fixation is not sufficiently accurate to ensure perfect occlusion, and that even a very minor degree of residual malocclusion reflects improper treatment and will lead to dental caries.

As our practice is predominantly non-European and long-term follow-up is impracticable, we are not able to settle the question of delayed dental caries developing in these cases. We do feel however that the advantages of short hospitalization with early return to work and immediate resumption of full diet weigh heavily in favour of the adoption of this technique, particularly for the non-European patient.

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