UNORTHODOX METHODS IN SCAPHOID FRACTURES

Review of 100 Consecutive Cases

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Two Types of Fracture

There are roughly two main types of fracture of the waist of the carpal scaphoid. In type I there is a crack in the bone with negligible or no displacement, whilst in type II fractures there is an appreciable gap and some degree of displacement.

The prognosis is best in type I and frequently the cartilage over the fracture line is intact. McLaughlin (1954) decided to treat a series by compression and inserted a lag screw for the purpose. The results were not such as to popularize the method, but operation soon after the fracture had occurred demonstrated intact articular cartilage across the fracture line in a number of cases. In these it would seem acceptable that in treatment immobilization sufficient to relieve pain and protect from further injury would be adequate.

Manipulative reduction ought to be undertaken in patients with type II fracture with displacement.

Economics and Treatment

First, patients must be encouraged to stay at work. This is advantageous all round, especially for the workman's morale and physical well-being. Secondly, treatment must be confined to the shortest time possible consistent with a good functional result.

It is conceded that it is not possible for all workmen afflicted with this type of injury to stay at work, but in order to make the injured wrist available for use a plaster-of-paris splint is used which does not immobilize the thumb. Admittedly, it is impossible to immobilize the fractured scaphoid without inclusion of the thumb in the plaster. On the other hand, it has been shown that the bone cannot be immobilized completely even if the thumb be included (McLaughlin, 1954).

The bone unites slowly, but treatment must be brought to an end early. Ten to twelve weeks after the accident, if the injured person is still under treatment, a careful appraisal of the situation ought to be made. A decision is taken as to which of various steps ought to be taken next.

The possibilities are:

- (1) Bone grafting.
- (2) Stop treatment.
- (3) Continue plaster treatment.
- (4) Other procedures may be advisable if, for instance, some complication exists, such as avascular necrosis. These are outside the scope of this paper.

Provided the patient is under 45, if there is non-union after 10-12 weeks' treatment a bone graft ought to be considered. The type of bone graft advocated is a tibial cortical graft, $\frac{1}{8}$ in. thick, inserted with X-ray control. Union takes place and the wrist is ready for heavy work 10-12 weeks after such a graft.

Another reasonable alternative is to stop treatment and to return to the former occupation after a short period of physiotherapy and rehabilitation. The disability associated with non-union of the scaphoid has been exaggerated. Only one-third of such patients have symptoms and they are usually slight. Mild symptoms are frequent in patients whose fractures have united. Those doing heavy work may need a wrist strap. In patients over 45 it is reasonable to stop treatment if there is delayed or non-union after three months' immobilization in plaster-of-paris.

On the whole, plaster treatment ought to be stopped at this stage. Bone grafting is to be preferred in the young and active. The outcome of this is reasonably certain, while non-union may still be the result after months of the use of plaster splinting. The older type of patient is advised to make the best of things and in the majority the functional result is good. No doubt it is justifiable to continue plaster treatment for a few weeks if there is a confident expectation of union occurring during that time.

In this connection Cohen (1953) considers that there are cases in which a fracture of the scaphoid progresses to final consolidation without fixation or treatment. A similar event was proved in the review which was undertaken and forms the basis of this paper. Patients discharged with radiological evidence of non-union had proven union a year later.

Diagnosis and Assessment of Progress

Although good quality X-rays are quite invaluable, it is considered that more weight should be given to clinical signs.

The two defects in radiological evidence in connection with this fracture are, first, that sometimes X-rays do not demonstrate a fracture in a scaphoid subsequently proved to be broken, and secondly, that X-ray proof of union is not present until long after union has taken place. These are serious drawbacks, but the clinician need not be misled. The physical sign of importance in diagnosis is the presence of tenderness when gentle pressure is exerted between the thumb on the back of the wrist over the scaphoid bone and the index finger in front. This sign is more useful than that of tenderness in the anatomical snuff-box. In addition, there is swelling in the region of the radial half of the carpus.

The main differentiation is from fracture of the radial styloid process (tenderness of the process and X-ray evidence) and from recent trauma to old fracture with pseudarthrosis (correct interpretation of history and X-ray appearances).

When to Stop Plaster Treatment

The same sign, tenderness over the scaphoid bone, is helpful in deciding when to stop plaster treatment. To wait for X-ray proof of union prolongs treatment unnecessarily. When pain on heavy pressure between fingers and thumb over the scaphoid has ceased plaster treatment is stopped. After two to three weeks spent in regaining power and movement the wrist is ready for full use.

It is usual to change the plaster after a fortnight in those in whom it has loosened, and for further X-ray examination in those in whom X-ray proof of the presence of the injury was not obtained at first. Subsequent changes of plaster may be at intervals of four to six weeks, and X-rays must be taken on each occasion.

In taking the postero-anterior view the fist should be clenched, the palm to the cassette and the hand in ulnar deviation. This gives the best view of the bone which is then more or less horizontal (Vernes, 1954).

Review of 100 Consecutive Cases

The injuries had been treated two to three years before the review; 64 patients attended for clinical and radiological examination, 32 replied to a questionnaire, and 4 were untraced.

The criteria for classification of the results depend on clinical and not radiological findings, and are shown in Table 1. When making the clinical assessment the range of movement was denoted by one percentage irrespective of whether

there was limitation of flexion, extension or deviation. The power was noted and the presence of swelling or tenderness. The patient was questioned with regard to pain, ability to do his usual job, strength and whether the wrist was as useful as before the accident. This method was considered applicable to the conditions of ordinary surgical work. The first of the four categories is thus self-explanatory. The second category—good—would include those with 10 per cent. limitation of movement or with occasional slight pain. A patient with a weak grip, appreciable limitation of movement or sufficient pain to have caused change in employment would come in the third category.

TABLE 1

Clinical Assessment	Category
Normal function and symptom free ..	Excellent
Slight symptoms	Good
Moderate symptoms	Indifferent
Considerable or severe disability ..	Bad

Sixty-four Patients Attending for Review

TABLE 2

Site of Fracture	No. of Cases
Waist	55
Tubercle	3
Distal pole	6
Total ..	64

There were 4 cases of recent trauma to old pseudarthrosis. Results in the remaining 60 patients were:

TABLE 3

Category	No. of Cases
Excellent	35
Good	22
Indifferent	3

The main complaint was slight pain at times on use and the most noticeable feature on examination was weakness of the grip. Limitation of movement was relatively slight and infrequent by comparison. Two patients had non-union, and of these one had had a bone graft without success. An additional seven patients had undergone bone-grafting and all had union. Three of these had excellent results and four were classified as good.

TABLE 4.—RESULTS OF TREATMENT IN EIGHT TIBIAL CORTICAL BONE PEG GRAFTS FOR DELAYED UNION

Category	No. of Cases	Union
Excellent	3	Present
Good	4	Present
Indifferent	1	Absent

Thirty-two Patients Who Replied to a Questionnaire

TABLE 5

Site of Fracture	No. of Cases
Waist	25
Tubercle	4
Distal pole	1
Proximal pole	2
Total	32

There were two patients with recent trauma to old pseudarthrosis. Results in the remaining 30 patients were:

TABLE 6

Category	No. of Cases
Excellent	17
Good	10
Indifferent	2
Died	1

From the X-ray appearances of these patients when discharged from hospital treatment it was considered that there were two with non-union.

Untraced

One of these patients had fracture of the tubercle and two of the waist of the bone, and X-rays showed that union was present when they were discharged from hospital treatment.

The fourth patient, who also had a fracture of the waist of the scaphoid, was advised grafting after three months on account of delayed union, but he decided to put the wrist to ordinary use and restarted work.

TABLE 7.—RESULTS OF TREATMENT IN 94 CONSECUTIVE RECENT SCAPHOID FRACTURES

Category	No. of Cases
Excellent	52
Good	32
Indifferent	5
Bad	0
Died	1
Untraced	4
Total	94

The remaining six patients had recent injury on old pseudarthrosis. The one death occurred after, not during, treatment.

Discussion

There were apparently five patients with non-union, an incidence of something over 5 per cent. (The real incidence of non-union is not known because a fair number of patients did not attend for review.) Barr (1953) found an incidence of

non-union of 22 per cent. in 35,000 military personnel afflicted with this injury, and although Cohen (1953) quoted only seven cases of non-union in 173 recent fractures, an incidence of up to 10 per cent. would not be considered unduly high.

On the other hand, there were eight fractures of the tubercle and in these symptoms are minimal and subside quickly.

The proportion of patients who underwent bone-grafting may be considered excessive, but it is a sign that active measures must be taken to reduce the time away from duty and the number of patients left with non-union.

Of the 94 recent fractures, 64 were classified as type I and 30 as type II. Only two patients with type I fracture had non-union and two had a bone graft inserted, whereas three type II patients had non-union and six had been grafted.

The possibility of really early grafting was considered for type II fractures in which one could foresee months of treatment. However, grafting is technically difficult at an early stage owing to the mobility of the fragments. McLaughlin (1954), in operating on recent fractures, found it necessary to devise a special apparatus to hold the fragments steady during fixation.

It was found that patients attending for trauma complicating pseudarthrosis had slight symptoms and recovered quickly. There seemed no need to deal radically with such cases, for instance by excision of fibrous tissue and cancellous grafts as described by Ritter (1953). Although Dwyer (1940) asserted that disastrous effects follow further injury to an ununited scaphoid with arthritic changes it was found that they responded well to two to three weeks' rest in plaster-of-paris followed by a short period of rehabilitation.

Summary

There are two types of fracture of the waist of the carpal scaphoid bone. In type I there is negligible displacement and the prognosis is much better than in type II in which there is displacement from the first.

For economic reasons a plaster-of-paris splint is used which does not include the thumb. It permits use of the hand, but it is important also to shorten the time of plaster immobilization. For this reason bone grafting is advocated fairly early in carefully selected cases with delayed union.

Symptoms are present in only one-third of patients with non-union of a scaphoid fracture and are generally slight. Even after union has occurred slight symptoms persist in a fair number of patients.

Importance is attached to clinical as well as

X-ray findings in diagnosis and assessment of progress. The absence of tenderness and swelling are the signs on which to rely in doubtful cases rather than to await radiological proof of union.

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