TREATMENT OF RADIAL HEAD FRACTURES USING A FIBRIN ADHESIVE SEAL

A REVIEW OF 15 CASES

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Since 1986 we have treated 15 patients with fractures of the head of the radius limited to one or two fragments (Mason type II) by open reduction and internal fixation with the Fibrin Adhesive System. At a mean follow-up of over two years, all but one of the results were excellent. This method is recommended for the treatment of selected fractures of the radial head followed by early mobilisation.

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The ideal treatment for articular fractures is anatomical restitution, but this usually involves the fixation of bone and osteochondral fragments by metal devices which require later removal.

A Fibrin Adhesive System (FAS) has been widely used in general surgery (Stemberger et al 1978), and also in orthopaedics for various tissues (Schwartz et al 1973; Rubak 1982), particularly for nerve anastomoses (Siedentop and Loewy 1979; Osgaard 1984), skin grafts (Westaby 1980) and osteochondral fractures (Westaby 1980; Meyers and Herron 1984; Niedermann et al 1985), and also as a haemostatic agent (Von Dinges et al 1979) and for filling bone cavities (Bösch et al 1980; Arbes et al 1981). It has also been used experimentally to fix stable epiphyseal fractures of the radial head, as it does not damage the epiphyseal plate (Havránek et al 1985). Its advantages include low cost, lack of immune response and its haemostatic properties (Meyers and Herron 1984). It has been suggested that bone revascularisation is enhanced (Bösch et al 1977).

The breaking strength of repair between bone fragments using the FAS is about 135 kg/cm² (McDougall and White 1957), and this implies that the bond may be adequate to fix bone and osteochondral fragments in joints which are not subjected to major load and traction forces.

PATIENTS AND METHODS

Since 1986 we have treated 15 patients with type-II displaced comminuted fractures of the radial head (Mason 1954) by open reduction and internal fixation with the FAS. There was one major fragment in nine and two detached fragments in six. There were ten men and five women. Details are given in Table I.

Table I. Details of 15 patients and results

<table>
<thead>
<tr>
<th>Case</th>
<th>Age (yr)</th>
<th>Sex</th>
<th>Fragments</th>
<th>Immobilisation (wk)</th>
<th>Follow-up (mth)</th>
<th>Loss of extension (degrees)</th>
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The Fibrin Adhesive System (Tissucol; Immuno AG, Vienna, Austria) supplies fibrinogen as the active substance, which is catalysed by thrombin and undergoes conversion to fibrin (Schwartz et al 1973). Fibrin has adhesive power and is eventually degraded by fibrinolysis. The FAS contains an enzyme which inhibits this proteolysis and thus prolongs the adhesive effect (Von Dinges et al 1979).
Appearance at operation, before (a) and after reduction of the fragments (b).

Radiographs before operation (a) and six months later (b).
The protein extracts are obtained from pooled fresh human plasma, but there have been no reported cases of hepatitis B, HIV infection or any other form of blood-borne disease in over one million cases (Immuno AG 1993), because of careful donor screening and thermal inactivation during production.

**Operative technique.** An incision is made through the gap between extensor carpi ulnaris and the anconeus. The fracture is reduced anatomically and a thin layer of fibrin adhesive is used to provide initial stability (Fig. 1). The elbow is then immobilised for from one to five weeks depending on the apparent stability of the reduction.

**RESULTS**

Immobilisation had been for from one to five weeks (mean 2.3) and follow-up ranged from 20 to 48 months. There were no postoperative complications or infections. Four patients had limitation of full extension, in one by 40° and in three by 10°. One patient had 10° limitation of supination. No patient had any pain and all had returned to their previous occupations.

Radiographs showed no signs of redisplacement post-operatively or of any secondary articular defects. The reconstruction was, in all cases, practically anatomical (Fig. 2).

**DISCUSSION**

The ideal treatment of radial head fractures is anatomical restoration of the articular surface with maintenance of length to avoid long-term complications at the elbow and the inferior radioulnar joint (McDougall and White 1957; Westaby 1980). Prosthetic replacement of the head of the radius has been recommended (Morrey, Askew and Chao 1981; Swanson, Jaeger and La Rochelle 1981) and the resection of comminuted fractures has been advised in the past. When there are only one or two fragments, we have shown that open reduction and internal fixation with the FAS can hold the fragments in an anatomical position until they have united.

We advise against attempts to use the FAS for comminuted fractures with more than two fragments. In one such case we failed to achieve a satisfactory repair, and resection of the head of the radius was performed at the same operation.

We consider that relatively early mobilisation of the elbow is important for the recovery of joint mobility and that the FAS provides sufficient stability to allow this (Arbes et al 1981). Our single case of significant loss of extension was probably due to an excessive period of immobilisation, rather than to the use of the FAS.

We conclude that fractures of the radial head with only one or two displaced fragments can be treated successfully using the FAS and with early but cautious mobilisation at seven to ten days after operation.

No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.

**REFERENCES**


