FROM THE ORTHOPEDIC DEPARTMENT, CENTRAL HOSPITAL, JÖNKÖPING, SWEDEN (CHIEF: A. JAKOBSSON, M.D.)

FRACTURE OF THE CAPITELLUM OF THE HUMERUS IN ADULTS

Treatment with Intra-Articular Chrom-Cobolt-Molybdenum Prosthesis

By

ÅKE JAKOBSSON

Watson-Jones distinguishes three degrees of injury of the capitellum of the humerus:

1. bruising of the articular cartilage of the capitellum;
2. chip fracture of the capitellum;
3. fracture of half of the capitellum and adjacent part of the trochlea.

   For the chip fracture the treatment is undoubtedly extirpation of the fragment.

Opinions differ greatly concerning the treatment of the third type. Thus, according to Lorenz Böhler the best treatment is extirpation of the articular fragment because of the difficulty in achieving an exact reduction. On the other hand Watson-Jones advises against extirpation of the fragment because of the risk of limitation of movement as the capsule tends to become adherent to the raw bone. He is of the opinion that the blood supply of the bone fragment is usually preserved. Smith considers that closed reduction may be justified in children. In adults. extirpation is the best method because extirpation of the avascular fragment cuts down the risk of development of traumatic arthritis. Jörg Böhler has recently published six cases with successful closed reduction and one further case with a good late result.

In order to avoid these complications I have, in two cases, inserted a chrom-cobolt-molybdenum prosthesis in place of the capitellar fragment. The prosthesis is an exact replica of the bone fragment (fig. 1 a, 1 b). This procedure has been possible thanks to help from the district

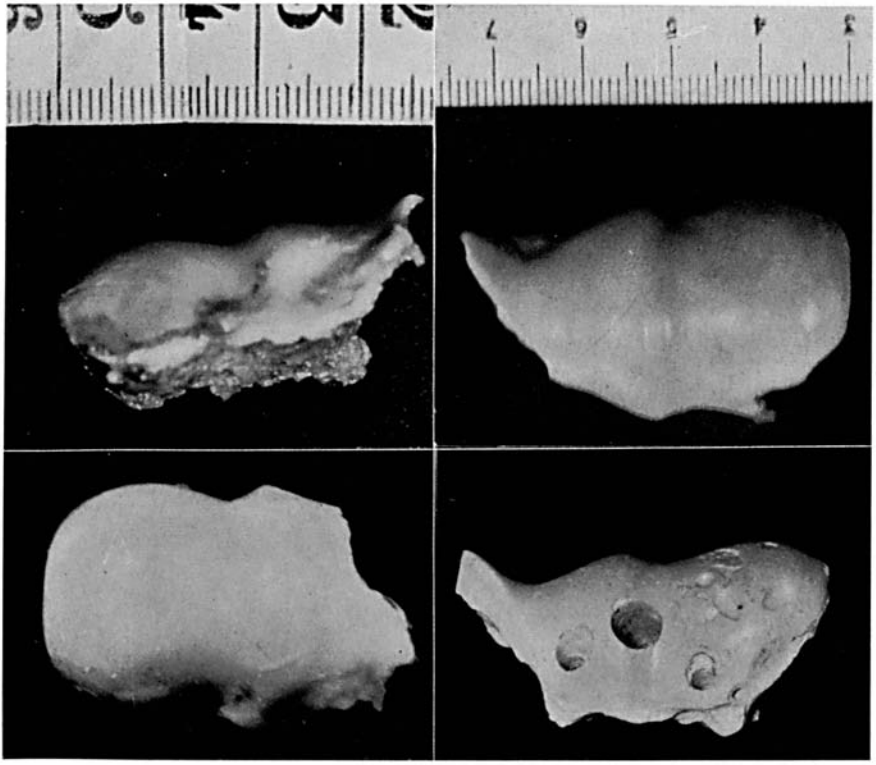
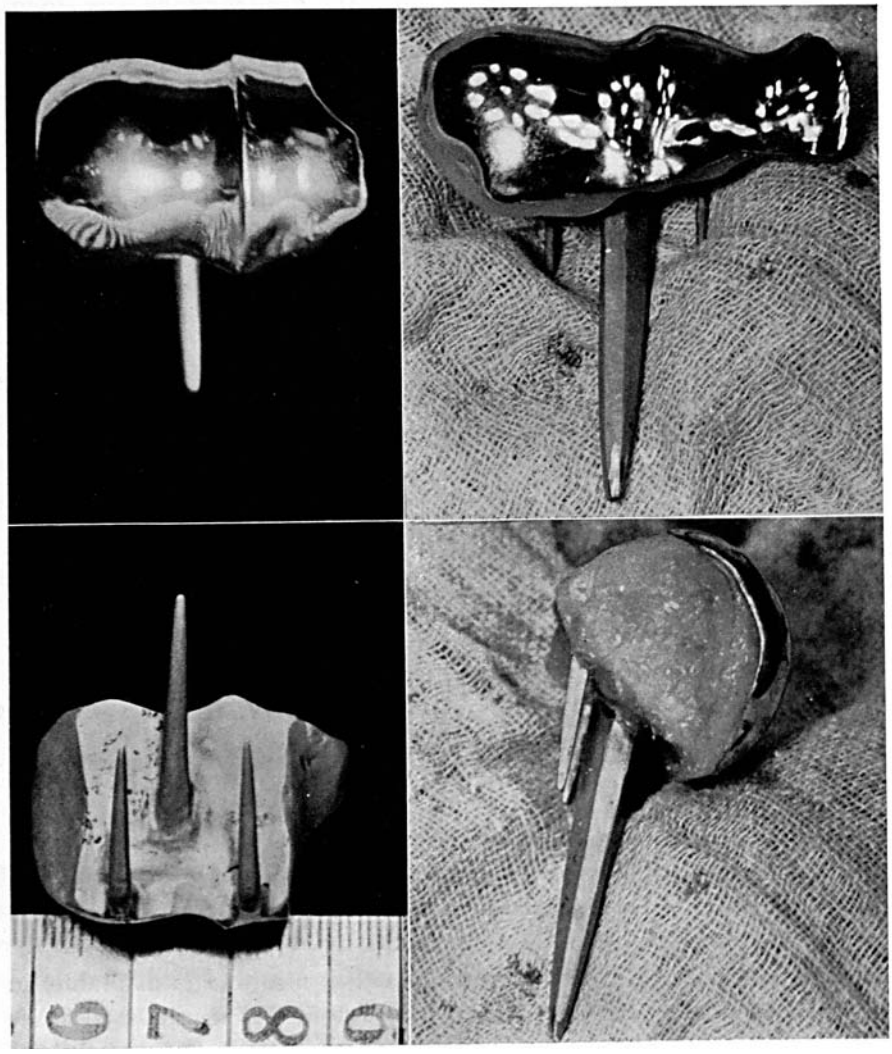


Fig. 1.

a. The capitellar fragment in case 1.
b. „ „ „ „ „ 2.
c. The steering plastic prothesis in case 2. Note the similarity of the fragments. In both cases the trochlea of the humerus is fractured in the same way.

dentistry laboratory. There a special casting machine is available, in which the casting takes place under rotation. The centrifugal force gives a uniform pressure and thus an exact copy is ensured. In the first case the complete prosthesis was cast in alloy (fig. 2 a). In the second case the bone fragment was too big for the casting machine, so only the joint surface and spikes were cast in metal, the rest of the prosthesis being made of plastic (fig. 2 b).

In the first operation the joint fragment was removed through a cubital incision. Two or three days later, when the prosthesis had been manufactured, it was put in place through a Kocher incision, which gives a very good approach to the joint. The only difficulty experienced was in drilling the canals for the nails of the prosthesis in the right



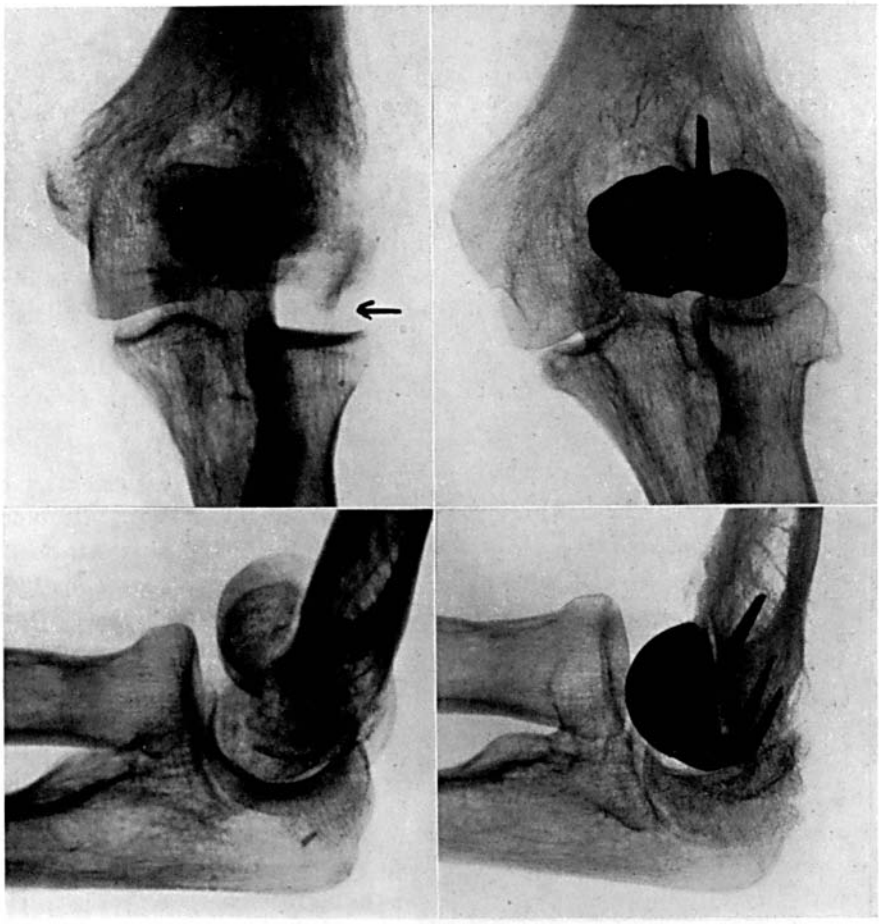
a b

Fig. 2.

a. Case 1. Chrom-cobolt-molybdenum alloy prosthesis.

b. Case 2. Plastic prosthesis with joint surface and nails of chrom-cobolt-molybdenum alloy. The central nail of the prosthesis is stronger than in case 1.

direction. However this was simplified in the second case by using a "steering" plastic prosthesis with canals in the direction of the nails which steered the drill in the right direction (fig. 1 c). After a few days active exercise was started. In the first case the range of movement



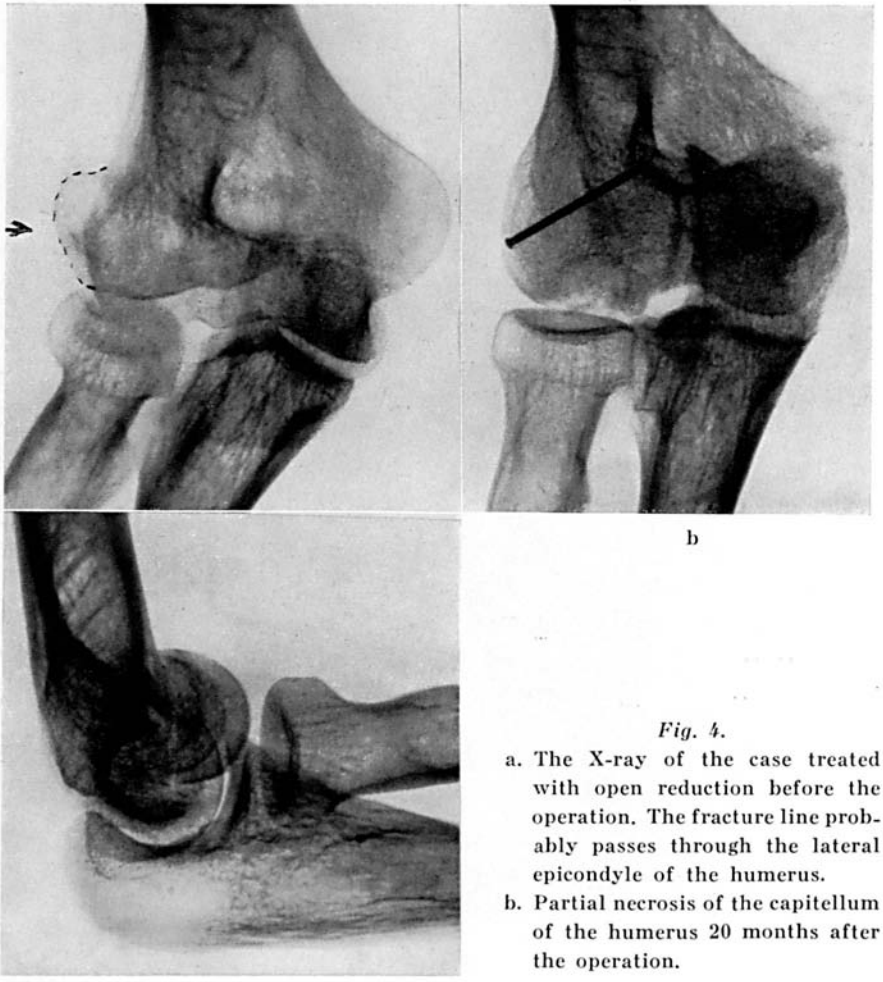
a b

Fig. 3.

a. Case 1 before the operation. Note the intact lateral epicondyle of the humerus.
b. Case 1 15 months after the operation.

is 155°–35° after 15 months and in the second case 150°–60° after 6 months. In both cases the joints are stable and painless.

A third case was operated on in the surgical department nearly 2 years ago. At operation the capitellar fragment was found partly attached by soft tissue. It was reduced and fixed by a nail. The range of movement is now 150°–60°, the joint is stable and there is no pain, but after exertion there is a little ache. The radiographic examination reveals a local necrosis of the joint surface. (Fig. 4 b).



b

a

Fig. 4.

a. The X-ray of the case treated with open reduction before the operation. The fracture line probably passes through the lateral epicondyle of the humerus.

b. Partial necrosis of the capitellum of the humerus 20 months after the operation.

It should be noticed that the lateral epicondyle of the humerus was not injured in my first case (fig. 3 a). I think that in such a case it is possible to extirpate the bone fragment and yet preserve a relatively stable joint. If, on the other hand, the lateral epicondyle is included in the loose fragment, extirpation will be followed by instability of the joint. In the second case it was partly fractured. However it was held in place by posterior soft tissue attachments. After the prosthesis had been inserted its lateral part was covered by the fractured epicondyle, which was fixed with a vitallium screw. In the last case, treated with

open reduction only, it appears from the radiographic examination before the operation and from the operation description that the fracture of the capitellum included part of the lateral epicondyle of the humerus (fig. 4 a). In spite of the fact that it was a favorable case for reduction due to the preservation of some blood supply to the capitellar fragment it underwent partial necrosis (fig. 4 b).

From these cases it would seem that it is possible to replace an avascular capitellar fragment with a prosthesis. If some complications should arise later the prosthesis can be removed and the joint has the same function as if the capitellar fragment was extirpated primarily.

SUMMARY

In 2 cases of fracture of the capitellum of the humerus with avascular fragment the writer has made a cast of the capitellar fragment and manufactured a chrom-cobolt-molybdenum prosthesis, which has then been inserted in the joint. The result has been a painless, stable joint with a range of movement of 155°–35° and 150°–60° respectively. A third case is mentioned, which was treated with open reduction of the fracture where examination 20 months after the operation revealed a partial necrosis of the capitellar fragment; the functional result however was good.

RESUME

Dans deux cas de fracture de la tête de l'humérus avec fragment avasculaire, l'auteur a pris l'empreinte du fragment de la tête et fait fabriquer une prothèse en chrome-cobolt-molybdène qui a été insérée dans l'articulation. Il en est résulté une articulation stable, sans douleur, avec une motilité de 155°–35° et de 150°–60°, respectivement.

Un troisième cas est mentionné, traité par réduction ouverte de la fracture. Un examen effectué 20 mois après l'intervention chirurgicale a révélé une nécrose partielle du fragment de la tête; le résultat fonctionnel en était cependant bon.

ZUSAMMENFASSUNG

In zwei Fällen von Bruch des Capitulum humeri und avaskulären Fragment hat der Verfasser ein Modell des Fragmentes gemacht und darnach eine Chrom-Kobalt-Molybden Prothese hergestellt, die in das Gelenk eingefügt wurde. Das Ergebnis war ein schmerzloses, stabiles

Gelenk mit einem Bewegungsumfang von 155°–35°, beziehungsweise 150°–60°. Ein dritter Fall wird erwähnt, der mittels offener Reposition des Bruches behandelt wurde. Im letzteren Falle erwies die Untersuchung 20 Monate nach der Operation eine teilweise Nekrose des Capitulum-Fragmentes. Das funktionelle Ergebnis war jedoch gut.

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