

EXPERIENCES WITH OPEN REDUCTION OF MEDIAL FRACTURES OF THE FEMORAL NECK

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Since the early nineteen-thirties, when *Sven Johansson* published his technique of closed reduction of medial femoral neck fractures, open reduction and internal fixation have only in exceptional cases been used in the routine management of these fractures.

Whenever this treatment has been resorted to, it has invariably been indicated owing to failure by means of closed reduction to achieve an adequate apposition of the fracture surfaces, permitting osteosynthesis. In view of the technical progress of the past decade, however, one wonders whether the obviousness of this indication being the only one is not about due for reconsideration.

Hulth's venographic study (1958) has introduced a more reliable method of predicting the outcome of a fracture at the time of operation. His investigation established that a negative venogram, i.e. failure of the veins draining the femoral head to be filled by the injected contrast medium, combined with a marked varus displacement, almost invariably results in more or less extensive necrosis. *S. Johansson* (1960) has subsequently reported promising results from experimental studies of the femoral head circulation by means of injections of ^{131}J .

Charnley reported in 1957 that with his so-called compression screw-plate the incidence of unsatisfactory clinical results could be materially reduced, i.e. from 50 per cent in earlier series using the Smith-Petersen nail to about 20 per cent in his current series. His appliance permitted compression of the fracture for a long period of time, even if a resorption occurred in the fracture site. In *Charnley's* opinion, this compression achieved more than merely complete immobilization. *Trueta* has suggested that the devitalization of a narrow zone of trabeculae in both

fragments, brought about by the compression, may stimulate vascular activity and thereby increase the formation of new bone in the form of a "creeping substitution", which replaces the necrotic bone tissue in the head.

Viewed against this background, the questions of interest from a practical, clinical point of view may be formulated as follows: Can exact open reduction and a fixation based on the compression principle reduce the incidence of necrosis if examination of the circulatory function at the time of operation has indicated extensive vascular damage?

MATERIAL AND METHODS

During the period from 1957 to 1959, a total of 10 open reductions were performed at the Orthopaedic and Surgical Departments of the Uppsala University Hospital. In 8 cases fixation was achieved with the Charnley instrumentarium, while Nyström nails were used in the remaining 2 cases. Difficulty to obtain a satisfactory reduction was the primary indication in 4 cases. In the remaining cases the treatment was adopted in an attempt to prevent the development of necrosis, according to the principles outlined above.

The following technique was used. First, closed reduction was attempted by routine methods. Thereupon *Hulth's* venographic cannula was introduced through a small incision over the trochanteric region. In 8 cases the reduction was adequate to permit venographic evaluation. The joint was exposed by a modified lateral incision, which permitted careful dissection right to the anterior capsule (*Hirsch*). In some cases this was ruptured, but in the remainder it was incised along the long axis of the neck, taking great care not to injure any vessels. Outwards rotation provided easy access to the fracture site and no difficulty was encountered in obtaining an exact reduction. Following this, the fixation device was applied.

In all 8 cases where venographic examination was feasible, a negative venogram was obtained. In the remaining two cases bleeding from the head fragment indicated that its circulation was unimpaired.

The failure to obtain an acceptable result by closed reduction was in all 4 cases due to interposition. In 3 cases bits of the shattered capsule were interposed, partly fixing the central fragment and hampering its rotation during manipulative reduction. In the fourth case a satisfactory apposition of the fracture surfaces was hampered by interposition of an avulsed fragment of bone.

In the remaining 6 cases closed reduction had produced an apposition of the fracture surfaces, which ordinarily could have been considered sufficient to permit fixation. Nevertheless, exploration in 4 of these cases disclosed a partial interposition of capsule fragments, preventing complete direct contact between the fracture surfaces.

RESULTS

In the uniform group of 7 cases in which venography of the fracture site had produced negative results, all treated with Charnley's compression appliance, the following end results were obtained:

Healed fracture with extensive necrosis of the head – 3 patients.

Pseudarthrosis and signs of necrosis of the head – 3 patients.

One patient in this group died 4 months after operation from an intercurrent disease, so that the results in this case could not be evaluated.

In the eighth case in which the venogram had been negative, the osteosynthesis was performed with Nyström nails and somewhat more than a year after injury the fracture had united without appreciable signs of necrosis in the head.

The two fractures with apparently unimpaired circulation at the time of operation had 3 years postoperatively healed with no signs of necrosis.

DISCUSSION

The scantiness of the material does not permit any too farreaching conclusions to be drawn. Still, the results of the group with negative venograms – 6 total failures and 2 cases of uncertain results – do seem to be fairly conclusive. Even perfect reduction, achieved under visual control, and fixation by means of the compression technique had failed to influence the unsatisfactory course which could be expected. If, at the time of operation, the results of a venographic or autoradiographic examination of the circulation indicate the presence of extensive vascular damage, arthroplasty would seem to be a preferable alternative.

Interposition of fragments of capsule or bone was observed in a majority of these cases and in some instances was so considerable that it made an acceptable reduction impossible. Open reduction to eliminate this obstruction is the obvious treatment in fracture cases with apparently unimpaired circulation, provided the patient's condition does not directly contra-indicate the more elaborate operation. The two cases

in which the fracture united suggest that this treatment has decided advantages under those circumstances. A condition for success is a cautious surgical technique in order to avoid further vascular damage.

SUMMARY

In order to see if exact open reduction and a fixation based on the compression principle could reduce the incidence of necroses and pseudarthroses by medial femoral neck fractures with signs at the operation of extensive vascular damage, 8 cases were treated in this way, using a Charnley compression screw plate. The circulation was examined with Hulth's venographic method. The treatment failed to influence the unsatisfactory course, which could be expected, and arthroplasty would seem to be a preferable alternative in these cases.

RESUME

Afin de voir s'il est exact qu'une réduction ouverte et qu'une fixation basée sur le principe de la compression est susceptible de réduire la fréquence des nécroses et des pseudarthroses dans le cas de fractures médianes du col fémoral présentant le signe à l'opération de lésions vasculaires étendues, 8 cas ont été traités de cette manière en utilisant la plaque de compression à vis Charnley. La circulation a été contrôlée par la méthode vénographique de Hulth. Le traitement n'a pas eu d'influence sur l'évolution peu satisfaisante à laquelle on pouvait s'attendre et il semble que l'arthroplastie aurait été une alternative préférable dans ces cas.

ZUSAMMENFASSUNG

Um herauszufinden ob eine genaue offene Reposition und eine Ruhigstellung, die auf dem Prinzip der Kompression beruhte, das Auftreten von Nekrosen und Pseudarthrosen bei medialen Schenkelhalsbrüchen mit Zeichen ausgedehnter Gefäßversorgungsstörungen unter der Operation, vermindern könnte, wurden 8 Fälle in dieser Weise behandelt indem man eine Kompressionsplattenschraube nach Charnley verwendete. Der Blutumlauf wurde mittels der venographischen Methode nach Hulth untersucht. Die Behandlung vermochte nicht den unzufriedenstellende Verlauf, den man erwarten konnte, zu beeinflussen und eine Gelenksplastik würde in solchen Fällen augenscheinlich vorzuziehen sein.

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