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EDITORIALS AND ANNOTATIONS

APPRAISAL OF THE VASCULAR FACTOR IN THE HEALING OF FRACTURES OF THE FEMORAL NECK

Royal Whitman (1902) emphasised early in this century that what made fractures of the femoral neck so much less likely to heal satisfactorily than most other fractures was the difficulty in reducing and maintaining the apposition of the fragments for the required length of time. Since then this fundamental idea has been the main guide in the treatment of fractures of the femoral neck. The introduction by Smith-Petersen (1931) of his method of inserting the three-flanged nail under direct vision, and its modification by Sven Johansson (1932) to exclude hip arthrotomy, may all be considered as attempts to fulfil the aim originally established by Whitman. Many of the numerous modifications introduced through the years, as for example the use of multiple wire fixation by Moore (1934), may be seen as attempts to reach the same goal by other ways.

That impaction of the fragments would further contribute to stabilisation of the fracture, and thus make easy its repair, was soon recognised, for it was thought that the main reason for the better prognosis of the abduction over the adduction fractures was the firm impaction of the former. It appears that Cotton (1911) was the first to recommend impaction of the fragments by hammering over the trochanter, but the method was not given a fair trial until Putti (1940) and Lippmann (1937) independently devised their methods of corkscrew bolts to make the fragments penetrate into each other.

In this issue Charnley and his associates describe another procedure directed to exert a compression force across the fracture with the purpose of bringing about whenever possible a "first intention osseous union in every case in which the head was viable"—to use the words of the authors. That such ought to be the purpose of any new method devised for the treatment of fractures of the femoral neck will not be disputed, for the merits of any procedure in use are gauged by the frequency with which this aim is achieved. Unfortunately, experience has shown that the future of the femoral head—and frequently with it the destiny of the patient—depends primarily on the behaviour of the arterial supply to the head, so greatly exposed to severe damage either at the time of the accident or, on occasions, during treatment, particularly in the course of manipulating the fragments into acceptable position or in fixing them together with metallic devices. Moreover, we cannot dismiss the possibility of protracted vascular damage caused when the patient walks on a rarefied femoral head before bone replacement has re-established a trabecular structure that can carry the body load with full satisfaction.

This trend of thought has enhanced the interest in the study of the finer details of the arterial pattern of the head and neck of the femur in adults and in senile life, and the consensus is that the calibre of the vascular lumen does not decrease with age, and that the blood supply through the ligamentum teres is as rich as ever, even in extreme age. What changes with the years is the density of the trabecular system of the femoral head and neck, which leaves them at the mercy of otherwise mild injuries, especially rotation and adduction strains. It is apparent that such osteoporotic bones, in breaking, will tear apart those vessels that may stand in the way, particularly those described under the name of external epiphysial arteries, seriously exposed
when the fracture line comes closer to the lateral side of the head or when an extreme degree of adduction has torn the lateral capsular attachment to the neck. This seems to us (1953) the most important factor conditioning the whole issue; but we must recognise that, no matter how good the blood flow reaching the fracture line may be, protection is needed for the new vessels of the callus to develop and ultimately bring about sound bone union. There are some grounds for believing that if an ischaemic head could be protected efficiently against crushing and the fracture well reduced and immobilised for many months—perhaps for over two years—it might finally become revascularised from across the old fracture line until it was strong enough to carry the body weight again. The well known case of Inclan (1942), who reported in his first account of the use of banked bone a perfect vascular penetration of the femoral head after more than a year of ischaemia, may serve as an example of this possibility. But very few are the ischaemic femoral heads that may be preserved from destruction in senile patients.

As an understandable reaction, methods directed to determine from the early days whether the head is viable or not are being sought relentlessly, without waiting for the appearance of the relative increased density of the femoral head as a sign of its death. Unfortunately in this respect we are still unaided despite the encouraging efforts of Boyd (1955), Rook (1953), Müßbichler (1956) and others.

Until a method is found that will allow us to assess from the beginning the viability of the femoral head we are compelled to treat all the fractures with a similar ruling whether the head is viable or not. The best method would appear to be that which offers the best chance of producing a reasonable callus in the shortest possible time in the greatest number of patients. In this respect the technique described in this issue may well be a valuable contribution, making allowances, as the authors wisely do, for the short time that the procedure has been under trial and the relatively small number of patients as yet available for examination. If the claims of the authors at the present time are substantiated by future work their contribution may be considered an outstanding one. In any case, it would be no small matter to have reduced the percentage of the authors’ failures from 50 per cent in their previous series with the standard Smith-Petersen nail to less than 20 per cent with their new compression device.

It would be out of place here to discuss the mechanism by which compression may help. It is our impression that it does something more than immobilise the fragments. By devitalising a fine line of trabeculae from both fragments by their inter-penetration it may well be that compression stimulates vascular production and thus new bone formation. Whether the corkscrew and plate devised by Charnley and his colleagues causes always the appropriate amount of pressure to stimulate callus formation or whether on occasions it may prove to have an excessive pull considering the feebleness of some senile femoral heads is a question to be answered in the future. We will await with interest a report on the long-term results of this method. In the meantime, and even afterwards, it must not be forgotten that one of the main causes of failure in the treatment of fractures of the femoral neck is a technical fault such as inadequate reduction, whereby a gap is left between the raw surfaces of the fragments, or inadequate fixation by poor placing of the nail.

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REFERENCES


