CHAPTER FOURTEEN

FRACTURES OF THE FEMORAL AND TIBIAL CONDYLES

THE injuries specially to be considered under this heading are : (1) T-shaped supracondylar fractures of the femur, (2) fractures of the medial femoral condyle, (3) T-shaped fractures of the tibial plateau, and (4) depressed fractures of the lateral tibial condyle.

The principles which should dominate treatment must take into account the following three features :

1. They are fractures involving a joint.
2. They are fractures of cancellous bone and are either comminuted or impacted.
3. They occur commonly in elderly patients and only rarely in athletic age groups.

These features demand a method with the following requirements:

1. Early mobilisation because the joint is involved.
2. Avoidance of traction and the encouragement of ' controlled collapse.' Controlled collapse in fractures of cancellous bone favours rapid consolidation and therefore indirectly promotes the return of joint mobility.
3. Acceptance of radiological deformity if clinical deformity is not gross. This is often made possible by the patient's age and is part of the principle of ' controlled collapse.'

When these principles are observed the rate of consolidation and recovery of joint mobility in elderly patients is sometimes quite astonishing. It is no uncommon thing to find a fracture quite painless at three weeks under this regime. In the patient, aged eighty-one, illustrated in Fig. 152, the T-shaped supracondylar fracture of the lower end of the femur was treated on a Thomas splint with fixed traction. While permitting collapse of the fracture from its original position after reduction the shortening became excessive (Fig. 153). Because I was worried lest the projection of the sharp spike of diaphysis would impede movement of the extensor apparatus, I attempted a remanipulation ; but even after only two *weeks* the fracture could not be moved under full anæsthesia. Twelve weeks after fracture this patient had 90 degrees of knee movement and was walking without pain, though at that time she could not actively extend the last 10 degrees. The final result was excellent.

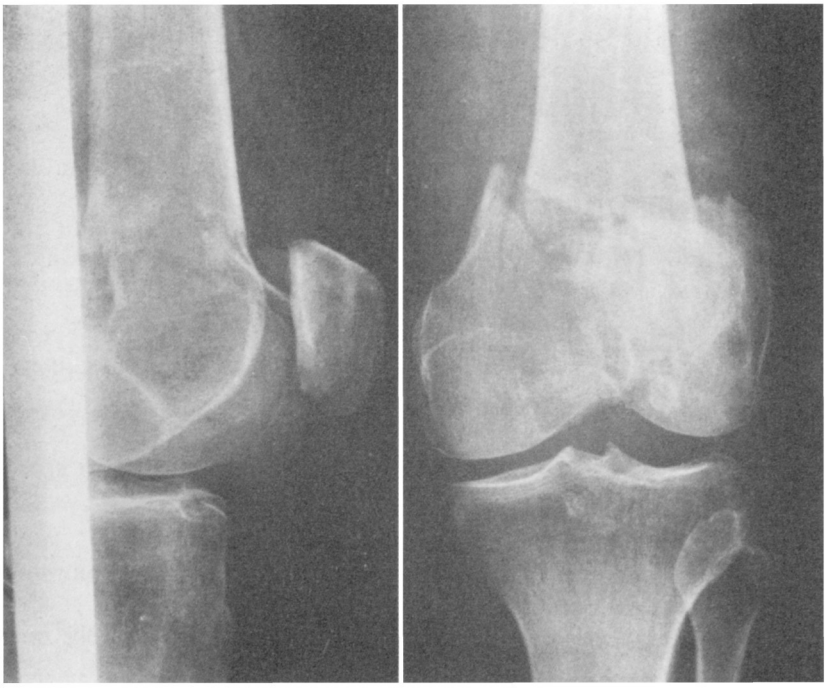


FIG. 152

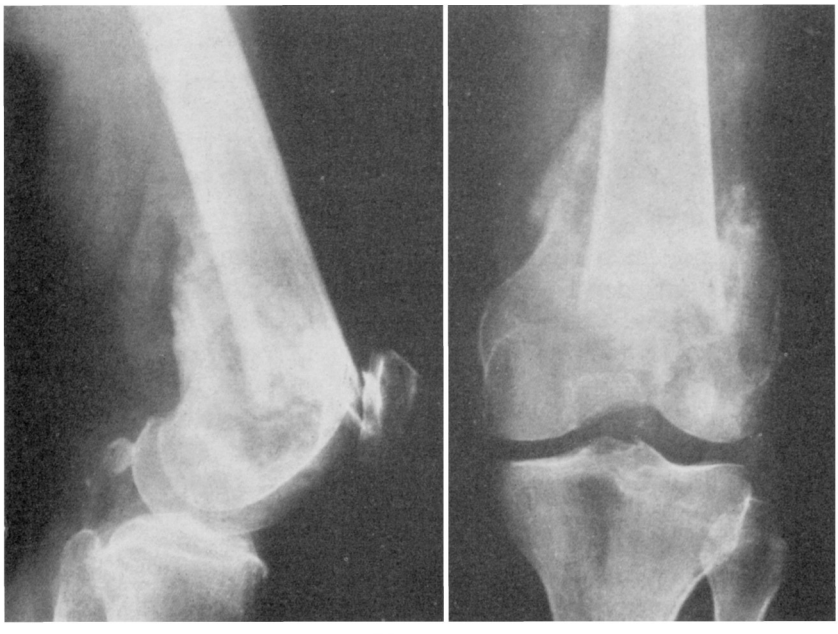


FIG. 153

Weight-Traction and Early Knee Mobilisation

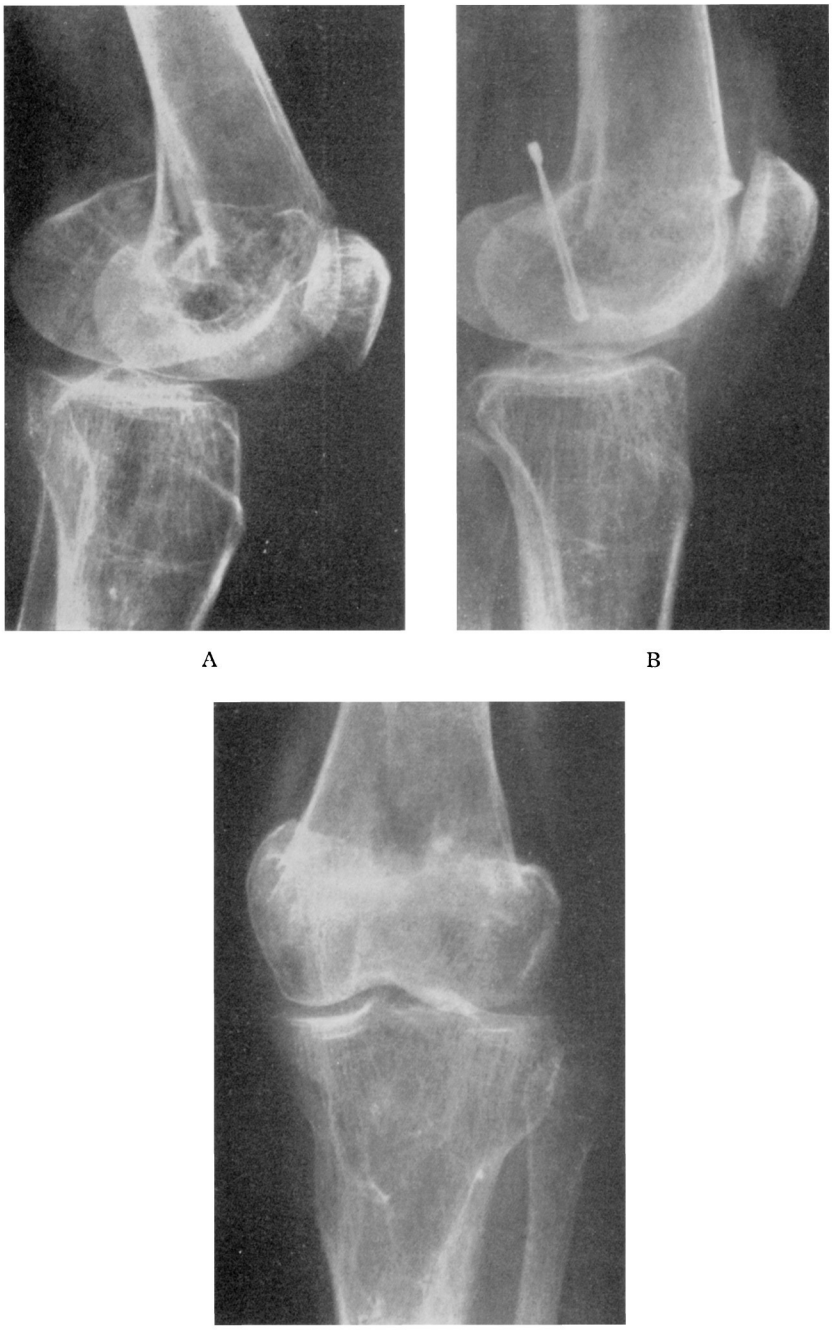
Excellent functional and anatomical results have been obtained in fractures involving the knee joint by weight-traction and early movement without splintage (Fairbank, 1954; Apley, 1956). I have no wish to decry the use of weight-traction without splintage in fractures involving the knee joint, and it is possible that I may be over-exaggerating the dangers of breaking down impacted fractures in cancellous bone by the use of weight-traction; nevertheless I still think that, *as a principle*, one must secure the start of sound consolidation before attempting joint movement if to procure joint movement introduces factors capable of impeding consolidation. The example illustrated in Fig. 154 is that of a frail woman, sixty-five years of age, treated with 'controlled collapse' on a Thomas splint with fixed traction. Movement inside the bandages was encouraged from the beginning, intermittent release of the knee was started at the end of three weeks, and all splintage was discarded at five weeks; 90 degrees of flexion was obtained at the end of seven weeks, and eventually a practically normal knee resulted. This speed of recovery of function and of knee range could not have been exceeded by any weight-traction method with early joint movement.

A disadvantage of the Thomas splint method is that it requires the daily attendance of a physiotherapist to untie and re-tie the traction cords. On the other hand, the method has a very important advantage over the skeletal traction in that control of alignment in the extended portion of the knee is possible and there is no danger of the infection of a fracture hæmatoma at the upper end of the tibia by a Steinmann nail applied in the area of tissue involved in œdema and ecchymosis.

An interesting example of conservative treatment in a fracture of the lateral femoral condyle is illustrated in Fig. 155 which occurred in a vigorous male of forty-five years of age. It is probable that many surgeons would have applied a transverse screw. Treated on a Thomas splint in the manner described the tendency to valgus deformity was minimised and intermittent mobilisation was started after three weeks. Function was so good that all splintage was abandoned after five weeks and the patient went home on crutches with 90 degrees of knee range. The end result was indistinguishable from normal and therefore the result of arthrotomy and internal fixation could not have been better. The only justification for operating on this fracture would have been a post-operative radiograph with a 'hair-line' reduction, and to get this might require a much more extensive arthrotomy than the operator expected at the start of the operation; to end the operation with an imperfect reduction would merely be meddlesome interference. If an attempt had been made to insert a screw it would have had to be inserted proximally in order to keep clear of the sliding mechanism of the joint capsule (a feature which does not complicate the insertion of screws transversely across fractures in the head of the tibia).

Technique

The mechanical principles involved in the treatment of all fractures involving the knee joint by means of the Thomas splint are the same whether the fracture is in the condyles of the femur or the tibia. The position of the fracture is



A B C

FIG. 154

Supracondylar fracture of femur in lady of sixty-five, treated by 'controlled collapse,' on straight Thomas splint, with skin extension for five weeks. Note knee range of 90 degrees seven weeks after injury.

D E

FIG. 154

Supracondylar fracture of femur in lady of sixty-five, treated by 'controlled collapse,' on straight Thomas splint, with skin extension for five weeks. Note knee range of 90 degrees seven weeks after injury.

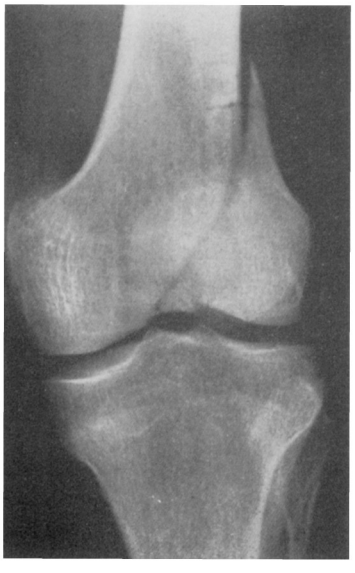


FIG. 155

FIG. 155—Fracture of lateral femoral condyle in man, forty-five years of age. Treated conservatively in preference to use of a transverse screw (see text).

'improved' (it is a euphemism to say that the fracture is reduced). This is done by getting an assistant to apply a traction force while the surgeon manually compresses the affected part of the knee from side to side, or from front to back, as the case may indicate. This is done after skin traction has been applied and a Thomas splint is in place. With the knee resting on the Thomas splint it is now

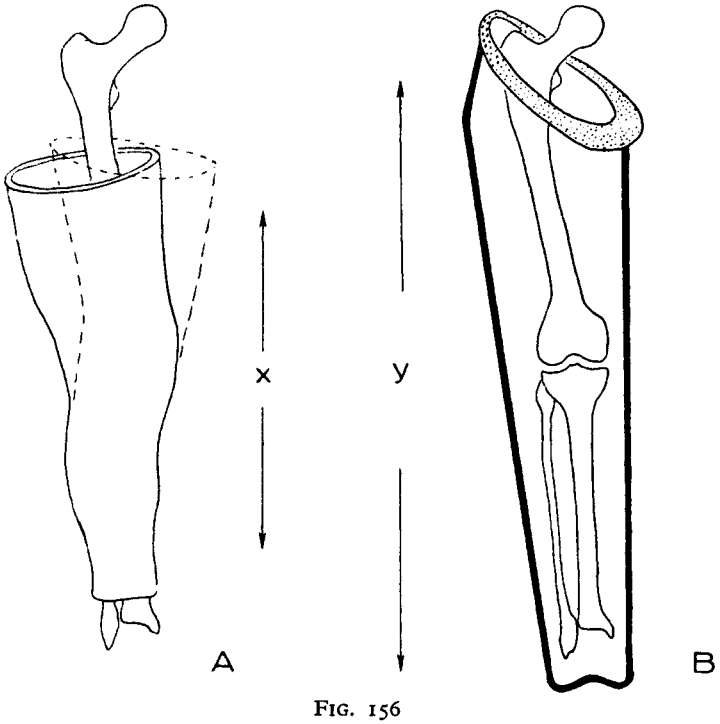


FIG. 156
Illustrating mechanical inefficiency of a plaster groin-ankle cylinder, A, in controlling angular deformity at the level of the knee, when compared with the long levers available in a Thomas splint, B. Short length of control (x); long length of control (y).

possible to control the amount of shortening by the skin traction and at the same time to correct the valgus deformity.

Very few people appreciate the mechanical advantage of the Thomas splint with fixed skin traction for injuries such as this in comparison with a plaster cast. It is necessary to emphasise that the Thomas splint permits an accurate control of valgus deformity because it takes a fixed purchase in the groin; in this respect it is superior to the inefficient control exerted by a plaster cylinder on a thick, short, and flabby thigh (Fig. 156). It is probable that those who fail to appreciate the mechanical advantage of the Thomas splint do so because they do not have the authentic apparatus with its complete ring and do not possess a suitable range of sizes; often what is called a 'Thomas splint' is nothing more than a variety of first-aid appliances with a ring which is so large that it can be applied outside the trousers, or which has a half-ring wrapped only in wool and a cotton bandage.

The Thomas splint is better than a plaster cylinder because *it allows* the *surgeon to observe the rate of clinical union* by detecting the earliest indications of the return of function. If a plaster cylinder is used it has to be applied for an empirical time of four to six weeks, but on a Thomas splint the sign that the knee is ready to start some active movement between two and three weeks after the injury will be evident when the patient is able to lift the knee a short distance off the pad lying under it. This movement is done with the heel still resting on the splint and is possible long before the patient can do a ' straight-leg raise.' The knee is not ready for the start of active joint movement until the patient can actively lift it a short distance inside the bandages holding it to the splint. There is no apparatus, except a Thomas splint with *fixed* traction, which simultaneously permits (1) incomplete immobilisation, (2) the control of varus and valgus angulation, and (3) the limb to be maintained with a controlled amount of shortening. It might be argued that simple balanced traction with weights and pulleys would facilitate knee movement and control angulation in a more comfortable and convenient way than the Thomas splint with fixed traction. But weight-traction can only control angulation when the intermuscular fibrous septa are pulled taut and this means that the limb is pulled out to full length. No other apparatus exists other than the Thomas splint with fixed traction, which allows the limb to remain slightly short (controlled collapse) without at the same time interfering with the efficiency of the mechanism controlling alignment.

It will be evident from this account how little the radiological control helps in the treatment of these cases. The recovery of motion in a joint where articular surfaces are involved by a fracture is quite unrelated to the amount of displacement; trivial displacements can often result in very stiff joints.

Résumé of Technique

To show the basic simplicity of the method the stages in treatment can be re-stated thus :

1. Under general anæsthesia apply skin traction to the leg, thread a Thomas splint over the thigh, and attach slings between the side bars to support the region of the knee.
2. With an assistant applying longitudinal traction to the foot, compress the knee from side to side and lower the limb on to the slings of the splint.
3. Attach the traction cords to the foot of the splint.
4. With tape measure or X-ray control, allow the limb to shorten a trifle after ' improving ' the position.
5. Encourage quadriceps contraction and watch for the first sign of the patient being able to lift the knee an inch or so off the splint—this will be about three weeks after the injury. By this I mean lift the knee with the heel still on the splint; it will not, of course, be possible to execute a ' straight-leg raise ' until much later.
6. When signs of active knee lifting are seen, untie traction cords daily and get a physiotherapist to support the limb and encourage active flexion exercises.

7. Abandon the splint when active straight-leg raising is easy (four to eight weeks) and rest knee on a pillow.
8. Do not worry if a little valgus deformity recurs in elderly patients—it will not be seen under a long skirt or in trousers.
9. Permit weight-bearing between eight and twelve weeks.

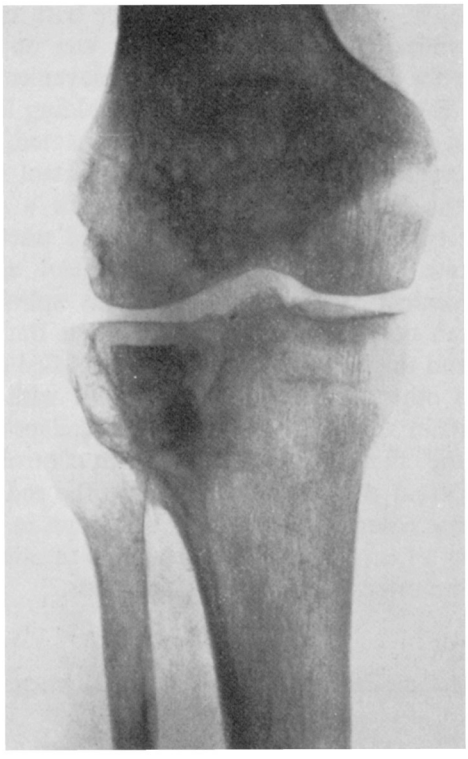


FIG. 157
Showing the result of open reduction in a depressed fracture of the tibial plateau—ischæmic necrosis of the fragment after operative elevation. Late traumatic arthritis likely though immediate result may be good.

Indications for Operative Treatment

Operative treatment is indicated in the relatively uncommon cases encountered in persons of athletic age, and especially where the fragments appear to be held apart by a down-driven fragment separating them. In these cases it is necessary to perform a complete arthrotomy and usually to remove a cartilage to expose the tibial plateau in order to raise the depressed fragment to the correct level (Fig. 157). In these younger patients a transverse screw is probably the best way of approximating the separated fragments.

REFERENCES

APLEY, A. G. (1956). *J. Bone Jt Surg.*, **38B**, 699.
FAIRBANK, J. T. (1954). *Proc. R. Soc. Med.*, **48**, 95.