TIBIAL CONDYLAR FRACTURES

THE LATE RESULTS OF CONSERVATIVE TREATMENT

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It is generally accepted that fractures into joints must, if possible, be afforded perfect reduction, and that when accurate reduction has not been achieved, some considerable stiffness and degenerative arthritis may confidently be expected. This was once commonly illustrated by the malunited fracture-dislocation of the ankle, and incongruities of the scaphoid, olecranon and acetabulum provoke early wear of their respective joints. An exception to this general rule is the tibial condylar fracture, which may be treated by skeletal traction and early movement with justifiable optimism.

The lateral tibial condyle is fractured when a valgus force acts on a knee through which weight is being taken, causing the corresponding femoral condyle to be driven downwards into the tibia. This combination of valgus and compression seems to occur in middle-aged people who fall short distances. The term "bumper fracture" or "fender fracture", introduced by Cotton and Berg in 1929, misstates the cause more often than not, and but for its useful brevity could well be discarded. Both the radiographic appearances and the mechanics of the fracture have in the past suggested problems in treatment which have divided surgeons into two distinct schools, namely, those who recommend open reduction and internal fixation, and those who are content to rely on closed methods.

Three types of lateral condylar fracture are customarily recognised, according to the classification of Palmer (1951).

(1) A vertical fracture splits off a wedge of lateral condyle, which may be little displaced, or displaced downwards and outwards. This type is most amenable to simple closed reduction, and also provides the simplest condylar fracture for internal fixation.

(2) There is a variable degree of compression of the lateral tibial plateau; a radiographic

appearance of minor plateau depression may belie extensive comminution, or the whole condyle may clearly be shattered.

(3) Comminution may involve both condyles, the fracture line resembling an inverted T or Y. With any of these three, the fracture line may extend through the neck of the fibula.

Fractures of the medial tibial condyle alone are seen much less frequently, being caused by a varus force on the straight knee. Their management is essentially similar to that of lateral condylar fractures.

It is argued by many protagonists of open reduction that such disruption of the articular surface of the tibia must inevitably lead to early degenerative arthritis of the knee: others simply affirm that the results of operation are better than the classical conservative treatment of attempted closed reduction and plaster external splintage. Palmer (1951) feels that conservative management of displaced fractures leaves too much to chance, and he operates on the displaced split type of fracture and on the comminuted depressed ones. Leadbetter and Hand (1940) believe that conservative treatment leaves genu valgum, lateral instability, limited movement and painful knees. This has certainly been quite contrary to our experience. Most authors who favour operative treatment agree that fixation of a comminution mosaic is difficult. Hohl and Luck (1956), in a classic paper, admit that the functional results of closed treatment are often considerably better than the anatomical or cosmetic results, and that operative reduction gives poor functional results, or, "at least as much recovery of function as comparable cases treated by conservative means"—a somewhat negative recommendation for surgery. Rombold (1960), appreciating the value of early movement, has for this purpose performed several *tours de force* of fixation of the shattered upper tibia with bolts, plates and screws. Perkins (1940), Furlong (1953) and Apley (1956) advocate a simple management of skeletal traction and early

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FIG. 1.—(a) and (b). With ten lbs. tibial traction, the patient extends his knee and flexes through the distal half of the bed. Range at 3 weeks.

movement of the knee, for which this paper seeks further justification.

For many years it was widely assumed that the mechanism of injury must necessarily damage the internal lateral ligament of the knee: and that even if operative repair of the ligament is not required, at least a period of plaster splintage must be accepted for ligamentous healing. But Martin's (1960) experimental work showed that, although sufficient valgus force could both tear the internal lateral ligament and fracture the lateral tibial condyle, the fracture could be produced without any associated ligament damage. Fairbank (1954) suspected that

TABLE 1
CAUSES OF INJURY

Fall	23
Pedestrian struck by vehicle	2
Knocked from cycle	3
Unspecified road accident	6
Association football	2
Struck by falling object on leg	3
Unknown	1
Total	40

ligamentous damage in bumper fractures was uncommon. In our experience it has been clinically absent or trivial.

Treatment

Tibial skeletal traction is applied under general anaesthetic, a Denham pin being inserted some three inches below the lowest extreme of the fracture as seen in the X-ray. Occasionally in certain fractures a crack extends down the tibial shaft for some inches: we prefer a pin placed low in the tibia for this type, rather than through the os calcis, provided that the foot is not in equinus when the pin is being inserted. A tense hæmarthrosis is aspirated. An attempt may be made to reduce significant displacement of the fracture by correcting any valgus of the knee and applying thumb pressure to the condyle, or occasionally by winding an Esmarch bandage up to the knee. The patient's leg rests on a pillow with 10 lbs. traction, the foot of the bed being raised for countertraction.

Physiotherapists encourage straight knee leg raising from the start, and subsequently knee flexion, for which a "split" bed is ideal though not essential. Most of our patients achieve 90 degrees of knee flexion and full extension within four weeks (Fig. 1). Union is presumed, and the traction discontinued, at six weeks. An X-ray is taken, but does not influence treatment. The patient then uses crutches and takes little or no weight through the affected limb for a further six weeks. At the end of three months from injury the average patient has, under supervision, regained full or nearly full movement, and can be encouraged to return to normal life.

Fisk (1962), calling this management the St. Thomas's Hospital tradition, criticises the lack of support for the limb during movement, and thinks that flexing the knee through a split bed is not a very natural exercise. How-

TABLE 2
SUMMARY OF TREATMENT ACCORDING TO SEVERITY OF INJURY

	Traction & early movement	Early movement alone	Plaster splintage	Internal fixation	Totals
Severe	9	0	1	2	12
Moderate	9	1	5	0	15
Mild	4	6	3	0	13
Totals	22	7	9	2	40

ever, we have found this method simple and rewarding for both patient and staff in the treatment of tibial condylar fractures. It is true that a similar management of femoral shaft fractures provides more problems, demanding a vigilant nursing staff and skilled physiotherapists.

Material and results

Forty patients were available for follow-up, out of one hundred and fifteen patients treated for tibial condylar fractures at St. Thomas's Hospital and the Rowley Bristow Orthopaedic Hospital between 1942 and 1961. The average age was fifty-three years, the youngest being twenty-seven, the oldest eighty-three. The average follow-up was 9.5 years, the shortest follow-up being three years and the longest twenty-two years. The causes of the fractures are summarised in Table 1.

Twelve of the patients were classified as severe injuries, where there was considerable comminution or condylar depression of five or more millimetres; fifteen were graded as moderately severe, and thirteen as mild, where there was little displacement. The treatment is summarised in Table 2. Seven fractures were treated by simple bed-rest and supervised exercises until control of knee extension and 90 degrees of flexion were obtained, being mobilised, and avoiding weight-bearing with crutches.

The results were assessed as follows:—

Excellent: painfree; full range of knee movement; no instability.

Good: Painfree, or having occasional aching in the knee; small loss of movement, usually of flexion; stable.

Fair: Aching after exercise; symptomatic loss of knee flexion; slight instability or valgus deformity.

Poor: Pain at rest; less than 90 degrees of knee flexion; marked deformity or instability.

In Table 3 the results are presented in

TABLE 3
SUMMARY OF RESULTS

	Excellent	Good	Fair	Poor
Severe	1	4	5	2
Moderate	6	7	2	0
Mild	7	6	0	0
Totals	14	17	7	2

relation to the severity of the fractures. Two patients, one of whom had a "moderate" condylar compression, one a mild split fracture, had forgotten which knee had been injured when reviewed twenty-two years later, and it was only the X-rays which showed evidence of the old fractures. Many of those labelled as good results were in fact very little short of excellent, having barometric aching in the knee or barely detectible abnormalities on examination. Residual valgus deformity of minor degree, and without any instability, was found in three patients; two patients had asymptomatic trivial lateral instability; two patients showed valgus instability of some ten degrees, one complaining of this and the other completely symptom-free.

The number of cases is too small to draw conclusions on the relative merits of treatment by plaster splintage and that of traction with movement. It is our definite impression, however, that early activity gives earlier return of function: patients splinted from the start appear to achieve comparable results, but their recovery of knee flexion is necessarily slower. Nor can comparison of these methods be made with internal fixation, used on only two patients in this series. Both of these had gross lateral condylar depression. The condyles were elevated and fixed with screws, in one patient as a delayed salvage procedure. One obtained a final knee range of 175 degrees to 90 degrees; the other continued to have severe pain and has now had her knee arthrodesed.

FIG. 2.—(a) Man aged 64 who fell from hayrick in 1944. Hæmarthrosis aspirated, traction and movement for 6 weeks. Later wore a caliper for a few months. (b) Twenty years later, he complains of occasional ache in wet weather. Knee flexion lacks 10 degrees, but is otherwise normal to examination.

FIG. 3.—(a) This 63-year-old patient fell off a table. Treated by traction for ten weeks. (b) Four and a half years later, the knee aches in cold wet weather, and she kneels with difficulty. There is a small degree of valgus but no wobble; range of 178 to 90 degrees.

Discussion

Follow-up radiographs of the knees in this series showed that, where there had been initial displacement of the fracture, some imperfection of the tibial joint line usually remained; persistent condylar depression or outwards spread was a common feature. On some films a little loss of lateral joint space was noted, but in no patient's X-rays was any gross degenerative arthritis apparent. Despite radiographic appearances of malunion, late

symptoms of these tibial condylar fractures are very few in the great majority of patients, and the functional results are surprisingly good.

Hohl and Luck (1956), after creating artificial defects in the knees of monkeys, splinted some of the knees and encouraged movement in others. The former group developed adhesions between the defect and the infrapatellar fat pad; in the knees which were moved, no adhesions formed, and the

FIG. 4.—(a) Aged 45, she fell off her bicycle. Initially the knee was said to be very valgus. Deformity corrected, traction and movement started. (b) Eight years later, only symptom is barometric ache. Knee looks slightly varus, lack 10 degrees of knee flexion.

FIG. 5.—(a) Initial X-ray in 1950 of a 66-year-old woman. (b) Fourteen years later, she denies all suggested symptoms. There is a small but definite valgus wobble, and a full painless range of normal movement.

defects filled with granulations and fibrous tissue which was converted eventually to fibrocartilage. The united tibial condyle must certainly be smoother than the radiograph suggests, the gaps and crevices being filled with fibro-cartilage. Treatment with traction checks further valgus deformity before union occurs, and movement will mould the fragments into reasonable congruity. (In contrast, plaster splintage must perpetuate incongruity). Instability from collateral ligament injury is a factor insufficient to make us distrust this

management. Accurate reduction and the holding of reduction of comminuted fractures in cancellous bone are seldom if ever feasible; the results of more simple treatment are strongly dissuasive from surgery.

Summary

1. Forty tibial condylar fractures have been reviewed after an average period of nine and a half years.
2. Twenty-seven of these were treated by skeletal traction and early movement, or by

movement alone. The results of conservative management were found to be satisfactory.

3. Disability from degenerative arthritis or joint instability is much less frequent than has been supposed.

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