

THE TREATMENT OF FRACTURES OF THE FEMUR BY PERKINS' TRACTION*

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'Is there any thing whereof it may be said, See, this is new? It hath been already of old time, which was before us.'

Ecclesiastes 1:10

The purpose of this paper is to draw attention to an old method of treating fracture of the femur, to report on our experience with its use at the Addington Hospital over the last 3 years and to describe its advantages and some of its pitfalls.

The results in 54 fractures of the femur treated by Perkins' traction will be compared with 93 fractures of the femur treated in Thomas's splints, and 67 by Küntscher nailing.

Perkins' traction is skeletal traction through the upper end of the tibia to maintain length and alignment of the limb.¹ Splints are not used and the limb is exercised from the beginning to encourage callus formation by maintaining the rich blood supply of the femur. It is based on the assumption that disuse and atrophy do not heal limbs.

Accurate reduction of the fracture is not attempted as it is felt that some displacement, especially slight shortening with bayonet apposition, leads to earlier union. This has been argued by St Clair Strange² and confirmed by our own experience.

The early exercise of the knee avoids stiffness which is so common a complication of fractures of the femur.

METHOD

Since 1962 the method of Procter³ has been used in the wards of the Addington Hospital, with a few minor modifications.

A Denham's pin is inserted, under local anaesthesia, through the upper end of the tibia about an inch below and behind the tibial tuberosity. The threads grip the bone firmly and avoid movement of the pin (Fig. 1).

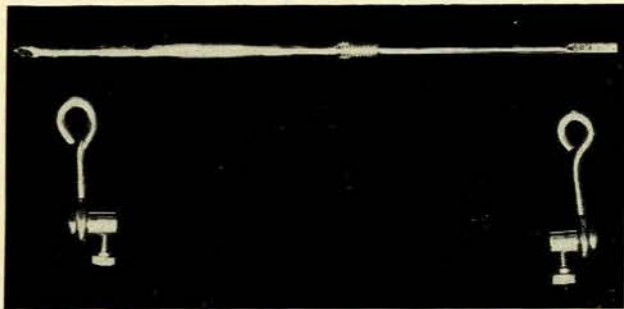


Fig. 1. Denham's pin showing the self-tapping thread in the centre.

Metal collars are attached to either side of the pin and traction is applied to them. Weights of between 8 and 15 lb. are attached to each collar, depending on the degree of overlap of the fracture and the musculature of the patient. The fractures in this series were not reduced under general anaesthesia. (We now feel that this is a disadvantage as it is not possible to rule out soft-tissue interposition.)

*Date received: 29 July 1968.

A pillow is placed longitudinally under the limb, from the middle of the calf to the middle of the thigh. This pillow (the master pillow) should not be moved during the early stages of treatment—a fact which should be stressed to the nursing staff. It should be of a distinctive colour. If there is any tendency to angulation at the fracture site this is controlled by placing a sling under the fracture with 5-10-lb. traction.

The alignment is judged clinically, and a control X-ray is taken after a week and the slings and weights are adjusted accordingly. Accurate reduction is not attempted, on the assumption that it is more important to treat the limb than to achieve a perfect X-ray.

Any tendency towards internal or external rotation is corrected either by increasing the weight on the medial or lateral strings or by placing the medial or lateral pulleys

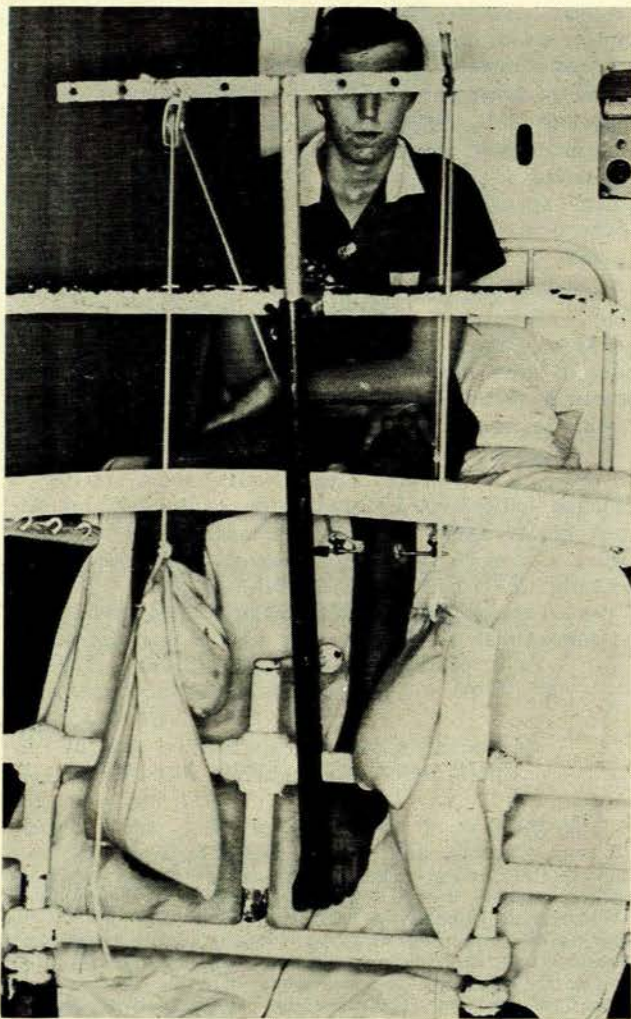


Fig. 2. Notice that the pulley on the lateral side is higher than the medial to correct for tendency to external rotation. The photograph was taken 6 weeks after the injury. The fracture was clinically and radiologically united, and the patient can bend his knee to 90°. He is able to sit up in bed and in this position could use a bed-pan.

higher (Figs. 2 and 3). Light upward traction may be applied to either end of the pin itself.

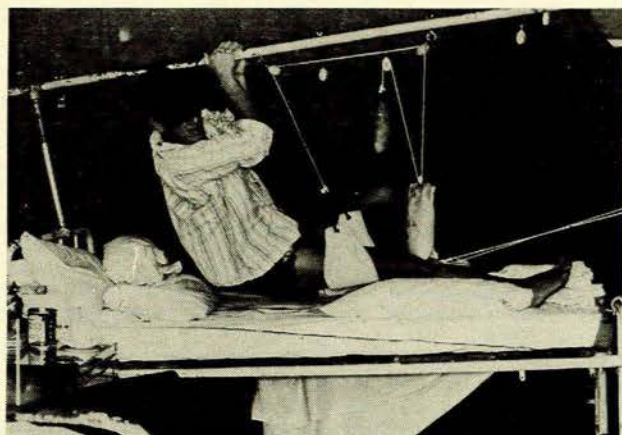


Fig. 3. Patient 10 days after his accident, able to lift himself clear of the bed. The position of the master pillow is shown, as is the sling under the fracture site.

The method of treatment is explained to the patient as soon as he is able to understand, and the exercises are commenced as soon as he can cooperate.

The bed used is the standard hospital bed from which the springs have been removed; the fracture boards are modified to prevent them from slipping off the bed. Two Dunlopillo half-mattresses are used.

Postoperative Management

Active quadriceps and hamstring contractions are begun as soon as possible. The patient is encouraged to contract all muscles. Crepitus and angulation are quite painless and it is surprising how comfortable the entire procedure is.

As soon as the patient can stabilize the limb with firm muscle contractions he is encouraged to attempt to lift it from the bed. He can usually do this at about the second week, when the fracture already feels clinically firm (Fig. 4).

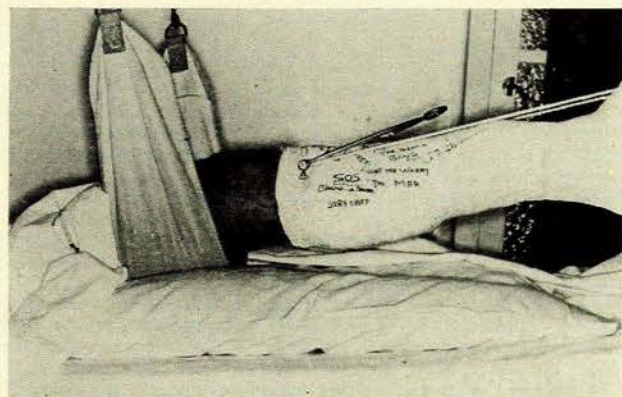


Fig. 4. A fracture of the tibia and fibula with a fractured femur in the same limb. The fracture has been reduced and the Denham's pin incorporated into the plaster. The curious shape of the plaster is due to wedging.

At this stage the mattress and lower fracture boards are removed and the patient flexes his knee, supporting

the femur with a hand over the fracture site (Fig. 2).

Recovery of flexion is rapid and usually by the time the knee flexes to 90° the fracture is united. It has been the practice to continue traction until 90° has been achieved. This takes about 6 weeks.

The patient is then allowed up in a weight-relieving caliper which he removes several times a day in order to exercise the knee. The caliper is discarded after 2-3 months.

Where the tibia is also fractured a below-knee plaster can be applied incorporating the Steinmann's pin, and the fracture of the femur is treated in the usual way.

In some cases there is interposition of soft tissue, but it is felt that a reduction under general anaesthesia will prevent this.

Pin track sepsis. There were 5 cases in which the standard Steinmann's pin was used. In no case was the infection severe enough to interfere with the treatment, and in all cases it occurred quite late. Since using a threaded pin there has been no case of sepsis. It would appear that loosening of the pin in the bone, and movement, are a prelude to sepsis. Perkins recommends removing the pin and inserting it at a lower or higher level, should sepsis occur.

Loosening of the pin is prevented by using a threaded pin.

The cooperation of the patient is essential for the success of this method, and unless he is prepared to exercise adequately some other method of treatment should be adopted. The sharper the tongue of the physiotherapist, the more rapidly does union occur.

Multiple fractures in the same limb, e.g. tibia and femur, double fractures of the femur and bilateral fractures of the femur, were found to unite much more slowly.

The advantages of the method are mainly that union is rapid, and is usually complete in 6 weeks. Incidence of knee stiffness has been much lower when compared with results of other methods.

The Denham's pin is more comfortable for the patient, a fact which was mentioned by several patients who had first been treated in Thomas's splints. It is particularly well suited to the treatment of multiple injuries. Once the patient can flex his knee, nursing is easier. He can sit on the edge of the divided bed to use a bed-pan, a concession which patients appreciate.

The method is very easy to use and supervise. There was never any problem of pressure sores or friction sores such as one occasionally sees with the use of Thomas's splints, and the equipment required is minimal.

RESULTS

Fifty-four patients with fractures of the midshaft or supracondylar fractures of the femur were treated by Perkins' traction. There were 4 supracondylar fractures.

TABLE I. ANALYSIS OF RESULTS

Method	No.	Average stay in hospital	Failures	Mortality	Stiff knees
Perkins	54	7 weeks	6	2	2
	58		10.4%	3.6%	3.4%
Thomas's splint	93	12 weeks	16	11	17
Küntschner nailing	67	5½ weeks	9%	11.8%	18.3%
			7	4	7
			10.1%	5.9%	10.4%

Four patients had bilateral fractures of the femur, making 58 in all.

Analysis of Failures

There were two true non-unions, both in elderly females with long oblique fractures of the femur with considerable displacement. It was felt that in these cases non-union was due to soft-tissue interposition which can be prevented by reduction under anaesthesia.

A third patient had a Küntscher nail inserted in the femur because of mobility at 8 weeks, although there was callus present. He had fractured both femurs, and one fused solidly at 6 weeks.

A fourth case of fracture of the mid-shaft of the femur was found to have soft-tissue interposition when operation for open reduction of the insertion of a Küntscher nail was performed.

In the fifth case a Küntscher nail was inserted into a double fracture of the femur (supracondylar and upper third), where the supracondylar fracture had united solidly but there was delayed union (at 8 weeks) of the upper third. A sixth case, similar to the above, was grafted without nailing and mobilized in a Thomas's splint.

Surgeons treating these cases expect early union, and, when union appears delayed, there is a temptation to undertake open operation. In no case did the use of Perkins' traction act as a contraindication to subsequent operations.

Stiff Knees

The first stiff knee occurred in an elderly woman with a supracondylar fracture grossly compound into the knee. She had flexion limited to 45° when she was discharged from hospital at 3 months. The final result is not known.

In the second case, a young male with a comminuted supracondylar fracture, the knee was still stiff at 60° after 6 months.

Refractures

There were two refractures. Both were in cases of bilateral fractures of the femur in patients who refused to cooperate. The first united after 3 weeks of traction. The second required Küntscher nailing and grafting.

SUMMARY AND CONCLUSION

Experience with 54 patients at the Addington Hospital has shown that Perkins' traction has distinct advantages over other methods of treatment. The non-union rate is no worse than with other methods and may very well be better if soft-tissue interposition is suspected in time. In Procter's series the union rate was 100%.

The incidence of stiff knees is very much less than with other methods. The stay in hospital is much shorter.

The ease with which this method can be used is stressed. Traction is very simple and requires no elaborate apparatus; there is no necessity for a large splint-room. A strict physio-therapist should direct exercise sessions twice daily. In this series no case was reduced under general anaesthesia. This is not necessary in the majority of cases, but the necessity for manipulation should be borne in mind.

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REFERENCES

1. Perkins, G. (1958): *Fractures and Dislocations*. London: Athlone Press.
2. Strange, F. G. St C. (1956): *Lancet*, 2, 305.
3. Procter, D. S. C. (1962): *S. Afr. Med. J.*, 36, 598.