

## The functional management of femoral shaft fractures



### Curriculum Vitae

Pauline Ingle (née Marshall), born in Port Elizabeth, qualified at the Royal Free Hospital, London. After working at the Robert Jones and Agnes Hunt Orthopaedic Hospital, Oswestry and as Resident Surgical Officer at the North Staffs Royal Infirmary during World War II, she returned to South Africa to work for five years at St Margaret's at Clydesdale Mission, Umzimkulu, before moving to All Saints Hospital, Engcobo in 1954, where she worked single-handed until Ronald was sent to help her in 1958. Ronald was born in China, where his father was a missionary Professor of Surgery. Ronald qualified from Kings College Hospital, London and spent five years with the RAF: first as a Station MO in Malaya and then in Surgery. They married in 1960 but have no children. According to custom, the community then changed Pauline's Xhosa name Celiwe (Called) to NoBantu (Of the people). They left All Saints in 1976. Ronald went to the Department of Health, Umtata for five years, expecting to be CMO for Primary Health Care, but was gradually trapped into general administration. Meanwhile Pauline got a BA from UNISA (Anthropology and Xhosa). After two years doing TB in the Border, Ronald joined the Department of Family Medicine at Medunsa and went into part-time retirement.

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### Summary

*The accepted, orthodox way in which femoral shaft fractures were managed changed dramatically during the time when the authors were at All Saints Hospital in Transkei – making it much easier, using fewer resources, simplifying the aftercare as well as the apparatus, and having better results. The changing pattern is explained by describing and illustrating firstly the orthodox method, then the Charnley's method and finally, with 15 practical points, the Functional method.*

### Introduction

In the 1950s we still lived with much of the management baggage we had brought from our medical education and training in the First World of the UK. The next 20 years at All Saints Hospital, Transkei saw a dramatic change in the way we managed fractures of the femoral shaft. This was not our only experience of the axiom that to simplify is often to improve. Another 20 years later we publish this particular simplification because we think this is likely to be just as helpful in the circumstances of today as it was to us in our circumstances then. We review the three methods and the steps involved in them.

### First period: The Orthodox Method (Fig 1)

This followed the teaching of Sir Reginald Watson-Jones.<sup>1</sup>

1. A good anatomical reduction is sought.
2. The Thomas splint, preferably with a Pearson knee-piece, must maintain the reduction, but at the same time provide for movement of the knee joint.
3. A Balkan beam with pulleys and weights is needed to:

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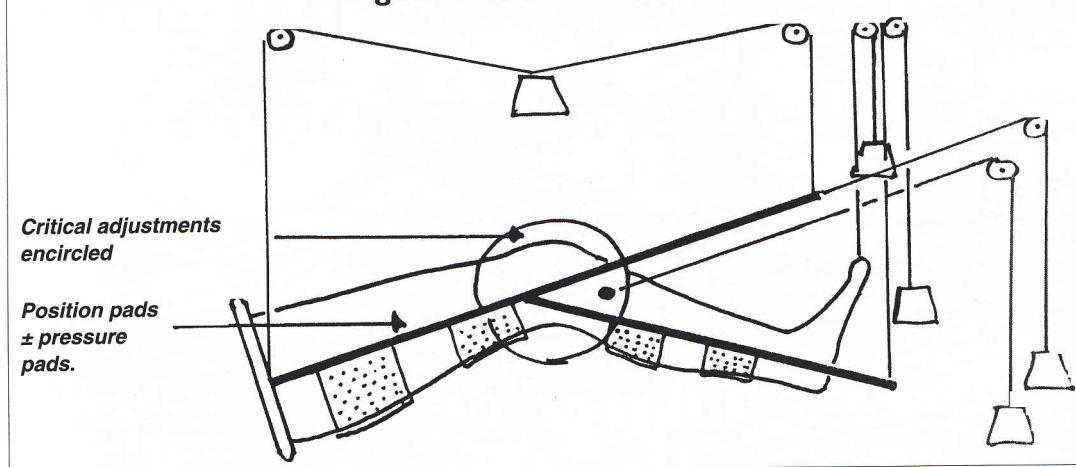
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### KEYWORDS

Femoral fractures;  
Rural health;  
Management.



**Figure 1 Orthodox Method**



To simplify is often to improve.

- a) balance the whole Thomas splint;
- b) apply continuous traction to the thigh via extension strapping or a below-knee Steinmann pin;
- c) balance the movement of the knee-piece; and
- d) maintain dorsiflexion of the foot.
4. Setting up involved general anaesthesia and X-ray control at the bedside and much disturbance in a crowded ward. Moving the bed to and from theatre was impossible.
5. The method required considerable practical skill, often several attempts at reduction, much attention to apparatus, and subsequent monitoring with X-rays.
6. Function at 12 weeks was poor.<sup>2</sup>

## Second period: Charnley's Method (Fig 2)

The mechanical and management principles of this method are beautifully described in *The Closed Treatment of Common Fractures* (which we feel sure is still essential reading for the rural surgeon).<sup>3</sup>

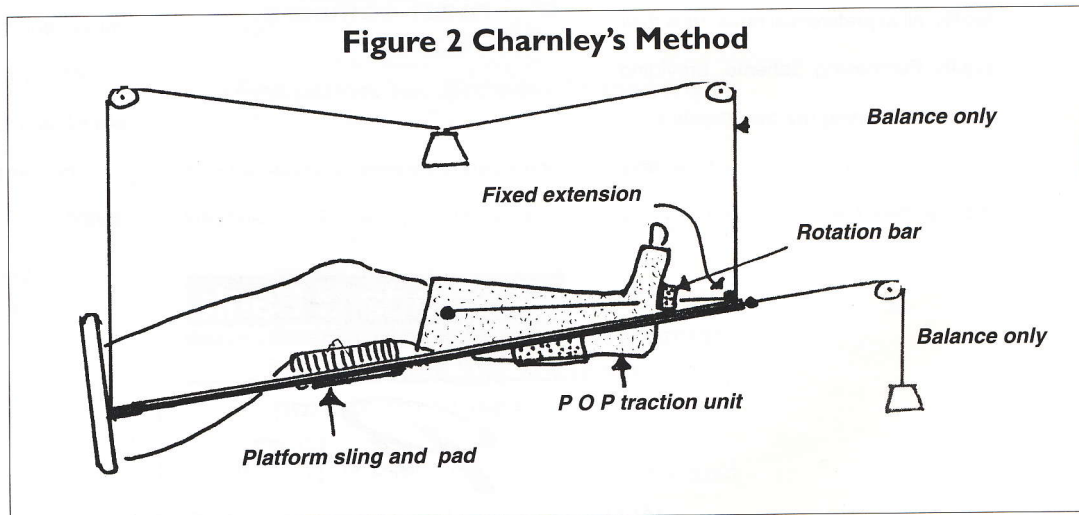
1. A traction unit is applied to the lower leg. It consists of a below-knee Steinmann pin embedded in a padded below-knee POP which also maintains dorsiflexion of the foot. A rotation bar is attached to the foot of the POP which, by resting transversely on

the side-pieces of the Thomas splint, prevents rotation.

2. Traction on the Steinmann pin is fixed to the end of the Thomas splint, which is simply balanced from the Balkan beam.
3. The keys to successful reduction and its maintenance are:
  - a) Using the Thomas splint slings as a platform to maintain forward bowing of the femur. When the slings are used as a gutter, the fracture sags.
  - b) Placing a large rectangular pad (about 20cm x 15cm x 8cm) between the fracture and the knee (not under the fracture site) to act as fulcrum, about which the traction unit applies an appropriate reductive force.
4. The traction unit could be applied and the fracture reduced in theatre, for the patient and splint are mobile, only balanced from the beam for con-

The functional method needs fewer resources.

**Figure 2 Charnley's Method**





# Functional management

venience. First time reductions were frequent and subsequent interventions few.

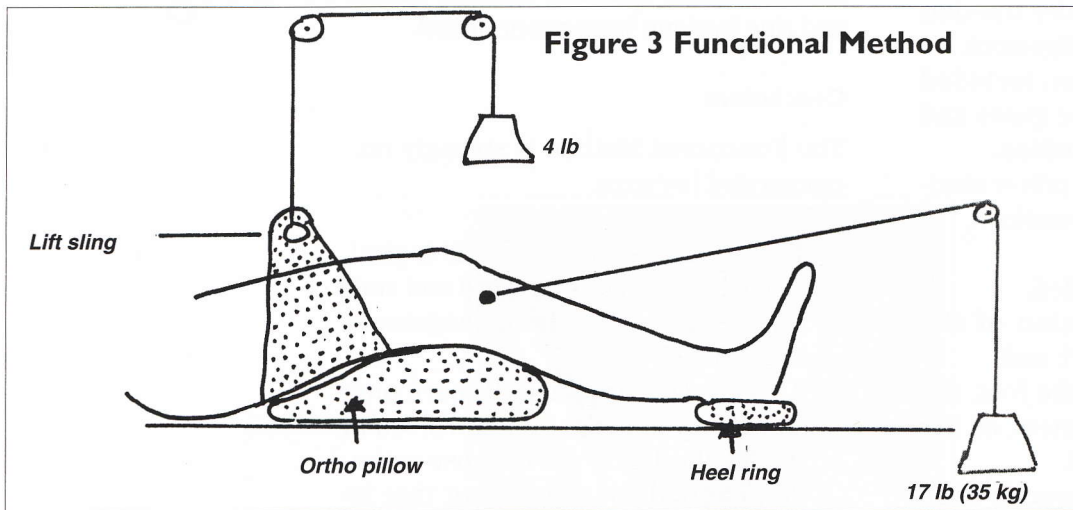
## Third period: The Functional Method (Fig 3)

Proctor,<sup>4</sup> in Zululand, based his method on the principles of Charnley<sup>3</sup> and the practice sometimes referred to as Perkin's Traction. Usdin<sup>5</sup> subsequently used the method at the Addington Hospital with minor modifications. We shall describe the method as adopted at All Saints where we did not use a split bed.

Anatomical reduction was preferred but not essential. The essential criteria were restoration of length and overcome of overlap.

4. **Control X-ray.** A portable X-ray was taken while traction was maintained with a pillow under the lower thigh, knee and upper leg. This X-ray provided the record of the fracture and the reduction, as achieved, in one. The pain of splinting and being X-rayed in the X-ray department and possible call out of radiographer was avoided.
5. The patient was then transferred to

The functional method needs simplified aftercare.



1. When a simple fracture of the lower two-thirds of the femoral shaft, not involving the knee joint, was diagnosed clinically in OPD, the patient was made comfortable with pillows and sandbags as he/she lay on the trolley.
2. The patient was taken to theatre and a below-knee Steinmann pin was inserted, and a stirrup and traction cord applied. This was done under local anaesthesia combined with premedication, or with Ketamine. General anaesthesia might have been used while gaining experience or with marked displacement. It should be remembered that skilful traction is a pain-relieving procedure.
3. **Reduction.** After applying traction, thereafter maintained by an assistant, the surgeon carried out an orthodox reduction manoeuvre.

the ward, with the surgeon or a responsible assistant maintaining the traction and alignment, and carefully transferred to a bed prepared with Balkan beam. The beam was positioned in abduction with its head off bed-centre to the side opposite the fracture.

6. **Maintaining traction.** Eight kilograms (17 lb) for average adults (9 kg for muscular adults) was applied at an elevation of 20 degrees and reduced to 5 kg after two weeks.
7. An 'orthopaedic pillow' was placed longitudinally under the lower thigh, knee and upper leg. This pillow should be well-filled and kept in a scarlet cover to remind everyone of its importance.
8. A purpose-made thigh sling was positioned under the fracture site and slung to 1½-2½kg weights to lift the fracture when the patient lifted

The functional method needs simplified apparatus.



onto a bedpan. A monkey bar hanging on the beam was essential for the patient's use.

9. A **heel ring** was used to both relieve pressure and help to keep the leg correctly aligned.
10. Finally the alignment of the thigh was set and thereafter checked at every nursing, physiotherapy and medical visit.
11. **Physiotherapy.** Thereafter the main task for recovery depended on physiotherapy, professional or otherwise.
  - a) Static quadriceps exercises started immediately. Under traction these also maintain alignment.
  - b) Heel-raising was soon included to achieve fully active quads and the extended knee position.
  - c) Knee-bending off the pillow started after two to three weeks.
12. Nurses made sure that:
  - a) traction was unimpeded;
  - b) the abducted position of the beam was maintained; and
  - c) that the position of the foot, the heel pad and alignment of the thigh was maintained.
13. **Pain-relieving drugs** needed to be generous and effective for 48 hours or so only. The concern of doctors and nurses about the painfulness of such a 'poorly controlled' fracture was soon dispelled.
14. **Follow up X-rays** were done after one to five days, and before mobilisation to assess the amount of bridging callus.
15. **Mobilisation.** Clinical union and full knee-bending occurred in three to five weeks. The fracture usually seemed ready for weight-bearing after eight or nine weeks, but we did not allow mobilisation in adults before 10 weeks. At this stage quadriceps function and knee-bending was so good compared with previous methods that it was for us to insist on crutches, such was patients' enthusiasm to be up and away.

## Contraindications

- Another major injury above the

pelvis (eg head injury) in which the management necessary interfered with the method.

- Inability of the patient to cooperate due to the disorientation or confusion of another illness or mental disorder.
- Subtrochanteric fractures and/or extreme flexion or adduction displacement of the proximal shaft.

Note that bilateral shaft fractures proved not to be a contraindication. By 1975 we had found that the method worked well for children under 12 years old, but that the difficulties of fitting Thomas splints and ring hygiene were pronounced.

## Conclusions

The Functional Method is strongly recommended because:

- The resources (surgical, radiological, anaesthetic, theatre or ward and staff time) spent on initial management are reduced.
- Aftercare is simplified. If more physiotherapy appears to be involved in this method, it is not because orthodox methods need less, but that its obvious benefit is motivational.
- Apparatus is simplified. Thomas splints are notoriously problematic.

The functional results are best.

## References:

1. Watson-Jones R. Fractures and joint injuries, Vol II. 4th ed. Edinburgh: E & S Livingstone, 1955.
2. Eggers IM and Mennen U. Application of a quadriceps endurance programme to patients with femur fractures immobilised by skeletal traction. *S Afr Med J* 1992;81:258-60.
3. Charnley J. The closed treatment of common fractures. 3rd ed. Edinburgh: E & S Livingstone, 1963.
4. Proctor DSC. The functional treatment of fractures of the femur. *S Afr Med J* 1962;36:598-601.
5. Usdin J. The treatment of fractures of the femur by Perkin's traction. *S Afr Med J* 1969;43:480-2.