

CASE REPORT

The Thomas Splint – A Necessary Tool In The Management Of Battlefield Injuries

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ABSTRACT

The Thomas splint was developed for the stabilisation of femoral fractures at the end of the nineteenth century, and since the First World War has been extensively used by the British Army. It has been shown to improve the outcome after ballistic fractures of the femur, but recently there have been moves to abandon this device in favour of more modern splints such as the Sager splint®. This is predominately due to the ease of use and smaller size of newer devices, which makes them more suitable for the pre-hospital environment.

However, we present our experience of managing both ballistic and closed femoral injuries using Thomas splints during the recent Gulf Conflict. It is our belief that the Thomas splint is an essential tool in the management of military femoral injuries at role three facilities and must be retained.

Key Words: *Thomas splint, military trauma, femoral fracture, traction, field hospital.*

Introduction

Hugh Owen Thomas devised his splint for treating femoral injuries in 1875 (1). During the First World War, its use was shown to dramatically reduce the mortality of ballistic femoral fractures. Colonel Sir Henry Gray, an RAMC surgeon, noted a reduction in mortality from 80% to 15.6 % during one battle in 1917 (2). Although the accuracy of these figures has been questioned (3) the use of the splint, combined with rapid evacuation to a casualty clearing station, undoubtedly had a dramatic effect on survival and morbidity rates. (4)

During the recent Gulf conflict 202 Field Hospital provided role 3 hospital care for UK forces in the initial war-fighting phase. We received 79 patients with penetrating fragment or gunshot wounds in the first ten days of the conflict. Most patients were received within 12 hours of wounding and were treated surgically using the International Committee of the Red Cross (ICRC) approach to war wounds – thorough debridement, stabilisation of any fractures, and the administration of appropriate antibiotics. All wounds were left open for delayed primary closure at a later date (usually five days).

In addition to the penetrating injuries, we also admitted a number of patients following blunt trauma, including 2 patients with significant injuries following road traffic accident (RTA).

Seven patients with penetrating or closed injuries to the femur were initially managed by Thomas splint and via a stabilisation longitudinal traction using a traction pin inserted into the proximal tibia (Figure 1). These patients are shown in Table 1.



Fig 1. A Thomas splint in situ.

Table 1. Patients requiring Thomas splint stabilisation.

Sex	Age	Injury	ICRC Grade
M	51	GSW to right distal femur	3
F	15	GSW to left femoral shaft	3
M	22	GSW left proximal femur	2
M	32	GSW left proximal femur	2
M	30	GSW left femoral shaft	2
M	31	RTA left femoral neck and shaft fractures	NA
M	31	RTA ipsilateral left femur and tibia fracture	NA

RTA = road traffic accident, GSW = gun shot wound.

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The ICRC grades wounds 1-3 dependant on the extent of soft tissue injuries. Grade 3 injuries are associated with significant bone, soft-tissue and vascular injury, and have a the highest morbidity and mortality rate.

Five of the patients were subsequently evacuated, but 2 remained as in-patients and were definitively managed by traction.



Fig 2. Radiograph of high-energy gunshot wound to the femoral shaft.

Illustrative Case

A 15 year old girl sustained a high-energy gunshot wound to the left thigh causing a multifragmentary fracture of the femoral shaft (Figure 2), and an extensive soft tissue and bony injury. This was treated by thorough debridement of foreign matter and non-viable tissue (Figure 3), the administration of antibiotics and traction pin insertion with application of a Thomas splint. Approximately 4kg of dynamic traction was easily provided in the field using bottles of drinking water.

She remained stable and comfortable, and was evacuated 2 days later; the stabilisation modified to provide fixed traction by securing the traction cords to the end of the splint. This permitted easy, comfortable movement of the patient, and a similar

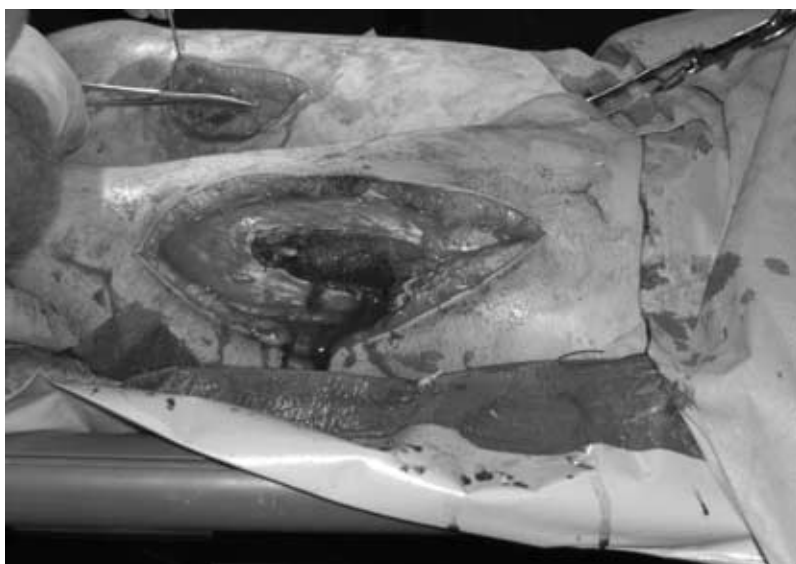


Fig 3. Following debridement of femoral injury.

example of the technique is shown in Figure 1.

Discussion

Despite recent advances in fracture care, the principles remain: adequate wound debridement and lavage, stabilisation of the limb and the administration of appropriate antibiotics. Reduction and stabilisation of the fracture reduces pain and therefore, analgesia requirement reduces further soft tissue damage and facilitates transport or evacuation of the patient. There are a number of methods of stabilisation available to the surgeon: plaster, open reduction and internal fixation (whether by plating or intramedullary nailing), external fixation, and traction techniques.

In general, plaster is the optimal method of stabilisation for military fractures, but it is not suitable for injuries with extensive bone or soft tissue damage. This is particularly true for gunshot wounds to the femur (see illustrative case) and, therefore, other methods must be considered. Internal fixation of military fractures has been associated with a high infection rate (6,7) and is inappropriate in a field hospital due to the equipment required. External fixation can be considered but it is difficult to achieve stability with femoral fractures, especially proximal or distal injuries (Figure 4). It has also been associated with a high complication rate when used for military injuries (8); extensive wounds when the pins would have to be inserted through the wound, predispose the site to infection. This would have been the situation with the illustrative case.



Fig 4. High energy GSW to proximal femur – unsuitable for external fixation.

Traction using the Thomas splint, although it may be considered antiquated, has significant advantages. This technique allows for comfortable reduction of the fracture, ease of transport and consideration of further methods of fixation at a later date if thought appropriate. In closed injuries from RTAs the use of the Thomas splint allows early evacuation to a base hospital for internal fixation.

Safe application of a Thomas splint requires three or four people. This is achievable

with role 3 staffing levels. The more modern splints are useful in pre-hospital care where they can be safely and speedily applied by limited numbers of front line staff prior to evacuating the patient to a role 3 facility. The Sager splint® is widely used in emergency departments and is eminently suitable for evacuation from point of wounding to definitive care at Role 3. It is not, however, suitable for long-term management of femoral fractures. Indeed, the manufacturer states: "The Sager Traction splint was designed for the emergency treatment of fractured femurs. Long term care for the entire healing process providing skeletal traction as provided by Thomas Full Ring Splint with Pearson or other attachment, was not considered" (9).

We have demonstrated that despite modern advances in splintage and fixation for long bone fractures, there remains an important role for the Thomas splint in military femoral trauma. Once again, it has proven itself in war and it should be retained in sufficient numbers at all role 3 facilities. It is appropriate that the Thomas splint established its reputation following its use in the management of GSWs to the femur, and

we have found that it is the most appropriate methods of stabilisation for these injuries.

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