

IAEM Clinical Guideline

Thomas Splint Application for Femoral Shaft Fractures in the Emergency Department

Version 1.0

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DISCLAIMER

IAEM recognises that patients, their situations, Emergency Departments and staff all vary. These guidelines cannot cover all clinical scenarios. The ultimate responsibility for the interpretation and application of these guidelines, the use of current information and a patient's overall care and wellbeing resides with the treating clinician.

Revision History

Date	Version	Section	Summary of changes	Author
August 2023	V1.0	All	Final version	EMcM/NP/ KM/SO'R

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GLOSSARY OF TERMS

DP	Dorsalis Pedis
ED	Emergency Department
FLACC	Face, Legs, Activity, Cry, Consolability
HCP	Healthcare Professionals
NOF	Neck of Femur

Thomas Splint Application for Femoral Shaft Fractures in the Emergency Department

INTRODUCTION

The femur is the longest, heaviest and strongest tubular bone in the body and a principal load bearing bone for the lower extremity. A femoral shaft fracture is defined as any fracture occurring between 5cm distal to the lesser trochanter and 5cm proximal to the adductor tubercle.

Femoral shaft fractures occur most commonly in young men and older women following highenergy trauma and low-energy falls, respectively. Blood loss from a femoral shaft fracture is associated with an increased mortality. Inadequately treated pain from these injuries may lead to complications such as pneumonia and myocardial ischaemia.

The role of traction is to control pain, to immobilise a joint or part of the body, and to reduce and re-align a fracture. In the context of a femoral shaft fracture the application of traction will reduce blood loss and allow for elevation of the affected limb.

Named after the early bone setter (Hugh Owen Thomas 1834-1891), the Thomas splint is a long leg splint with a loop that extends beyond the foot which can be fixed or used as part of balanced skin traction. The design of the splint has changed little since its early use in treating tuberculosis of the knee, and later, to treat femoral shaft fractures during the First World War.



PARAMETERS

- Target audience:Healthcare professionals (HCPs) in an acute care setting managing
patients with a suspected femoral shaft fracture.
- Patient population:Patients with a suspected or confirmed femoral shaft fracture in theED, including adults and children.
- Exclusion criteria:

 Neck of femur / pelvic fracture.
 Supracondylar fracture of the distal femur or fracture involving the knee joint.
 Fractures of ankle or foot.

 Contraindications:

 Patient refusal.
 Partial amputation with bone separation of the femur, where only marginal tissue connects the distal limb.
 Wounds or excoriated skin in the groin or buttocks where the Thomas splint will sit.
 - Signs of Compartment syndrome.

AIMS

The aim of this document is to provide guidance to clinical staff on the application of a Thomas splint for strongly suspected or proven femoral shaft fractures.

POINTS TO CONSIDER

- A <u>fascia iliaca or femoral nerve block</u> should be given prior to application of the splint if there are no contraindications to this.
- It may be necessary to provide further analgesia at the treating clinician's discretion.
- Explain the procedure to the patient, outlining the expected benefits from applying the splint.
- The application of Thomas splint traction should be carried out by at least two HCPs who are trained in the procedure.
- Thomas splints are made for either right or left legs. There are two types:
 - Fixed ring the shorter side will be applied medially.
 - Split ring the shorter side will be applied medially with the buckle lying over the outer thigh.

The split ring splint is preferable and should be used if available.

PATIENT MEASUREMENT

- Measure the patient's uninjured limb. An inside leg length measurement is required from the groin to the base of the heel. (Add a further 10-15cm to this measurement to allow for ankle plantar flexion in the splint).
- An oblique thigh circumference should be taken on the non-affected thigh to determine the thigh hoop size. Add 5cm to the ring end to allow for swelling and comfort.

EQUIPMENT

- Thomas splint (with complete or adjustable split ring) with correct ring size and length
- Double layer of elasticated tubular bandage / Tubigrip
- Skin traction set (Adult or Child)
- Measuring tape
- Gamgee padding
- Padding (as for plaster) for the pelvic ring
- Two Tongue depressors to act as a Windlass
- Scissors

Pre-Procedure

Prior to applying the splint, assess the limb and document the following:

- External rotation
- Limb shortening
- Level of pain using relevant pain score (numeric in adults, FLACC / Wong Baker / Vas or Manchester pain ladder scores in children) https://iaem.ie/wp-

content/uploads/2020/09/IAEM-Pain-Management-in-Paediatric-Emergency-Care.pdf

- Open wounds or skin damage
- Distal pulses present
- Analgesia administered
- Time of fascia iliac block

Set Up



- A B Thomas splint with Tubigrip Gamgee padding
- C D Skin traction adult
- Skin traction child
- Ε
- Tongue depressors Padding (as for plaster) Measuring tape F
- G
- Crepe Bandages Н

APPLICATION OF THOMAS SPLINT

- Pull double layer of Tubigrip over Thomas splint frame to create a sling for the limb.
- The heel should not be resting on the sling as this would cause a pressure sore. Slings should 'sag' slightly and the distal sling should end before the heel.
- Apply plaster padding to the pelvic rim of the Thomas splint. (Figure 1)
- Apply two layers of Gamgee (soft cotton padding) on top of the tubigrip for comfort.
 (<u>Figure 2</u>)
- Place an extra Gamgee pad under the knee, this allows five degrees of knee flexion to maintain natural alignment of limb.
- Check if the patient has a known allergy to medical tape. Adhesive / non-adhesive extension set can be cut to required length and ends rounded.
- One practitioner will reduce the shortening of the affected leg. This is achieved by holding the patient's heel (calcaneus) and gently applying traction continuously until the muscles of the thigh come to length, noticing that the heel of the affected limb will be brought to the same length as the unaffected limb.
- Only once the limb is brought to length should any external rotation be corrected as this greatly reduces the pain felt by the patient.
- Before application of traction, perform a neurovascular assessment of the affected limb and assess skin for cuts / abrasions / rashes / skin conditions / fragile broken skin, etc.
- Whilst traction is being maintained, the second practitioner slides the Thomas splint under the leg, ensuring that the padded ring is resting on the Ischium and genitalia is not caught by the pelvic ring.
- The second practitioner, who is not holding the limb to length, will apply the skin traction.
- Check the DP pulse to ensure vascular integrity.

- Apply the skin traction extension longitudinally around the leg. It should extend to the upper part of the thigh along both sides. The spongy part should be located symmetrically under the sole of the foot, with a gap of 4cm between it and the foot (to allow for plantar flexion). The foam should extend to cover each malleolus for protection.
- The skin traction should then be secured from the thigh to the ankle using crepe bandages. It is a good idea to leave the knee and fibular head free from the bandage to reduce the risk of perineal nerve compression at the fibular head. Ensure the bandage is wrinkle free and not too tight to reduce risk of pressure damage and blister formation. (Figure 3)
- Maintaining traction, the leg should then be placed carefully on top of the Gamgee.
- Secure the traction cords from the skin extension to the end of the splint, passing the outer cord over the lateral bar of the splint and the inner cord under the medial bar.
 (Figure 4)
- The traction cords are now pulled tight around the W shape at the bottom of the splint and secured firmly.
- The taped tongue depressors are inserted between the cords and twisted around several times (used as a Windlass). This creates the traction (<u>Figure 4</u>). Apply only enough traction to maintain limb length. Over traction can damage the skin.
- When completed the leg should be elevated.
- It is important that neurovascular observations are performed after application of the splint (colour, sensation, warmth and movement).
- Check and record the distal pulses and capillary refill time and mark the DP pulse with a skin marker.

Please note commercial Thomas splints are available in some health care settings.



Figure 1: Plaster padding applied to pelvic rim of Thomas splint.



Figure 2: Two layers of Gamgee put on top of tubigrip



Figure 3: Securing the skin traction with crepe bandages.



Figure 4: Creating traction

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