

FEMORAL FRACTURES: ASSESSMENT AND MANAGEMENT IN ED -CHW

PRACTICE GUIDELINE[®]

DOCUMENT SUMMARY/KEY POINTS

- A femoral fracture should be suspected when a patient presents with a thigh that is swollen and/or deformed. Significant pain will usually be experienced with any movement of the leg.
- Call the trauma team if the criteria of mechanism of injury or physiological changes are met.
- Patient should be managed in Observation Ward or Resuscitation Area.
- **Order of assessment involves:**
 1. Initial assessment and resuscitation (Primary and Secondary Survey)
 2. Pain relief
 3. IV Antibiotic administration for open injuries
 4. Radiological studies
 5. Early orthopaedic consultation and ongoing management
 6. Consider possibility of non-accidental injury, especially in children < 2 years.
 7. Transfer to Orthopaedic ward on traction bed for prompt application of traction
- Clinical management should be discussed with the ED consultant/fellow.

CHANGE SUMMARY

- Amendments made throughout – it is recommended staff should re-read this document.
- **28/6/23:** Minor review – Appendix 1 – AAGBI guideline updated to 2023 and includes SMOF 20% lipid

READ ACKNOWLEDGEMENT

- All clinical staff (medical and nursing) and Orthopaedic medical officers working in the Emergency Department are to read and acknowledge they understand the contents of this document.

This document reflects what is currently regarded as safe practice. However, as in any clinical situation, there may be factors which cannot be covered by a single set of guidelines. This document does not replace the need for the application of clinical judgement to each individual presentation.

Approved by:	SCHN Policy, Procedure and Guideline Committee	
Date Effective:	1 st October 2018	Review Period: 3 years
Team Leader:	Head of Department	Area/Dept: Emergency Department CHW

Management Summary

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Exercise caution when using this guideline for patients with:

1. Other injuries requiring urgent surgical/trauma team management
2. Open fractures
3. Fractures of proximal or distal femur
4. Co-morbidities such as known bone disease, neuromuscular disease, metastatic cancers or pathological fracture.

In all above instances, management should be discussed with the ED consultant/fellow and the Orthopaedic team

Guideline

1. Medical assessment and stabilisation in the Emergency Department

- Record the mechanism of injury.
- **The initial clinical approach should be a primary and secondary survey to identify and manage immediate life threatening injuries.**
- Look for other injuries especially where there has been significant trauma, such as in high speed motor vehicle/pedestrian injuries.

Note: shock from an isolated paediatric femoral fracture is unlikely – search for other injuries!

- Full neurovascular assessment of **BOTH** lower limbs is to be documented in patient notes.
- Limb ischemia is an emergency requiring urgent orthopaedic intervention.

- Ensure the patient has adequate IV access and IV resuscitation fluids prescribed if required. In stable patients the IV may be inserted under Nitrous Sedation as part of the Fascia Iliaca Block (FIB) procedure.
- IV antibiotics should be administered early for all open injuries. Cephazolin is preferred, but consultation with the orthopaedic MO is appropriate for heavily contaminated wounds where alternate antibiotic prophylaxis needs to be considered.

2. Analgesia

- Urgent assessment of pain, using an age appropriate paediatric pain score, should immediately be followed by provision of analgesia with timely re-assessment of effect.
- Remember to provide effective analgesia for any procedures that may cause pain, such as x-ray transfer, traction application, bed transfers, personal hygiene needs.
- The patient must have an appropriate analgesia plan charted PRIOR to discharge from the Emergency Department
- Suggested analgesia regimen for the wards is:
 - Paracetamol, oral: 15 mg/kg/dose 4-6 hourly
 - Ibuprofen, oral: 10 mg/kg/dose 8 hourly
 - Oxycodone, oral: 0.1 mg/kg/dose 4-6 hourly, prn for breakthrough
- The orthopaedic team will review analgesic requirements every 24 hours on the ward

Opioid Analgesia

- The intramuscular or subcutaneous routes are not to be used in children.
- Intranasal Fentanyl is an excellent immediate choice followed by intravenous or oral opioid boluses to establish analgesia in severe acute pain.

Regional Anaesthesia - Fascia Iliaca Block (FIB) or Femoral Nerve Block (FNB)

- This provides excellent analgesia and relief from muscle spasm for patients with mid-shaft femoral fractures and facilitates patient transfer, traction application and physical assessment.
- A FIB) is the preferred block in ED as it is equipotent to a FNB, can be performed without ultrasound and is less likely to result in inadvertent intravascular administration of local anaesthetic
- A FNB or FIB must only be administered by a medical officer who is experienced with this procedure, or under the instruction of a senior medical officer.
- Ultrasound guidance for a FNB is suggested to reduce complications over a “blind approach”. There may be situations where a regional block can be administered without ultrasound guidance. This should be discussed with the ED consultant or fellow in charge.
- The administration of a FIB or FNB is a painful procedure – consider administration of inhaled nitrous oxide +/- intranasal fentanyl (discuss with ED consultant/fellow).
- IV access must be established prior to performing the procedure. The IV can be inserted under nitrous sedation.

- The patient must have full monitoring, including ECG
- Staff should ensure they are familiar with the recognition of local anaesthetic toxicity (circumoral numbness, dizziness, agitation, seizures, cardiac arrest) and the treatment – See Appendix 1
- Suggested local anaesthetic doses are:
 - **Fascia Iliaca block (FIB)**: 1–18 years, single dose: 0.7–1 mL/kg of 0.2% (2 mg/mL) ropivacaine [maximum dose: 40 mL (= 80 mg)]^{1,2}
 - **Femoral nerve block (FNB)**: 1–18 years, single dose: 0.4–0.5 mL/kg of 0.2% (2 mg/mL) ropivacaine [maximum dose: 0.5 mL/kg]^{2, 3}
- An analgesia plan must be in place for when the effect of the block has worn off

Benzodiazepines

- Effective analgesia, including traction, is in most cases adequate in relieving muscle spasm associated with femoral fractures
- Diazepam, oral: 0.1–0.3 mg/kg/dose 8 hourly prn, titrate to response (≤12 years: 15 mg/DAY; >12 years: 40 mg/DAY) should be prescribed for when the patient is on the ward)

3. Radiology

X-rays should be attended to within 1 hour of arrival to the Emergency Department, and prior to any attempt at regional anaesthesia.

- X-rays:
 - Anterior / posterior view of the limb
 - Joints below and above the fracture site clearly visible (not impeded by splints or other items whenever practical)

4. Orthopaedic consultation and management

Orthopaedic review of the patient in the ED should be timely.

It is the responsibility of the orthopaedic team to provide a management plan, including traction.

5. Always consider Non-Accidental Injury (NAI)

If there is suspicion of NAI, staff should follow protocol and make a referral to the Child Protection team. Use the injury risk assessment template available on Health E Care (under Management Plan templates) to help assess for NAI.

7. Reduction and Splint/Traction

Reduction relieves pressure on skin and neurovascular structures and helps reduce blood loss. Traction further reduces muscle spasm and provides excellent relief from pain when applied correctly.

Timely transfer of the patient to the Orthopaedic Ward should occur so that reduction and splint application can occur. Pre-hospital splints should remain in situ unless there is delay in

transfer to the Orthopaedic Ward. If required, Thomas Splint traction should ideally be applied by the orthopaedic registrar or experienced orthopaedic nurse.

Definitive immobilisation and traction is a specialised procedure that is attended to by the orthopaedic team.

The orthopaedic registrar / consultant should prescribe the traction in the child's notes.

This should include:

- Type of traction required
- Amount of weight required - based on the child's weight (between 5-10%)

Where Traction equipment is not available in a timely fashion splintage with plaster or Zimmer splint is appropriate for distal 1/3 femoral shaft fractures

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Appendix 1. Recognition and management of local anaesthetic toxicity

3-10 Local anaesthetic toxicity v.2

Signs of severe toxicity:

- Sudden alteration in mental status, severe agitation or loss of consciousness, with or without tonic-clonic convulsions.
- Cardiovascular collapse: sinus bradycardia, conduction blocks, asystole and ventricular tachyarrhythmias may all occur.
- Local anaesthetic toxicity may occur some time after an initial injection.

- SMOF (20% lipid emulsion) is the lipid of choice at SCHN – available in the ADC in a 500ml bag
- Lipid emulsions are isotonic solutions and can be given peripherally.
- Consider use of 1.2micrometre filter (not mandatory in high acute settings in context of LA toxicity)

START

- 1 Stop injecting the local anaesthetic (remember infusion pumps).
 - 2 Call for help and inform immediate clinical team of problem.
 - 3 Call for cardiac arrest trolley and lipid rescue pack.
 - 4 Give 100% oxygen and ensure adequate lung ventilation:
 - Maintain the airway and if necessary secure it with a tracheal tube.
 - Avoid hypercarbia – consider mild hyperventilation.
 - 5 Confirm or establish intravenous access.
 - 6 If circulatory arrest:
 - Start continuous CPR using standard protocols (→ 2-1) but:
 - Give intravenous lipid emulsion (Box A).
 - Use smaller adrenaline dose ($\leq 1\mu\text{g.kg}^{-1}$ instead of 1 mg)
 - Avoid vasopressin.
 - Recovery may take >1 hour.
 - Consider the use of cardiopulmonary bypass if available.
- If no circulatory arrest:
- Conventional therapies to treat hypotension, brady- and tachyarrhythmia.
 - Consider intravenous lipid emulsion (Box A).
- 7 Control seizures:
 - Small incremental dose of benzodiazepine is drug of choice.
 - Thiopental or propofol can be used, but beware negative inotropic effect.
 - Consider neuromuscular blockade if seizures cannot be controlled.

Box A: LIPID EMULSION REGIME**USE 20% Intralipid® (propofol is not a suitable substitute)****Immediately**

- Give an initial i.v. bolus of lipid emulsion 1.5 ml.kg^{-1} over 2-3 min (~100 ml for a 70 kg adult)
- Start an i.v. infusion of lipid emulsion at $15 \text{ ml.kg}^{-1}.\text{h}^{-1}$ (17.5 ml.min^{-1} for a 70 kg adult)

At 5 and 10 minutes:

- Give a repeat bolus (same dose) if:
 - cardiovascular stability has not been restored or
 - an adequate circulation deteriorates

At any time after 5 minutes:

- Double the rate to $30 \text{ ml.kg}^{-1}.\text{h}^{-1}$ if:
 - cardiovascular stability has not been restored or
 - an adequate circulation deteriorates

Do not exceed maximum cumulative dose 12 ml.kg^{-1} (70 kg: 840 ml)

Box B: CRITICAL CHANGES

Cardiac arrest → Check already done 1 to 5, then → 6

Box C: AFTER THE EVENT

Arrange safe transfer to appropriate clinical area
Exclude pancreatitis: regular clinical review, daily amylase or lipase
Report case on your local critical incident system and to the relevant national system (these vary between each devolved nation and in Ireland)