

Neck of femur fracture: perioperative management

Ronald Cheung

Correspondence: roncheung39@gmail.com

Originally published as *Anaesthesia Tutorial of the Week 296*, 21 October 2013

INTRODUCTION

Several large systematic reviews of neck of femur fracture (NOF) surgery have demonstrated that operative delay beyond 48 hours results in increased morbidity and mortality.¹⁻³ Surgery beyond the 48-hour period has been shown to more than double the risk of postoperative complications such as pneumonia, urinary tract infections, deep vein thrombosis and pulmonary embolism,⁴ whilst earlier surgery results in reduced mortality and postoperative complications.⁵

Reasons for operative delay can be grouped into system-based or medical-based delays. System-related delays include waiting for routine medical consultations or the unavailability of operating rooms or surgeons. Medical delays include stabilisation of medical problems such as unstable blood sugar levels in diabetic patients or reversing anticoagulation.

Timely surgery for NOFs presents a challenge for health care systems as it involves large numbers of elderly patients with significant comorbidities.⁶ To manage this complexity, a protocol-driven and multidisciplinary approach is ideal. This article is largely based on the recently released Association of Anaesthetists of Great Britain and Ireland (AAGBI) guidelines regarding NOF surgery.⁷ They are unique because they are specifically directed towards helping anaesthetists manage patients with hip fracture.

FACILITIES AND SERVICES REQUIRED

Multidisciplinary management

A multidisciplinary group could include general practitioners, community nurses, emergency staff, bed managers, orthopaedic nursing staff and surgeons, anaesthetists, orthogeriatricians, physiotherapists, occupational therapists, social workers, rehabilitation services and trauma coordinators.

Planned care pathways

Patients with a hip fracture who arrive in the emergency department should have a planned care pathway which includes prioritised anaesthetist and orthopaedic reviews as well as instructions on the management of preoperative issues such as fasting and anticoagulation. The pathway should also include prompt notification of bed managers and trauma coordinators to reduce the risk of delay.

Trauma coordinators

Trauma coordinators can reduce preoperative delays, facilitate interdisciplinary communication and start discharge planning. Together with multidisciplinary trauma meetings in the morning before the start of operating lists, they can effectively reduce delays.

Protected trauma lists

These are separate from general emergency lists and should be provided daily. The AAGBI recommends that hip fracture surgery should be prioritised over all other cases other than life- or limb-threatening trauma.

Consultant-delivered service

The AAGBI recommends that patients with hip fracture be anaesthetised and operated on by consultants with clinical experience in treating the unwell, older patient in order to reduce operative time and poor surgical outcomes.

Operating department

Room temperature should be between 20 and 23 °C with a humidity of 50–60%. A dedicated radiographer will help reduce delay. An adequate stock of surgical implants, consumables and instruments should also be prepared.

Summary

Surgical repair of hip fractures should occur within 48 hours of hospital admission.

Surgery is the best analgesia for a hip fracture.

The value of investigations needs to be carefully weighed against the risk of delaying surgery further.

Patients with hip fracture require multidisciplinary care

Audit projects are required for quality improvement.

Ronald Cheung
Westmead Hospital
Westmead
NSW
Australia

PREOPERATIVE MANAGEMENT

Analgesia

Surgical fixation is the best analgesic in hip fractures. Start with simple analgesics such as paracetamol and progress to opioids only after urea and electrolytes have been checked. Regional analgesia using nerve blocks or field blocks (such as the fascia iliaca block) offers effective preoperative pain relief and reduces the risk of opioid-induced side-effects.⁸

Preoperative assessment

Seventy per cent of patients with a NOF will have an American Society of Anesthesiologists (ASA) score of 3–4, making preoperative assessment by an anaesthetist mandatory.⁹ Thirty-five per cent will have one comorbidity, 17% will have two and 7% will have three or more.¹⁰ The most common comorbidities are cardiovascular disease (35%), respiratory disease (14%), cerebrovascular disease (13%), diabetes (9%), malignancy (8%) and renal disease (3%).¹⁰ The anaesthetic assessment allows for planning of anaesthetic technique, assessment and communication of perioperative risk, and preoptimisation.

Early input from orthogeriatricians is also recommended. Orthogeriatric input can identify patients at increased risk of perioperative morbidity and mortality, help optimise patients before surgery and facilitate the commencement of early rehabilitation and discharge planning.

Routine preoperative investigations

Full blood count and group and hold

Preoperative anaemia is present in 40% of patients. The AAGBI suggests the use of a higher blood transfusion trigger in the elderly, such that in the case of patients with Hb < 90 g L⁻¹ (or Hb < 100 g L⁻¹ with a history of ischaemic heart disease), two units of blood should be transfused.

Leucocytosis and neutrophilia are common and may present a reaction to trauma rather than infection. A platelet count of less than $80 \times 10^9 \text{ L}^{-1}$ is a relative contraindication to neuraxial anaesthesia and a count less than $50 \times 10^9 \text{ L}^{-1}$ will usually necessitate a platelet transfusion.

Urea and electrolytes

Hyper- and hypokalaemia, as well as hyponatraemia, are common.

Coagulation studies

Request coagulation tests only if clinically required.

Electrocardiography (ECG)

ECG is required in all patients with a NOF.

Chest X-ray (CXR)

CXR is not necessary for all patients but may be useful in those with pneumonia or heart failure.

Common comorbidities

Atrial fibrillation (AF)

Patients in AF should ideally have a ventricular rate less than 100 beats per minute. Exacerbants such as electrolyte abnormalities or sepsis should be treated.

Anticoagulation

Aspirin should be withheld during inpatient stay unless indicated for unstable angina or stroke. In those on clopidogrel, surgery should not be delayed and prophylactic platelets are not necessary. The AAGBI suggests generally not stopping clopidogrel on admission, especially in patients with drug-eluting stents. This suggestion may differ to the practice at your hospital. Hence, an individual approach balancing the risks of interrupting clopidogrel therapy will need to be tailored to each patient. Hospital guidelines regarding the perioperative management of warfarin should be followed.

Aim for an international normalised ratio (INR) of less than 2 for surgery and less than 1.5 for neuraxial anaesthesia. Use vitamin K or, where available, four-factor prothrombin complex concentrates (Beriplex, Octaplex) to reverse warfarin if necessary. Perioperative cover with heparin is usually required. Warfarin should be recommenced 24 hours after surgery.

If unsure about the management of anticoagulation, advice from a haematologist should be sought promptly.

Chest infection

Chest infections require prompt antibiotics and the AAGBI recommends proceeding to surgery under regional anaesthesia if possible.

Diabetes

Hyperglycaemia is not a reason to delay surgery unless the patient is ketotic and/or dehydrated. Hospital guidelines concerning the perioperative management of diabetes should be followed.

Heart murmur

There is debate regarding the postponement of surgery pending echocardiography in the light of unrecognised aortic stenosis. The majority of clinicians favour proceeding to surgery with modification of their techniques towards general anaesthesia and invasive blood pressure monitoring.

Echocardiography may be indicated in order to:

1. establish left ventricular function if the patient is breathless at rest or on low-level exertion
2. investigate severity of an ejection systolic murmur heart in

the aortic area, particularly if two or more of the following are present:

- unexplained syncope or presyncope
- slow rising pulse
- absent second heart sound
- left ventricular hypertrophy on ECG without hypertension.

Implantable cardioverter defibrillators (ICD) and pacemakers

With both devices there are risks of perioperative failure and of unipolar diathermy resulting in delivery of an arrhythmogenic shock to the myocardium. The AAGBI recommends early consultation with a cardiologist to identify the specific type of device and to develop a plan for intraoperative management.

INTRAOPERATIVE MANAGEMENT

Anaesthetic choice

There is little evidence to support the use of one anaesthetic technique over another for patients undergoing hip fracture surgery. Anaesthetists tend to use the technique that they are familiar with. Approximately half of anaesthetists use neuraxial anaesthesia and the rest use general anaesthesia. The AAGBI recommends that peripheral nerve blockade always be considered whether a spinal or general anaesthesia is used.

Neuraxial anaesthesia

The AAGBI recommends the use of either spinal or general anaesthesia but not a combination of the two as the latter is associated

with falls and hypotension. Lower doses of intrathecal bupivacaine (<10 mg) may reduce associated hypotension. Intrathecal fentanyl is preferred to morphine as it is associated with less respiratory and cognitive depression.

General anaesthesia

It is recommended that reduced doses of intravenous induction agents be administered. Inhalational induction is generally well tolerated by the elderly and may facilitate a haemodynamically stable induction. There remains debate about whether mechanical ventilation is preferable to spontaneous.

Peripheral nerve blockade

Peripheral nerve blockade can reduce postoperative analgesia requirements. Blockade of the femoral, obturator and lateral cutaneous nerve of the thigh can provide adequate analgesia. The psoas compartment block/lumbar plexus block is the most reliable method of blocking all three. Femoral nerve blocks do not reliably block all three nerves but can reduce postoperative analgesia requirements and be more easily placed with ultrasound guidance. The fascia iliaca block is an alternative technique that covers all three nerves and requires a similar level of skill to the femoral nerve block.

Table 1 describes possible reasons why a delay in surgery may be justified.

Monitoring

Have a low threshold for obtaining further monitoring equipment for this patient group (see Table 2).

Table 1. Acceptable and unacceptable reasons for delaying surgery in hip fractures

Unacceptable	Acceptable
Lack of facilities or theatre space	Hb < 80 g dL ⁻¹
Awaiting echocardiography	Na ⁺ < 120 or > 150 mmol L ⁻¹
Unavailable surgical expertise	K ⁺ < 2.8 or > 6.0 mmol L ⁻¹
Minor electrolyte abnormalities	Uncontrolled diabetes
	Correctable cardiac arrhythmias with a ventricular rate > 120 bpm
	Chest infection with sepsis
	Reversible coagulopathy

Table 2. Minimum and optional monitoring

Minimum	Optional
Anaesthetist present	Invasive blood pressure monitoring
Pulse oximetry	Cardiac output monitoring (e.g. oesophageal Doppler-guided fluid therapy)
Capnography	Bispectral index (BIS)
ECG	Cerebral oxygen saturation
Non-invasive blood pressure monitoring	
Point-of-care Hb (e.g. Hemocue®)	

Supplemental pain relief

Opioids and non-steroidal anti-inflammatory drugs should be used with caution (Table 3). Codeine should not be used because its variable pharmacokinetics make its efficacy and safety difficult to predict in an individual.⁷ Paracetamol should be given in the perioperative period.

Thromboprophylaxis

Low-molecular-weight heparin should be administered on the evening before surgery to patients on the daytime trauma lists. This precaution allows for an appropriate window of time to minimise the risk of bleeding related to neuraxial anaesthesia. Thromboprophylactic stockings or intermittent calf compressors should be used intraoperatively. Regional anaesthesia, prompt surgery and early mobilisation will also reduce the risk of deep vein thrombosis.

Antibiotics

Administer within 1 hour prior to skin incision. Follow your hospital's antibiotic protocols.

Pressure care

Elderly patients should be positioned to avoid pressure sores if possible.

Thermoregulation

Active warming techniques should be used as elderly patients are prone to intraoperative hypothermia.

Intravenous fluids

Many patients are hypovolaemic from fasting prior to their surgery. Preoperative intravenous fluids should be prescribed.

POSTOPERATIVE MANAGEMENT

Nursing

These patients should ideally be in a ward with a nurse to patient ratio of 1:4.

Analgesia

As the peripheral nerve blockade wears off, administer paracetamol regularly with carefully prescribed opioid analgesia as required.

Table 3. AAGBI recommendations for supplemental pain relief

Yes	Caution	No
Paracetamol	Non-steroidal anti-inflammatory drugs Opioids	Codeine

Hypoxia

Supplemental oxygen should be provided in the first 24 hours after the operation. Early mobilisation will improve oxygenation and respiratory function.

Fluid balance

Hypovolaemia is common postoperatively, and oral fluid intake should be encouraged and intravenous fluids avoided if possible.

Urinary tract infections (UTI)

UTIs are common and urinary catheters should be removed as soon as possible to reduce the risk of infection. Early mobilisation will also reduce the risk of UTIs.

Postoperative confusion

Cognitive dysfunction or an acute confusional state occurs in 25% of patients with hip fracture.¹¹ This can interrupt management and rehabilitation. Physicians specialised in the care of the elderly should be involved. Haloperidol or lorazepam should be used only for short-term symptom control. An underlying cause of the acute confusion should be sought and treated.

Malnutrition

Many patients with hip fracture are malnourished on admission to hospital. Dietitians should be involved and nutritional supplements should be provided.

Rehabilitation

Rehabilitation aims to return the patient to their pre-morbid level of activity. Rehabilitation should start as early as possible and be coordinated with an orthogeriatrician.

WEBLINKS

1. Sample patient information sheets regarding hip fractures which can be modified to suit your specific hospital: <http://docroncheung.blogspot.com.au/2013/04/sample-patient-informationleaflets-on.html>
2. Information and tutorial on the fascia iliaca block: http://neuraxiom.com/fascia_iliaca_block.html

REFERENCES

1. Shiga T, Wajima Z, Ohe Y. Is operative delay associated with increased mortality of hip fracture patients? Systematic review, meta-analysis, and meta-regression. *Can J Anaesthesiol* 2008; **55**: 146–54.
3. Khan SK, Kalra S, Khanna A et al. Timing of surgery for hip fractures: a systematic review of 52 published studies involving 291,413 patients. *Injury* 2009; **40**: 692–7.
4. Moja L, Piatti A, Pecoraro V, et al. Time matters in hip fracture surgery: patients operated within 48 h have better outcomes. A meta-analysis and meta-regression of over 190,000 patients. *PLoS ONE* 2012; **7**(10): e46175.
5. Sircar P, Godkar D, Mahgerefteh S, et al. Morbidity and mortality among patients with hip fractures surgically repaired within and after 48 h. *Am J Ther* 2007; **14**: 508–13.
6. Simunovic N, Devereaux PJ, Sprague S, Guyatt GH, Schemitsch E, Debeer J, Bhandari M. Effect of early surgery after hip fracture on mortality and complications: systematic review and meta-analysis. *Can Med Assoc J* 2010; **182**: 1609–16.
7. Griffiths R, Alper J, Beckingsale A, et al. AAGBI Guidelines: Management of proximal femoral fractures 2011. *Anaesthesia* 2012; **67**: 85–98.
8. Iledema, J. Cautions with codeine. *Austral Prescrib* 2011; **34**: 133–5.
9. Gurkan I, Wenz JF. Perioperative infection control: an update for patient safety in orthopaedic surgery. *Orthopedics* 2006; **29**: 329–39.
10. The National Hip Fracture Database. National Report, 2010. [http://www.rcseng.ac.uk/news/docs/NHFD%20\(final\).pdf](http://www.rcseng.ac.uk/news/docs/NHFD%20(final).pdf)
11. Roche JJ, Wenn RT, Sahota O, Moran CG. Effect of comorbidities and postoperative complications on mortality after hip fracture in elderly people: prospective observational cohort study. *BMJ* 2005; **331**: 1374–9.