

# Anaesthesia for fractured neck of femur

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## Abstract

Fracture of the femoral neck is a common injury in the elderly, and many patients have significant co-morbidities. Effective management requires a multidisciplinary approach involving anaesthetists, medical physicians and orthopaedic surgeons. Although early surgery within 24–48 hours is beneficial, there may be medical conditions that need prior optimization. Both general anaesthesia and regional neuroaxial anaesthesia can be used, although it appears regional anaesthesia is preferred by most anaesthetists as it may reduce early postoperative mortality, incidence of pulmonary complications and deep vein thrombosis.

**Keywords** Femoral neck fracture; fractured hip; fractured neck of femur; general anaesthesia; patient-centred medical home care; perioperative management; preoperative assessment; regional anaesthesia

**Royal College of Anaesthetists CPD matrix:** 3A08

## Introduction

Femoral neck fractures are associated with ageing and osteoporosis and can occur after relatively trivial trauma in elderly patients. Each year, 1.6 million people worldwide suffer from fractured hip.<sup>1</sup> The mean age for men is 84 years and women 83 years.<sup>2</sup> With an ageing population, incidence of fractured hip is increasing, and the number of fractured hips is estimated to exceed 6 million by 2050.<sup>3</sup> Femoral neck fracture is associated with an in-hospital mortality rate of 1–6%<sup>3</sup>, 30-day postoperative mortality between 5 and 10%,<sup>3</sup> and 1-year mortality of around 30%.<sup>2</sup> This mortality rate has remained relatively constant over the past 20 years and it continues to be a major cause for mortality, morbidity and loss of functional activity.

Optimal perioperative care emphasizes early optimization and early surgery, effective multimodal analgesia, and use of a multidisciplinary team. The multidisciplinary team should consist of the anaesthetist, orthopaedic surgeon, medical physicians/geriatricians, physiotherapist and nursing staff. Good communication and discussion of patient management between team members is essential. The perioperative management of

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## Learning objectives

After reading this article you should be able to:

- list four indications for cardiac consultation
- list four patient-related postoperative pulmonary complications
- know the advantages of early hip fracture surgery
- know the possible benefits of regional anaesthesia compared to general anaesthesia for hip fracture surgery

these patients is challenging, as most are elderly with frequent co-morbidities. Current evidence suggests that early surgery is beneficial but sometimes medical optimization or further investigations are required before surgery can proceed safely. Thus a balance needs to be made between optimization/investigations and avoiding unnecessary surgical delay needs.

There is great variation in anaesthetic technique for hip fracture surgery, mainly because previous studies have not shown clear benefit with any particular technique. In this article we will review the perioperative management of patients with fractured neck of femur with emphasis on preoperative optimization, minimization of surgical delay, potential consequence of surgical delay, and best anaesthetic technique.

## Timing of surgery

Guidelines recommend that hip fracture surgery should be performed within 24–48 hours. Early surgery allows quicker mobilization and may reduce deconditioning and muscle wasting. It can also reduce the incidence of complications such as pneumonia and skin breakdown (Box 1).

A previous clinical audit performed in the UK showed that time from admission to surgery ranged from 24 to 108 hours, with a median of 47 hours.<sup>4</sup> About 42% of operations were delayed, mostly due to organizational and medical reasons.<sup>4</sup> Only 4% of delays were due to anaesthesia.<sup>4</sup>

Most literature supports early surgery. A meta-analysis of 35 retrospective and prospective studies involving over 190,000 patients showed that early surgery (mostly 24–48 hours) was associated with significantly lower risk of mortality.<sup>5</sup> The difference remained significant after adjusting for age, female prevalence, location, year and exclusion of low quality and retrospective studies. However, there was significant heterogeneity, which reflects presence of confounding factors such as variability in health status and co-morbidities. Another meta-analysis of prospective observational studies demonstrated that

## Advantages of early hip surgery

- ↓ mortality
- ↓ length of hospital stay
- Early mobilization
- ↓ muscle loss
- ↓ pneumonia
- ↓ pressure sores
- ↓ severe pain

## Box 1

surgery within 24–72 hours significantly reduced mortality at 1 year, but not 1 month or 3–6 months after surgery.<sup>6</sup> Even when only analysing studies that adjusted for American Society of Anesthesiology (ASA) score, age, and gender, early surgery was associated with a reduced risk of mortality.<sup>6</sup> In addition, delay beyond 48 hours has been shown to increase risk of 30-day mortality by 41% and 1-year mortality by 32%.<sup>7</sup> Early surgery is associated with less pneumonia, pressure sores,<sup>6</sup> and severe pain and also reduces length of hospital stay.

Surgical delay is often due to concurrent medical illness or severe comorbid conditions. Thus, the higher mortality demonstrated from previous studies in patients with delayed surgery may be because they are less healthy generally, and not a result of the delay itself. A prospective case-matched cohort study which defined delay as 24 hours found that there was no difference in mortality and mobility after surgery when patients with a medical reason for delay were removed from analysis.

Hip fracture surgery should be performed within 24–48 hours for patients who are medically stable. In patients with unstable medical conditions, optimization is needed first as early surgery without prior stabilization can be harmful.

### Preoperative assessment

A clinical audit of 1195 patients in the UK showed that patients had a median ASA grade of 3.<sup>4</sup> The most common co-morbidities are cardiovascular disease, chronic obstructive airways disease, cerebrovascular disease, diabetes mellitus and renal impairment. Another study showed that 35% of the patients had at least one co-morbidity and 17% had two.<sup>8</sup> The purpose of preoperative assessment is to identify high-risk patients, optimize conditions that make surgery potentially life threatening, and help formulate an anaesthetic plan.

### Clinical assessment and general risk stratification

A thorough history and physical examination is an essential part of the preoperative assessment. Often information from a witness/carer is important, especially in patients with cognitive impairment. It is also important to ask for symptoms suggesting acute cardiac or cerebral events that may have precipitated the injury. Assessment for other possible associated injuries especially head injuries should also be performed.

Co-morbidities are a predictor of mortality and rehabilitation potential. Various scoring systems are available to predict outcome, such as the Charlson co-morbidity index, Geriatrics Index of Comorbidity, and cumulative illness rating scale. However, many of these systems are complicated and difficult to use in practice. More recently, the Nottingham hip fracture score has been introduced to predict 30-day mortality. Predictors of mortality from that scoring system include: age (66–85, over 86 years), male gender, two or more co-morbidities, a mini-mental test score of 6 or lower out of 10, malignancy, living in an institution and anaemia (admission haemoglobin concentration  $\leq 10$  g/dl). Other predictive factors include preoperative mobility, cognitive state, preoperative residence, abnormal sodium and renal dysfunction.

### Cardiac assessment and preoperative echocardiography

Cardiac evaluation involves assessment for active cardiac disease, functional capacity of the patient, and clinical risk

factors. Conditions requiring special attention include unstable coronary syndromes (severe or unstable angina, acute or recent myocardial infarction), decompensated heart failure, severe valvular diseases (severe aortic stenosis, symptomatic mitral stenosis), and significant arrhythmia (symptomatic bradycardia, high degree atrioventricular block, supraventricular tachycardia with uncontrolled ventricular rate, newly recognized ventricular tachycardia, symptomatic ventricular arrhythmia). Significant cardiac risk factors include ischaemic heart disease, heart failure (prior/compensated), cerebrovascular disease, and renal insufficiency. Functional status is useful in predicting perioperative and long term cardiac outcomes, and an asymptomatic patient with a metabolic equivalent of four or more (e.g. able to walk two flights of stairs, walk uphill) is unlikely to require preoperative cardiac intervention.

Most patients with hip fracture do not require cardiac consultation. Presence of active cardiac conditions mentioned earlier requires cardiac assessment (Box 2). Patients with medical assistance devices like pacemakers and automatic implantable cardioverter defibrillator also require cardiac consultation to evaluate battery life and mode adjustment if necessary. Also, cardiac evaluation may be needed when there is an unexplained cardiac symptom to ascertain a diagnosis. Finally patients with poor functional capacity and presence of clinical risk factors may benefit from cardiac assessment in order to determine if anything can be done to improve it.

The need for echocardiography is controversial. The anaesthetist needs to balance the benefit of thorough preoperative work up with the potential disadvantage of surgical delay. Patients with known cardiac murmur and previous echocardiography do not require a repeat examination. A UK national survey conducted amongst 155 trauma anaesthetists by Sandby-Thomas et al. showed that only 20.4% of anaesthetists would insist on a preoperative echocardiogram after detecting a new cardiac murmur.<sup>9</sup> Most of the anaesthetists (53.6%) would only ask for an echocardiogram if the patient also had suspicious symptoms or signs.<sup>9</sup> There are arguments for and against preoperative echocardiography.

The 2001 National Confidential Enquiry into Perioperative Deaths report recommended that echocardiogram should be performed in all patients with cardiac murmurs. Cardiac murmurs are, however, common in the elderly, most are sclerotic and a study showed that 70% of elderly patients with detected murmur were subsequently found to have valvular heart disease.

### Indications for cardiac consultation

- Active cardiac conditions
  - unstable coronary syndromes
  - decompensated heart failure
  - severe valvular heart disease
  - significant arrhythmia
- Medical assistance devices
  - Pacemakers
  - Automatic implantable cardioverter defibrillator
- Unexplained cardiac symptoms

### Box 2

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