Total hip replacement: improving patients’ quality of life


Summary

Hip arthroplasty (total hip replacement) is a common orthopaedic procedure that can greatly improve patients’ quality of life. This article discusses the pathophysiology of hip dysfunction, the assessment and pre-operative screening of patients with hip pain, and some of the post-operative nursing considerations following hip arthroplasty. Multidisciplinary care of patients undergoing hip arthroplasty is essential to provide optimal care and an efficient service.

Introduction

Hip arthroplasty is the replacement of the hip joint with a prosthesis, and is one of the most common reconstructive operations (Huo et al 2008). More than 52,000 procedures are carried out every year, at an average cost of £4,300 each (National Audit Office (NAO) 2003, National Joint Registry 2008).

The primary function of the hip joint is to support the weight of the body when static (standing) or dynamic (running or walking). Hip arthroplasty may be performed when irreversible damage has occurred to the joint; this damage often causes pain, dysfunction and reduced quality of life. Damage to the joint may be caused by primary, degenerative disease of the hip (arthrosis), secondary causes of arthrosis, or trauma. Fractures that occur in the joint capsule are termed intracapsular. Intracapsular fractures are prone to developing avascular necrosis because of the disruption of the blood supply to the femoral head (McRae and Esser 2002).

The earliest recorded attempts at hip replacement were by Themistocles Glück in Germany, in 1891, who used ivory to replace the femoral head. Austin Moore inserted the first metal prosthesis in 1940 (Gomez and Morcuende 2005), and the first effective total hip replacement was performed by Sir John Charnley in the 1960s (Eustice and Eustice 2008).

Aims and intended learning outcomes

This article provides the reader with information about hip pain and the use of hip replacements, and examines the role of the nurse in caring for a patient undergoing hip arthroplasty. After reading this article and completing the time out activities you should be able to:

- Outline the reasons why patients may require hip arthroplasty.
- Discuss the importance of pre-operative planning.
- Describe the post-operative needs of the patient.
- Identify potential post-operative complications of hip arthroplasty.

Anatomy

The hip is a ball and socket synovial joint formed of two moveable components—the head of the femur.
and the acetabulum of the pelvis. The cavity is deepened by the acetabular labrum, which is a ring of cartilage attached to the rim of the acetabulum; this adds to the stability of the joint without limiting the range of movement. The capsule surrounds the joint and is filled with synovial fluid; it allows movement in the joint and provides increased stability. The joint is further strengthened by the iliofemoral, pubofemoral and ischiofemoral ligaments (Abrahams et al 2005) (Figure 1). Nerve supply to the hip includes branches of the femoral, obturator and sciatic nerves. Movement of the hip includes:
- Flexion (bending).
- Extension (straightening).
- Abduction (movement away from the midline of the body).
- Adduction (movement towards the midline of the body).
- Circumduction (circular movement).
- Lateral rotation (turning away from the midline of the body).

Pathophysiology

Arthrosis affecting the hip may be classified either as a primary cause in itself or as the result of a secondary cause. Both primary and secondary processes may cause pain and dysfunction. Osteoarthritis, a non-inflammatory degenerative disorder of the synovial joints, is a primary cause of hip arthrosis. Osteoarthritis results in localised loss of cartilage, remodelling of underlying bone and osteophyte (bony outgrowth) formation at the joint margins, with consequential remodelling of the joint shape (National Collaborating Centre for Chronic Conditions (NCC) 2008).

Bone remodelling is a natural process in the body in which bone reabsorption and the production of new bone (ossification) occur. The natural balance may be affected as a result of changes to the cartilage or biomechanical forces within the joint, and osteophytes and cysts may develop. This can result in pain and discomfort within the joint.

Ankylosing spondylitis is a chronic inflammatory rheumatic disease commonly associated with the spine, which may affect the hip joint in some individuals. It results in progressive stiffness and fusion (ankylosis) of the joints.

Avascular necrosis of the femoral head commonly results from the disruption of blood flow because of trauma, such as a displaced femoral neck fracture or an intracapsular fracture. It may also be attributed to non-traumatic causes, such as caisson disease (decompression sickness), Gaucher’s disease (a genetic condition resulting in deposition of fatty compounds in bone), sickle cell disease, or use of corticosteroids (Chillag 2004). Necrosis of the femoral head results in the collapse of the structure with consequential pain and loss of function.

Secondary causes of hip arthrosis are varied, but may include factors such as previous trauma, infection or damage to the joint (Box 1). These may result in the characteristic features of osteoarthritis, with remodelling of the underlying bone and formation of osteophytes at the joint margins, as occurs when there are focal areas of damage to the articular cartilage. This is termed secondary osteoarthritis and results in pain and dysfunction of the hip (Doherty et al 2006).

Diagnosis

Patients with arthrosis of the hip may have a reduced range of hip movements and consequently experience difficulty in carrying out daily activities such as putting on socks or cutting toenails. Hip pain associated with osteoarthritis
typically worsens with joint use, and is usually least severe at the start of the day or following rest, and more severe at the end of the day (Doherty et al 2006). Severe hip arthrosis may, however, cause pain at rest and restrict the individual’s ability to mobilise and engage in self-caring or leisure activities.

Diagnosis is largely based on history taking and clinical examination, although relevant imaging such as X-ray, computerised tomography or magnetic resonance imaging is required to confirm diagnosis or to identify the presence of fractures or avascular necrosis. In osteoarthritis, X-rays may show signs of joint space narrowing, sclerosis and cysts (Clinical Knowledge Summaries (CKS) 2008).

A thorough examination of the hip includes inspection from the anterior, posterior and lateral aspects, checking that the pelvis is level, looking for leg length discrepancies, measuring from the iliac crest to the medial malleolus (ankle), and fixed flexion deformity of the hip, which results in the inability to straighten the joint fully. Leg length discrepancies may be addressed with appropriate use of shoe raises or orthoses and may help improve hip pain. Inspection of the gait (walking behaviour) is one method of testing the function of the hip joint.

Patients with hip pathology commonly have a ‘Trendelenburg gait’, which is an abnormal pattern of walking caused by a weakness of the abductor muscles (gluteus medius and gluteus minimus). The pelvis drops on the unaffected side of the body when the heel strikes on the affected side. The pelvic drop lasts until heel strike occurs on the unaffected side. In cases where both hips are affected with weak abductors, a bilateral ‘waddling’ gait may be evident.

Testing of hip movements may identify a reduced range of movement, especially the internal and external rotation of the hip, which is often painful. Referred pain from trochanteric bursitis (inflammation of the connective tissue around the head of the femur), the lumbar spine or pelvis should be excluded during the examination process (Doherty et al 2006).

### Secondary causes of hip arthrosis
- Legg-Calvé-Perthes disease, osteochondrosis in the femoral head.
- Slipped femoral epiphysis.
- Developmental hip dysplasia.
- Previous trauma or injury to the joint.
- Infection, for example tuberculosis, osteomyelitis.

## Time out 2
Write a list identifying activities of daily living that may be affected by reduced range of movement and increased pain within the hip joint. Discuss your thoughts with a physiotherapist and an occupational therapist and identify any equipment or aids that could be used to address these issues.

### Non-operative management of hip pain
The use of a walking stick may reduce the force through the hip joint and so reduce pain and improve function, stride length and rhythm. Home adaptations and assistive devices such as long-handed reachers, chair raisers or raised toilet seats and perch stools may improve levels of independence and quality of life for patients struggling with activities of daily living. It is important that patients are given the opportunity to discuss the difficulties they experience so that appropriate devices can be supplied to enhance independence. Nurses are ideally situated in acute and community sectors to have such discussions with patients with hip pain who are either contemplating hip arthroplasty or awaiting surgery.

Exercises focusing on local muscle strengthening and general aerobic fitness may reduce pain and improve function (Fransen et al 2002, NCC 2008), with the potential benefits of improved general mobility and the ability to self-care. Some individuals may experience increased pain and stiffness following exercise and may benefit from learning to pace activities so that specific exercise sessions are integrated with periods of rest and activity throughout the day.

In some cases, analgesia such as paracetamol and/or codeine may be required to allow participation in exercise or maintain activities of daily living. The use of non-steroidal anti-inflammatory drugs (NSAIDs), such as ibuprofen, may be beneficial if relief is not obtained from taking regular paracetamol. NSAIDs should be used at the lowest effective dose for the shortest duration of time to reduce the risk of associated morbidities such as gastrointestinal, liver or renal complications.

If the patient’s body mass index is greater than 28, weight loss is recommended to reduce the strain on affected joints (CKS 2008). The Department of Health (DH) (2009) has developed an 18-week care pathway for degenerative disease of the hip joint, which aims to ensure that all patients receive high quality care without unnecessary delay. It guarantees that patients will have to wait no longer than
learning zone orthopaedic nursing

18 weeks from initial referral to the start of any treatment.

**Pre-operative assessment**

Patients often feel their general health and fitness declines because of reduced mobility and increasing disability in the time between being listed for surgery and attending a pre-operative assessment (Sandell 2008). By the time surgery is performed, muscle weakness and loss of function are common (McMeeken and Galea 2007).

The British Orthopaedic Association (BOA) (2006) considers pre-operative assessment clinics as best practice in the assessment of patients, in relation to the risks associated with surgery, and to help reduce surgical cancellations. The use of nurse-led pre-operative assessment clinics creates the opportunity for patients and their families to discuss the planned surgery and to raise any concerns. Routine investigations such as blood tests (including group and save or cross-matching), urine sample (midstream) and relevant microbiological assessments, for example meticillin-resistant Staphylococcus aureus screening, should be carried out during the pre-operative assessment. Baseline observations such as blood pressure, pulse, respiratory rate and oxygen saturations should also be documented to allow post-operative comparison.

**Time out 3**

Write a list of the blood tests that you think may be beneficial to check pre-operatively and note why these are important. Discuss this with a senior member of staff. Are there any other investigations that may be relevant in some cases? If so, why? Local guidelines will offer information on what investigations and pre-operative screening are required before surgical procedures such as hip replacements.

Education is also a fundamental component of pre-operative assessment clinics. The provision of verbal and written information on post-operative exercises and the use of post-operative pain relief, such as patient-controlled analgesia devices, allows the patient time to familiarise him or herself with this information, practise if appropriate and ask any questions he or she might have before surgery. Information given at this time helps reduce pre-operative anxiety and assists patients to prepare for their forthcoming procedure (McDonald et al 2004, Walker 2007).

Provisional discharge planning should begin at the pre-operative assessment clinic, considering the patient’s age, comorbidities, home circumstances and availability of carers following discharge from hospital (BOA 2006). The presence of allied health professionals at pre-operative assessments is crucial to address any issues that may arise at this time.

The length of stay in hospital varies depending on patient needs, complications of surgery and the presence of comorbidities. Relevant information with regards to discharge planning can be given to the patient and his or her family before admission to hospital so that preparations, such as stocking up the cupboard or freezer with food, can be made to make life easier following discharge. Ineffective or inadequate pre-operative planning can result in delayed discharge because of a lack of equipment or services.

**Surgery**

Patients should be admitted to hospital with adequate time to allow for pre-operative and pre-anaesthetic procedures (BOA 2006). While many patients can be admitted on the day of surgery, it may be advisable for patients scheduled first on the operating list to be admitted the previous day. The patient’s leg, on the side to be operated on, should be marked in indelible ink by the surgeon or one of the surgical team.

A hemi-arthroplasty involves the removal of the femoral head and replacement with a prosthesis. This procedure is commonly performed following intracapsular fractures of the femoral head.

A total arthroplasty involves the insertion of a femoral prosthesis and the resurfacing of the acetabulum with a concave lining (Figure 2). This lining allows the prosthesis to move smoothly within the acetabulum. Implants may be cemented in place. When uncemented implants are used, a porous coating on the implant encourages bony ingrowth, which results in fixation. Alternatively, ‘hybrid’ approaches involving a combination of fixation methods may be used.

The two main approaches for hip arthroplasty are posterior and lateral. The posterior approach is considered to be easier to perform, although it is associated with increased rates of dislocation, compared with the direct lateral approach; the latter may also reduce the risk of injury to the sciatic nerve. While there are advantages and disadvantages to each approach, there are currently insufficient data to identify the optimal surgical approach in adults undergoing total hip
arthroplasty for osteoarthritis (Jolles and Bogoch 2006).

A number of prostheses are available for the replacement hip, and the evidence of the effective performance of the implant and the preference of the surgical team should govern clinical decision making. However, choices may also be influenced by cost (BOA 2006).

The NCC (2008) estimates that up to 10% of primary total hip replacements will need revision surgery within ten years. Revision arthroplasty may be required when there is failure of the previously implanted prosthetic device, which results in pain and dysfunction of the hip. In these instances, the old cement and prosthetic components are removed and replaced with new components. Revision surgery may involve the femoral, acetabular or both components, and is considered a more complex operation than a primary hip replacement. Revision surgery is often associated with prolonged rehabilitation periods and greater nursing input. Patients aged under 65 years are more likely to require surgical revision than those of advancing years (Santaguida et al 2008).

A national hip register was recommended by the NAO (2000) to provide a record of all hip and knee prostheses so that their performance could be monitored. Details can be found at: www.njrcentre.org.uk. The National Joint Registry (2008) also provides data on the number of hip and knee replacements carried out by each hospital in England and Wales, and by which surgeons.

**Post-operative nursing considerations**

Once the patient has returned to the ward, regular post-operative observations should be carried out in accordance with hospital policy and as dictated by the patient’s condition. Routine observations should include blood pressure, pulse, respiratory rate, oxygen saturations and temperature to monitor for signs of dehydration, shock or increased levels of pain. The wound should be inspected at regular intervals to check for signs of haemorrhage. The colour, sensation, movement and pedal pulses of the operated leg should be assessed regularly to observe for any circulatory or neurological impairment following surgery.

Continuing assessment of fluid balance should be documented, including intravenous and oral intake, urine output and any drainage within surgical drains. Patients are often catheterised during the immediate post-operative period. The catheter should be removed as soon as the patient is mobile enough to use the toilet, to reduce the risk of urinary tract infection (Temple 2004).

**Time out 4**

Reflect on the last time you cared for an acutely unwell post-operative patient. How did your assessment and management of the patient change? Write down the things you would like to assess and any actions you would take under the following headings: airway, breathing, circulation, disability and exposure. Guidance can be found at: www.resus.org.uk/pages/MEdental.pdf (appendix 1, page 21 onwards).

**Time out 5**

Consider the different types of analgesia patients may require pre and post-operatively. Make a list of medications that may be used by patients in the pre and post-operative stages of their care, and include the most common side effects. Discuss your choice of medications and routes with the pharmacist or a member of the acute pain team.

Pain assessments and checks on the use of patient-controlled analgesia should be noted at regular intervals, the aim being to monitor the use and effectiveness of analgesia in the early post-operative period. The patient-controlled analgesia device should be checked frequently for information on the patient’s requests for analgesia and the number of doses administered. Level of consciousness should also be assessed regularly, as part of the pain assessment, to ensure the patient is alert and orientated, as opposed to sedated or unresponsive. Findings should be documented,
greater than 30), active cardiac or respiratory failure or a personal or family history of VTE are also risk factors for developing thromboembolism following surgery. VTE is the most common post-operative complication following hip arthroplasty (BOA 2006), with a VTE occurring in more than 40% of patients undergoing orthopaedic procedures (NCC 2008).

The use of regional anaesthesia for hip arthroplasty is associated with a lower risk of VTE compared with general anaesthesia, although its use is guided by patient suitability and patient preference. Local guidance regarding anti-embolic therapy should be followed for patients undergoing hip arthroplasty. This is likely to include a combination of anticoagulant therapy such as low molecular weight heparin, thigh-length anti-embolic stockings and possibly the use of intermittent pneumatic compression or foot impulse systems (NCC 2008). Indications of deep vein thrombosis include oedema, tenderness and redness of the calf.

Common infective organisms following hip arthroplasty include *Staphylococcus aureus* and *Staphylococcus epidermidis*. To reduce the risk of post-operative infection, prophylactic intravenous antibiotics should be given on induction of the anaesthetic and for the first 24 hours following the operation (BOA 2006). Wound infection may be classified as superficial, when it affects the wound, or deep when the bone (osteomyelitis) or the prosthesis become infected. Deep infection is a serious risk in orthopaedic surgery and may result in extended periods of hospitalisation and, potentially, a clinical need to remove the prosthesis.

After microbiology results have identified the type of infective organism, appropriate antibiotic therapy may be commenced. Oral antibiotics are commonly adequate to eradicate superficial wound infections, although deep infection will require the use of intravenous antibiotics.

Loosening of the prosthesis in the absence of infection is termed aseptic loosening. Dislocation of the prosthesis is also a possibility, especially in the first six weeks following surgery (Temple 2004). Patients should be advised to avoid excessive range of movement to minimise the risk of dislocating the hip. Movements especially contraindicated include adduction and external rotation of the hip, for example when crossing legs, excessive abduction and excessive flexion of the hip beyond 90 degrees. Equipment and adaptations such as chair raisers and raised toilet seats may help to prevent excessive hip flexion and hence reduce the risk of dislocation.

Hospital physiotherapists will review patients post-operatively to instruct on specific exercises and assess whether individuals require mobility aids. All patients should be encouraged to perform deep breathing exercises to help maintain good lung function and prevent secretions accumulating within the lungs, which may result in respiratory infection. Patients should be encouraged to participate in foot exercises such as rotation, flexion and extension of the ankle to encourage venous return and to help prevent pooling of blood in the calf muscles (Temple 2004).

Nurses spend more time with patients than other allied health professionals, and it is essential that nursing staff are aware of the nature and benefit of post-operative exercises and are able to instruct and support patients in performing these exercises frequently throughout the day. An X-ray should be performed following surgery to check the positioning of the implant and to identify if there is any evidence of loosening. Following surgery, the patient may begin to mobilise; this will initially be partially weightbearing using a frame or crutches.

**Post-operative complications**

The risk of VTE increases following surgery because of the advancing age and immobility of some patients. Obesity (body mass index along with any actions taken, on the patient’s pain assessment chart.

Patients who have their pain well controlled following surgery are able to mobilise more quickly and easily, which helps reduce the risk of post-operative complications such as venous thromboembolism (VTE) (deep vein thrombosis and pulmonary embolism) and respiratory infection. Prolonged and inadequate post-operative pain may result in higher mortality and morbidity rates, increased length of hospital stay and greater healthcare expenses (Eid and Bucknall 2008).

**Time out 6**

Find out what exercises should be performed following hip replacement surgery and practice these so that you are confident enough to explain these to patients or other members of staff. Discussion with a physiotherapist or senior member of staff may be helpful.
Conclusion

Hip arthroplasty is a common procedure that frequently results in increased levels of independence and reduced pain levels. Knowledge of the relevant anatomy and physiology of the hip helps nurses appreciate why activities of daily living may become painful and difficult for patients with diseases affecting the hip. This knowledge allows practitioners to anticipate the assistance that may be required and to liaise appropriately with members of the multidisciplinary team to provide equipment and support in accordance with the patient’s needs.

It is essential that nurses are aware of the importance of effective screening and assessment strategies at pre-operative assessment clinics. They can then identify actual or potential problems either with the intended surgery or with issues regarding discharge arrangements. Understanding the nature of the surgery enables nurses to effectively deliver good pre and post-operative care and anticipate any complications that may arise.

References


