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CARE OF PATIENTS UNDERGOING JOINT REPLACEMENT

Recovery from hip and knee arthroplasty can be prolonged and painful. Jennie Walker describes the support that nurses need to offer individuals before and after surgery.

Abstract

Hip and knee replacements are common orthopaedic procedures that can greatly improve patients' quality of life and provide relief from the pain caused by various musculoskeletal diseases. This article considers pre-operative preparation of the patient undergoing joint arthroplasty and significant post-operative clinical considerations.

The nurse has an important role in the preparation, care and support of the patient throughout the surgical journey. Holistic assessment and effective pre and post-operative planning facilitate patient-focused care and optimal recovery.

Keywords

Hip replacement, knee replacement, musculoskeletal system and disorders, orthopaedics, surgical nursing

ARTHROPLASTY IS the replacement of a joint with a prosthesis. It is one of the most common reconstructive operations in orthopaedics (Hu et al 2008). In 2010, 76,759 hip replacement procedures and 81,979 knee replacement procedures were recorded on the National Joint Registry (NJR) (2011). Arthroplasty can be performed when irreversible damage has occurred to a joint that causes pain, dysfunction and reduced health-related quality of life. Damage can be caused by primary arthrosis (disease of the joint) (Table 1, page 16), or secondary causes such as other disease processes, trauma and musculoskeletal injury.

The earliest recorded attempt at joint replacement was in 1891 in Germany by Themistocles Glück who used ivory to replace the femoral head (Gomez and Morcuende 2005), and an ivory cup for a tibial hemiarthroplasty in 1894 (Wong et al 2011). Austin Moore inserted the first metal hip prosthesis in 1940, however, the first effective total hip replacement was performed by John Charnley in the 1960s (Wroblewski et al 2006). Knee replacement was first performed in 1954 by Shiers and has also been through many developments to reach its current form.

Pathophysiology

Arthrosis describes degeneration of the joint caused by primary disease, for example, osteoarthritis, or secondary processes such as those listed in Box 1 (page 16). Initial pathology can cause bone remodelling with formation of osteophytes (bony spurs) at joint margins and damage to the articular cartilage. This is termed secondary osteoarthritis and can result in pain and dysfunction of the affected joint in a similar manner to primary osteoarthritis.

Intracapsular fractures of the neck of the femur are prone to developing avascular necrosis (AVN) because of the disruption of the blood supply (McRae and Esser 2002). Necrosis of the femoral head results in collapse of the structure with
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Table 1  Primary causes of arthrosis

<table>
<thead>
<tr>
<th>Osteoarthritis</th>
<th>Non-inflammatory disorder of the synovial joints.</th>
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<tbody>
<tr>
<td></td>
<td>Localised loss of hyaline cartilage, remodelling of underlying bone and osteophyte formation (bony spurs) at the joint margins with consequential remodelling of the joint shape.</td>
</tr>
<tr>
<td>Ankylosing spondylitis</td>
<td>Chronic inflammatory rheumatic disease (seronegative spondyloarthropathy).</td>
</tr>
<tr>
<td></td>
<td>Progressive stiffness and fusion (ankylosis) of the joints.</td>
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<tr>
<td>Rheumatoid arthritis</td>
<td>Chronic inflammatory rheumatic disease.</td>
</tr>
<tr>
<td></td>
<td>Destruction of articular cartilage and bony erosions.</td>
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</tbody>
</table>

Pre-operative assessment
General health and fitness can decline because of reduced mobility and increasing disability, resulting in muscle weakness and loss of function by the time patients are admitted to hospital for surgery (McMeeken and Galea 2007). Pre-operative preparation should begin when the patient is placed on the surgical waiting list. While it is often difficult for patients to exercise, it is important that appropriate information and advice is provided to assist with maintaining or improving health before surgery.

Nurses in primary care are ideally placed to assess the physical, psychological and social preparation of patients before admission to hospital (Lucas 2008).

Discharge planning Pre-operative involvement of the multidisciplinary team aids effective assessment and planning for identified needs. Inadequate planning can result in delayed discharges because of lack of equipment or services. Provisional discharge planning should begin at pre-operative assessment, taking into consideration the patient’s age, comorbidities, home circumstances and availability of carers after discharge (British Orthopaedic Association (BOA) 2006). Patients’ discharge needs should be assessed well in advance of surgery, taking into account their environment, social support and social roles.

The patient and family can be given information and advice on, for example, stocking up the cupboard/freezer, or moving furniture to make things easier for the patient after discharge. Patients will need to check whether the height of chairs and location of toilets will cause difficulties because of their compromised strength, which will make getting up from low chairs or climbing stairs more difficult.

Social support is of great benefit in the post-operative period, often providing help with tasks such as shopping and laundry, although this cannot be relied on and many people do not have such support. The social support or care a patient provides to others also needs to be considered so that appropriate support can be arranged for others until the patient is able to resume normal activities.

Risks Pre-operative assessment clinics facilitate effective assessment of patients in relation to risks associated with surgery and help reduce cancellations (BOA 2006). Nurse-led pre-operative assessment clinics offer patients and families the chance to discuss surgery and raise any concerns. Routine investigations such as blood tests including group and save or cross-matching, urine
sample and relevant microbiological assessment such as meticillin-resistant Staphylococcus aureus screening should be carried out during the pre-operative assessment.

It is important that infections are treated before joint replacement surgery because the implant may become infected as a result of haematogenous seeding (Montanaro et al 2007). Baseline observations such as blood pressure, pulse, respiratory rate and oxygen saturations should be documented to allow post-operative comparison. Comorbidities such as diabetes, cardiac arrhythmias and hypertension should be assessed and appropriately managed before surgery. It is important that infection or other issues are managed before surgery to ensure patient safety. If this is not possible in the time frame given, surgery may need to be postponed to maximise patient fitness.

Education and information Pre-operative outcome expectations can affect post-operative outcomes (Lucas 2008), especially as patients may not appreciate that complete recovery can take up to one year. Pre-operative education is a fundamental part of pre-operative assessment clinics. Providing patients with verbal and written information on post-operative exercises and post-operative pain relief allows time for patients to familiarise themselves with the information, practise skills and ask questions before surgery.

Information given at this time helps to reduce pre-operative anxiety and prepare patients for their forthcoming procedure (McDonald et al 2004, Walker 2007). Having the opportunity to practise using crutches or performing exercises before surgery can increase confidence in using them post-operatively.

Surgery

Many patients are admitted to hospital on the day of surgery, although it is important to ensure adequate time is planned for pre-operative and pre-anaesthetic procedures to be carried out (BOA 2006). The side of the patient’s body to be operated on should be marked indelibly by the surgeon or surgical team and consent should be appropriately documented in the medical notes. It is important that patients are fasted in accordance with local policy before transfer to theatre, and are aware of the types of drips, drains and analgesia they may have in place when they return to the ward.

Joint replacement can be either a hemi (partial) or total arthroplasty, and both incur surgical insult to the soft tissue, ligaments and surrounding muscles. This not only causes post-operative pain, but makes mobilisation difficult in the early stages.

Patients’ discharge needs should be assessed well in advance, taking into account their environment, social support and social roles

A partial hip replacement (hemi-arthroplasty) involves removal of the femoral head and replacement with a prosthesis. This procedure is commonly performed after intracapsular fractures or AVN of the femoral head. Total hip replacement (Figure 1, page 18) involves the insertion of a femoral prosthesis and resurfacing of the acetabulum with a concave lining. This lining allows the prosthesis to move smoothly in the acetabulum and is more common in osteoarthritis. Similarly knee arthroplasty may involve total knee replacement (Figure 2, page 19) in which the distal femur and proximal tibia are cut to shape before inserting the metal components into the bone, or a replacement of the medial, lateral or patellofemoral region as required.

Hip and knee replacements may be cemented using polymethyl methacrylate, uncemented or use “hybrid” methods to secure the prosthesis. In uncemented prostheses, bony ingrowth is encouraged by a porous coating on the implant. In patients aged 70 or over cemented prostheses were associated with the lowest revision rates, and the highest rates with metal on metal types of replacements (NJR 2011).

A range of prostheses are available for each joint, which vary in design, suitability for pathology and cost (Table 2, page 19). Revision arthroplasty may be required when there is failure of the prosthetic device which causes joint pain and dysfunction. Implant failure can be caused by particles generated by wear of the joint. Polyethylene wear debris can cause synovitis, osteolysis and loosening of the implant (Wong et al 2011). Revision surgery is often longer and more complex than primary replacement because the old cement and prosthetic components have to be removed before implanting new mechanisms. Larger prostheses are required for revision to ensure good purchase, although this makes further replacements difficult and increases risk of periprosthetic fracture.

The NJR provides a record of all prostheses and data about the number of joint replacements carried out by each trust and by which surgeons. Details can be found at www.njrcentre.org.uk

Post-operative care

After surgery, regular observations should be carried out such as blood pressure, pulse, respiratory rate, oxygen saturations and temperature. It is also
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important to monitor for signs of dehydration, shock or increased levels of pain. Early warning systems enable any abnormal parameters to be identified and prompt action taken (Higgins et al 2008). The wound should be inspected regularly to check for signs of haemorrhage or infection.

Regular neurovascular observations of the limb that was operated on to check for colour, warmth, sensation, movement and pedal pulses can promptly identify circulatory or neurological impairment after surgery. Continuing assessment of fluid balance must also be documented including intravenous (IV) and oral intake, urine output and any drainage in surgical drains. The extensive nature of the surgery and the older age and multiple comorbidities of many patients undergoing arthroplasty mean that it is important that nursing staff carry out observations regularly, until the patient is considered stable.

Pain relief Pain assessment and checks of patient-controlled analgesia (PCA), epidurals and blocks should be carried out regularly to monitor the use and effectiveness of analgesia in the early post-operative period. The PCA should be checked to ensure effective delivery of the medication and, where appropriate, patient requests for analgesia and the number of doses administered should be noted. The patient’s level of consciousness should be assessed to ensure he or she is alert and orientated, as opposed to sedated or unresponsive. Findings and any actions taken should be documented on the pain assessment chart. Patients who have effective pain relief are able to mobilise earlier with greater ease, which reduces the risk of post-operative complications such as deep vein thrombosis (DVT) and respiratory infection. Conversely, prolonged post-operative pain may result in higher mortality and morbidity rates, increased length of hospital stay and greater healthcare expenses (Eid and Bucknall 2008).

Physiotherapy Physiotherapists advise patients on specific exercises to do and assess them for use of mobility aids. Initially patients will be partially weight bearing and will therefore need to use a frame or crutches. Patients should be encouraged to do foot exercises such as the rotation, flexion and extension of the ankle to promote venous return and help prevent pooling of blood in the calf muscles (Temple 2004). Because nurses spend more time with patients than other health professionals, it is important that they are aware of appropriate and simple post-operative exercises that patients can perform.

Nurses should be confident in the instruction and support of patients performing these exercises at regular intervals throughout the day.

It is important that patients are informed about activities which should be avoided after surgery. In hip replacements the femoral head is taken out...
of the socket and replaced with an implant. In the initial post-operative period the soft tissues cannot support the structure and maintain it in place, therefore movements that may increase the risk of dislocating the prosthesis should be discouraged. Risk can be reduced by avoiding excessive range of:

- Adduction and abduction (moving toward and away from the midline).
- External rotation of the hip.
- Flexion of the hip beyond 90 degrees.

Occupational therapy assessment can assist with appropriate equipment and adaptations such as chair raisers and raised toilet seats to help prevent excessive hip flexion and reduce the risk of dislocation. Other home adaptations may be required in the initial period while the patient is rehabilitating.

After knee replacement, activities such as jumping, jogging or running, contact sports or high impact aerobics should be avoided, however, less strenuous activities such as golf, ballroom dancing and driving are not problematic.

Complications

Venous thromboembolism (VTE) is a common complication (BOA 2006) and occurs in more than 40 per cent of patients undergoing orthopaedic procedures (National Institute for Health and Clinical Excellence (NICE) 2008). There is also the risk of fat embolism after arthroplasty, although this is much less common than VTE.

The risk of VTE increases significantly after surgery because of the advancing age and immobility of many patients. Obesity (a body mass index greater than 30), active heart/respiratory failure, or a personal or family history of VTE are considerable risk factors for VTE after surgery. Local guidance about anti-embolic therapy should be followed for patients undergoing arthroplasty of the hip or knee; this may include a combination of anticoagulant therapy such as low molecular weight heparin (LMWH), anti-embolic stockings and possibly the use of intermittent pneumatic compression or foot impulse systems (NICE 2008). Some areas are moving away from subcutaneous LMWH injections and using oral forms of anti-coagulation. Signs of DVT occurring in the calf include oedema, tenderness and redness of the area.

Infections

Prophylactic IV antibiotics should be given to reduce the risk of surgical infection. Infections after arthroplasty are commonly caused by *Staphylococcus aureus* and *Staphylococcus epidermidis* (Mortazavi et al 2010). Infections may be classified as superficial (affecting the superficial wound site only), or deep, in which the bone or the prosthesis are infected. Oral antibiotics are usually sufficient to eradicate superficial wound infections, although deep infection may require the use of IV antibiotics and oral antibiotics (Darley and MacGowan 2004).

Deep infection can result in extended periods of hospitalisation and in some instances the prosthesis may have to be removed before the infection can be resolved. This is because of the presence of a biofilm secreted by bacteria which make them unresponsive to antibiotic therapy.

Patients who have elective joint replacements are admitted to hospital with the intention of being discharged back to their home or residential home as soon as they are fit. In some instances, such as after trauma, the initial phases of rehabilitation may take longer than anticipated. It may be necessary to consider other options for rehabilitation than remaining on an acute ward. A holistic assessment should be made for each patient and the multidisciplinary team needs to be actively involved in determining the best possible route of rehabilitation. Although

<table>
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<tr>
<th>Type of replacement</th>
<th>Description</th>
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<tr>
<td>Metal on metal implant</td>
<td>Increased risk of revision, although more data required to confirm finding.</td>
</tr>
<tr>
<td>Ceramic on ceramic lining</td>
<td>Ceramic is resistant to wear and scratch resistant. No long-term data available.</td>
</tr>
<tr>
<td>Polyethylene on metal lining</td>
<td>No long-term data available.</td>
</tr>
</tbody>
</table>

Table 2 Type of replacement

![Knee replacement](image)
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there is always pressure to reduce the length of inpatient stays, a rushed discharge, or discharge without appropriate support in place, can result in unnecessary re-admission to hospital (Bishop 2010). Understanding patients’ pre- and post-operative healthcare needs facilitates effective planning and care management (Su et al 2010). Failure to do this will hinder discharge planning and patient-focused care.

Recovery from hip and knee replacements is often a slow process and the effect that surgery will have on roles and relationships after discharge from hospital is often underestimated. Many patients will have to re-establish roles and relationships in society which they may have relinquished because of pain and restrictions present before surgery (Grant et al 2009).

Conclusion

Arthroplasty is a common procedure which greatly benefits many individuals and often results in increased levels of independence. Knowledge of relevant anatomy and physiology and what surgical procedures involve helps nurses appreciate why activities of daily living may become painful and difficult after surgery. This allows practitioners to anticipate what assistance may be required and appropriately liaise with members of the multidisciplinary team to provide equipment and support before and after surgery.

Nurses need to be aware of the importance of effective screening and assessment strategies at pre-operative assessment clinics and in the community so that actual or potential problems, either with the intended surgery or with issues about discharge arrangements, are identified. Understanding the nature of the surgery enables nurses to deliver excellent pre- and post-operative care and anticipate any complications that may arise.

References


