

# Perioperative management of patients with musculoskeletal disease and for the burns patient

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## Abstract

Musculoskeletal disease may present as isolated joint disease, a severe multisystem disorder or a neuromuscular disorder affecting the musculoskeletal system. Thorough preoperative assessment is essential to plan the surgical management of this group of patients. Assessment of the severity of cardiorespiratory disease may be difficult with severely limited mobility. The airway and neck may be involved so early anaesthetic opinion is essential. Drug therapy may need to be modified or stopped perioperatively. Intraoperative positioning and thermoregulation can be difficult to achieve and postoperative analgesia needs to be carefully planned to avoid respiratory depression in a vulnerable group.

Patients with burns may present in the emergency department for urgent assessment or for early surgery to excise the burn and graft the defect. There may be an inhalational injury which if severe will require urgent treatment often with intubation and ICU care. A major burn is also a multisystem disorder and again there are challenges with airway management positioning and thermoregulation. These patients present for repeated surgeries and can suffer extreme emotional and psychological strain as a result of the burn insult.

**Keywords** Anaesthesia; burn injury; inhalational injury; malignant hyperthermia; musculoskeletal disease; neuromuscular diseases

## Perioperative care of patients with musculoskeletal disease

This diverse group of disorders range in severity from isolated disease of a single joint to severe multisystem disease. The primarily musculoskeletal disorders are listed in [Table 1](#), along with the more common neuromuscular diseases that affect the musculoskeletal system. Surgery may be either for a specific problem related to the condition or coincidental.

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## Preoperative assessment

**History:** assessment begins with a review of the patient's notes. These patients have often had multiple surgeries and old admission documents and anaesthetic charts may help highlight likely problems and requirements.

A thorough history must be taken, focussing on both medical problems associated with the disease and unrelated problems. The multisystem nature of these disorders cannot be over-emphasized and issues particular to the inherited and acquired disorders are summarized in [Tables 2 and 3](#). Musculoskeletal disease limits activity, which may lead to underestimation of the severity of other disease; for example, symptoms of ischaemic heart disease may be hidden by reduced mobility. The stress of anaesthesia and surgery readily unmasks advanced disease and every effort must be made to optimize this preoperatively.

Expect the patient to be prescribed analgesics, medication for chronic pain (including opioids), steroids, other disease-modifying drugs and biological agents. All these drugs have side effects. Steroids suppress endogenous steroid production and should not be stopped abruptly. Indeed, they may need to be supplemented perioperatively and guidelines can be found in the British National Formulary.<sup>1</sup> Disease-modifying agents (sulphasalazine, azathioprine, cyclosporin, gold, penicillamine) may cause bone marrow suppression, immunosuppression and renal damage. The biological anti-cytokine agents (etanercept, infliximab, adalimumab) act against tumour necrosis factor- $\alpha$ . They are associated with severe immunosuppression and should be withheld for 2–4 weeks before major surgery to reduce the risk of postoperative infection, in consultation with the patient's rheumatologist.

**Examination:** a thorough cardiovascular and respiratory examination is essential, noting especially the extent of any deformity of the thoracolumbar spine and its impact on underlying structures. Neurological examination should document any preoperative neurological deficits and any weakness, particularly respiratory and bulbar. The airway should be examined prior to anaesthesia. Mouth opening can be limited by disease affecting the temporomandibular joints. Cervical spine involvement causes limited neck flexion and extension either by instability (typically atlanto-axial) with neurological signs, or from fusion of cervical vertebrae. These signs suggest difficulties with airway management and the early involvement of an experienced anaesthetist is recommended. It is advisable to consult the patient's neurologist to inform them of admission and involve physiotherapy early to ensure optimal perioperative support.

**Investigations:** a full blood count, urea and electrolytes are recommended in most cases. ECG, chest X-ray and other investigations depend on the systemic manifestations of the disease. Lung function may be compromised both by musculoskeletal deformity and drug therapy. Lung function tests and arterial blood gas analysis help assess the severity of this. Ideally, the severity of ischaemic heart disease should be assessed with dynamic testing but this is challenging with limited mobility. Stress echocardiography and myocardial perfusion scans can be helpful. If necessary, cardiopulmonary exercise testing can be performed using an arm-cycle ergometer. Neck symptoms will usually have been investigated. However,

## Common musculoskeletal disorders

Musculoskeletal		Neuromuscular	
Inherited	Acquired	Inherited	Acquired
Ehlers–Danlos syndrome	Osteoarthritis	Muscular dystrophy	Motor neurone disease
Marfan syndrome	Rheumatoid arthritis	Myotonic dystrophy	Multiple sclerosis
Osteogenesis imperfecta	Ankylosing spondylitis		Myasthenia gravis
	Scoliosis		
	Osteoporosis		

**Table 1**

radiographs in flexion and extension and MRI scan of the cervical spine can be requested; these should be reported by an experienced radiologist.

### Intraoperative management

**Airway control and ventilation:** airway management may be challenging. Tracheal intubation requires flexion of the lower part of the cervical spine and extension of the upper to visualize the larynx; this manipulation may cause severe neurological deterioration. In the unstable neck intubation may be performed awake, fibreoptically and nasally if mouth opening is limited. If tracheal intubation is not essential then a laryngeal mask airway may be used; this can be inserted under general anaesthetic with less movement of the neck. However, it does not protect the trachea from soiling. Deformity of the thoracic spine and chest wall rigidity can make ventilation difficult as a result of a restrictive defect.

For surgical procedures below T10, central neuraxial blockade (CNB) may be considered, avoiding intubation and ventilation. However, this may be technically difficult with a higher incidence of complications including epidural haematoma. Local anaesthetic spread may be unpredictable. Upper limb procedures can be carried out under brachial plexus block and a lower limb can be effectively anaesthetized with a combination of lumbar plexus or femoral and sciatic block. Transversus abdominis plane blocks provide anaesthesia of the anterior abdominal wall. Ultrasound guidance makes all these blocks more straightforward as nerves can usually still be visualized even if positioning is sub-optimal.

**Drugs:** neuromuscular blocking drugs (NMB) should be used with caution. Depolarizing NMB (suxamethonium) can lead to a fatal rise in potassium due to activation of extrajunctional acetylcholine (ACh) receptors. In the myotonic patient, suxamethonium can cause sustained muscle contraction with hyperpyrexia and rhabdomyolysis. Patients are often highly sensitive to non-depolarizing agents with resultant respiratory muscle weakness postoperatively. There is an association between Duchenne muscular dystrophy and malignant hyperthermia (MH). For this reason volatile agents, known to trigger MH, are avoided. The key features of MH are summarized in [Table 4](#).

**Positioning and warming:** elderly patients are often frail with low body mass index or muscle mass. This, along with a skeletal deformity, makes positioning difficult. Ideally, the patient should

position themselves awake on the operating table in the most comfortable position for surgery; anaesthesia is then induced. Particular care must be taken with pressure areas. Steroids make skin very fragile so exposed areas must be padded. Adhesive dressings used to secure cannulae and cover wounds can tear the skin. This group is already at risk of postoperative infection as a result of both the disease and drug therapy; warming is essential and should be guided by regular temperature monitoring.

**Analgesia:** ideally, the patient's regular analgesics should be continued perioperatively. NSAIDs should be discontinued according to local policy. For acute surgical pain, regular paracetamol should progress to weak and strong opioids. However, opioids may lead to respiratory depression and weak cough in patients with already poor respiratory function. They are also associated with postoperative nausea and vomiting and prophylactic antiemetics should be prescribed.

Regional techniques are invaluable in this group of patients. CNB can be prolonged with the addition of opioids provided appropriate postoperative monitoring for delayed respiratory depression is available. Long-acting local anaesthetic agents should be used for peripheral nerve blocks and perineural catheters can be inserted to allow local anaesthetic infusion to be continued postoperatively.

### Postoperative care

Emergence from anaesthesia should be managed as carefully as induction and maintenance to avoid any damage to the neck, vulnerable joints and tissues. Analgesia can present a challenge. These patients may already be taking multiple analgesics which should be carefully reviewed perioperatively. Opiates can be given using a patient-controlled system. However, patients may be unable to activate the device if they have hand deformity or bandaging. Opiates should also be used with caution as they can cause respiratory depression. In view of these challenges it is wise to involve the acute pain team as early as possible. High-dependency monitoring is essential for this challenging group, allowing early detection of respiratory failure. Physiotherapy is the mainstay of their recovery and analgesia must be adequate for this.

### Perioperative care of the burns patient

The ultimate outcome for the burns patient depends on early appropriate resuscitation, multidisciplinary team management,

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