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Anesthetic Considerations in Rheumatoid Arthritis

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Abstract: Rheumatoid arthritis is an autoimmune disorder defined by erosive symmetrical poloarthropathy. It affects joints of hand and feet and also affects other organs. There has been a great deal of progress in the management of rheumatoid arthritis.Perioperative management of these patients is challenging.the anaesthesiologist must be aware of recent developments and potential risk of this multisystem disease.
Keywords: Rheumatoid, anesthesia, cervical spine.

Introduction

Rheumatoid arthritis (RA) is a autoimmune disorder characterized by acute and chronic systemic inflammation that primarily involves the joints. It may affect many tissues and organs, including blood vessels, heart, skin, lungs, and muscles. RA patients have a reduced life expectancy when compared with the general population. Rheumatic disorders occur with high variability; some are developed very rapidly, others chronically, remain disabled throughout. Anesthetic risks increases as the disease may involve the cardiovascular, respiratory and renal systems, besides mechanical deformations due to osteoarticular involvement.

Pre-Anesthetic Assessment

The goal of the pre-anesthetic assessment in patients with rheumatoid arthritis is to determine the extent of disease and then to minimize anesthetic and surgical risks. One should be aware of both the consequences of articular and systemic complications of disease and the adverse effects of concurrent drug therapy that may interfere with anesthesia[1,2].

Risks And Difficulties Secondary To Articular Damage

Rheumatoid arthritis is characterized by destruction of synovial joints, affecting mainly the small joints. The temporomandibular joint and spine joints are of particular interest to anesthesiologists. Proliferation and hypertrophy of synovial cells form a layer that destroys articular cartilage, and it can cause ankylosis of the articular space with fibrosis and calcification[2].

These articular changes have an impact on management of anesthesia:

- The presence of deformities may affect patient positioning during surgery, hindering access for regional anesthesia or venous cannulation.
- The difficulty in positioning the patient on the operating table can result in regions of the body without adequate support, requiring additional support during anesthesia.

Head and neck involvement in rheumatoid arthritis can result in difficult airways due to the complexity of executing the necessary maneuvers for tracheal intubation. Therefore, it is essential to try to evaluate the extension of cervical spine, temporomandibular joint, and cricoarytenoid joint involvement before anesthesia[2].

Cervical Spine

More than 80% have cervical spine involvement and, of these, over 30% may have instability with symptoms of pain related to the affected spinal segment. Acute subluxation may cause spinal cord compression and/or compression of the vertebral arteries leading to quadriparesis or sudden death. One should be careful to limit movements of cervical spine extension and flexion during anesthesia, which might result in difficult conventional direct laryngoscopy[2].

Temporomadibular Joint

Temporomandibular dysfunction is frequently produces limitation of mouth opening and render direct laryngoscopy impossible. Fibrosis on upper and lower articular surfaces can lead to ankylosis These changes are more common in juvenile rheumatoid arthritis (JRA), frequently associated with hypoplastic mandible[3]. The incidence of upper airways obstruction in supine position is high in patients with temporomandibular arthritis[4].

Cricoarytenoid Dysfunction

Laryngeal involvement can be seen in more than 75% of rheumatoid arthritis patients . Fixation of the cricoarytenoid joint can present itself as a foreign body sensation in the oropharynx, dysphagia, dyspnea, hoarseness, stridor, and airways obstruction[1]. Laryngoscopy can reveal a reduction in the movement of cricoarytenoid joint and vocal cords during inspiration. Postoperative monitoring is necessary to detect possible signs of airways obstruction after removal of orotracheal tube.

Systemic Diseases of Interest to Anesthesiologists[5]

Cardiovascular	Pericardial effusions, pericarditis and cardiac tamponade
	Myocarditis, amyloidosis, and granulomatous disease
	Endocarditis and left ventricular failure
	Peripheral vasculitis and Raynaud's phenomenon
	Increased atherosclerosis and coronary heart disease
Respiratory	Restrictive defect (fibrosing alveolitis)
	Rheumatoid nodules
	Reduced chest wall compliance (costochondral disease)
	Pleural effusions
Haematological	Normocytic normochromic anaemia
	Iron deficiency anaemia (peptic ulceration and bleeding)
	Bone marrow depression from drug treatment
Hepatic and renal	Chronic renal failure from drug treatment (approx 25%)
	Hepatomegaly, splenomegaly
	Increased serum fibrinogen and alpha-1 acid glycoprotein
	Decreased serum albumin
Neurological and ocular	Peripheral neuropathy
	Autonomic dysfunction
	Kerato-conjunctivitis

Effects of pharmacotherapy

The groups of drugs currently available for the management of RA include those giving symptomatic relief, corticosteroids, disease-modifying anti-rheumatic drugs (DMARDs) and biological agents, including the new anti-cytokine drugs. In more severe cases, patients may be receiving long-term opioid analgesic . Important adverse effects of drug treatment which are relevant to anesthesia are shown in below [5].

Drug therapy in RA	Key adverse effects relevant to anaesthesia
Drugs providing symptomatic relief	
Corticosteroids	Hypertension, electrolyte imbalance, diabetes, obesity, peptic ulcer disease, fragile skin, adrenal suppression
NSAIDs	Heart failure, hypertension, gastric bleeding and ulceration, nephrotoxicity, fluid retention, increased perioperative bleeding
Disease-modifying anti-arthritis drugs	
Sulphasalazine	Neutropenia, thrombocytopenia, aplastic anaemia, fibrosing alveolitis
Methotrexate	Pulmonary toxicity, hepatic cirrhosis
Chloroquine	Retinopathy, neuromyopathy, cardiomyopathy
Azathioprine	Cholestatic hepatitis, bone marrow suppression
Cyclosporin	Nephrotoxicity, hypertension, tremor
Gold	Thrombocytopenia, bone marrow suppression, pulmonary fibrosis, hepatotoxicity, nephrotic syndrome, proteinuria

Drug therapy in RA	Key adverse effects relevant to anaesthesia
Penicillamine	Bone marrow suppression, haemolytic anaemia, nephrotic syndrome, myasthenia-like syndrome
Anti-cytokine agents (Biological agents)	
Etanercept (binds TNF)	Flu-like symptoms, blood disorders, demyelinating disorder of the CNS
Infliximab(anti-TNF antibody)	Associated with development of TB at extrapulmonary sites, chest and abdominal pain
Adalimumab(anti-TNF)	Flu-like symptoms, abdominal pain, cough, light-headedness

Preoperative Investigation

It will depend on the nature and degree of the involved organ impairment.

Table I shows guidelines for investigation.

Table-1 – Pre-anesthetic Assessment[6]

EXAMINATION	JUSTIFICATION
In all cases	
Complete blood count	Anemia by GI losses Drug-induce dyscrasia
Electrolytes and BUN	Renal involvement, drug toxicity
Electrocardiogram	Arrhythmias, conduction defect, ischemia, chamber hypertrophy secondary to valvular disease
Chest X-ray	Pulmonary fibrosis, kyphoscoliosis, heart area
Cervical spine X-ray	Flexion deformities, vertical or horizontal translocation. Instability
Whenever indicated	
Pulmonary function tests	Involvement of the pulmonary wall or restrictive disease Arterial blood gases
Liver function tests	Low albumin – drug toxicity
Direct laryngoscopy	Symptoms of joint involvement Cricoarytenoid
Echocardiography	Valvular heart disease Pericarditis

Regional or local anaesthesia[7]

It is always better to perform surgery under regional or even peripheral nerve blockade. Upper limb surgery may be performed under brachial plexus block and lower limb surgery performed under spinal, epidural block. Regional or local anaesthesia have the advantages of avoiding both neck and airway manipulation and thereby the systemic effects of drugs used for general anaesthesia are also avoided.

Peripheral nerve blocks can be technically challenging because of loss of anatomical landmarks from contractures and flexion deformities. Similarly, spinal and epidural anaesthesia may be technically difficult in cases where the lumbar and thoracic spines are involved in the disease process.

Managing the airway

If general anesthesia is to be performed, the airway can be managed in several ways. The Guedel airway and a face mask may be sufficient in mask ventilation. The laryngeal mask airway (LMA) may also be used. It may be difficult to insert an LMA if the angle between the oral and pharyngeal axis at the back of the tongue is less than 90°; a reinforced LMA may be preferable in such circumstances.

If tracheal intubation is indicated, this must be achieved without causing further injury to a potentially unstable cervical spine. Manipulation of the neck from the neutral position can lead to neurological deterioration, quadriplegia and even sudden death and thus should be avoided[8]. The recommended 'sniffing' position for laryngcscopy, whereby the head is hyperextended on a flexed neck can result in

exacerbation of the anterior atlanto-axial subluxation with resultant neurological injury[9] . Care should be taken during conventional laryngoscopy and neck manipulation in all patients with RA, even without overt cervical spine instability.An intubating LMA (ILMA) may be used to achieve endotracheal intubation with minimal cervical spine movement.

Fibreoptic intubation has improved the safety of airway management in patients with RA[10] . Where difficult intubation is anticipated because of cervical spine instability, TMJ disease or a reduction in neck movement, an awake fibreoptic intubation is highly recommended[11]. However, an awake fibreoptic intubation is not without problems and depends on the skill of the operator. Tracheostomy can be performed under local anaesthesia and is another method of securing the airway of patients with cricoarytenoid involvement.

Other important factors

Positioning of the patient should be meticulous and all pressure areas padded to avoid pressure sores. Methylcellulose eye drops should be applied as up to 15% of patients with RA suffer from kerato-conjunctivitis sicca and are at risk of corneal ulceration. Consideration should be given in positioning the patient awake before induction of general anaesthesia.

Full aseptic technique for establishing i.v. access, epidural/spinal blocks, arterial and CVP-line and urinary catheter is mandatory as these patients may be at increased risk of infections from immunosuppressive drug treatment.

Long-term steroid therapy causes adrenal suppression and patients taking an equivalent dose greater than prednisolone 10 mg daily require steroid cover[12]. Blood glucose concentrations should be monitored closely and controlled with insulin . Patients taking steroids and NSAIDs are at risk of developing gastro-intestinal tract bleeding and should receive gastric acid prophylaxis.

Postoperative management

Careful observation of the airway and breathing are required in the immediate postoperative period. Pre-existing glottic stenosis due to bilateral ankylosis of the cricoarytenoid joints may lead to complete airway obstruction following extubation due to airway oedema caused by tracheal intubation. There are multiple case reports highlighting this complication, which may arise several hours postoperatively. This may require reintubation or tracheostomy, and may be fatal[13]. Patients with RA, in general, are considered to be in a hypercoagulable state. Such patients receiving corticosteroids showed a hypercoagulable state compared with patients suffering from osteoarthritis in the peri-operative period[14]. Thromboprophylaxis should be prescribed, as patients with RA tend to have a slower recovery and return to mobilization.

Patients with RA may be at higher risk of peptic ulceration, especially if they are on a combination of steroids and NSAIDs, and appropriate prophylaxis should be considered. Standard physiotherapy and breathing exercises should be instituted as early as possible due to the increased risk of infection .

Pain should be adequately controlled to avoid delayed mobilisation, venous thromboembolism and chest infections. Opioid analgesia can be used in carefully monitored doses to reduce the incidence of side effects. Patients may find it difficult to use a PCA due to joint deformity and muscle weakness. In these cases, nurse-controlled analgesia or modified devices are possible alternatives

Conclusion

Anesthesia for severe rheumatoid arthritis can be challenging. So the anesthetist must have adequate knowledge of multisystem involvement of disease and the medications patients may be taking and prepare accordingly for safe perioperative management.

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