RHEUMATOID ARTHRITIS AND ANAESTHESIA - PART 2
ANAESTHESIA TUTORIAL OF THE WEEK 267

13TH AUGUST 2012

Dr Rashmi Menon
Leeds General Infirmary
Correspondence to rashmimenon@doctors.org.uk

QUESTIONS

1. A patient with long standing rheumatoid arthritis (RA) presents with hoarseness of voice. What are the anaesthetic implications of this? Choose the single best answer.
    a. This history is not significant
    b. Hoarseness might worsen after endotracheal intubation-the patient should be warned about this
    c. The patient may be difficult to intubate as the vocal cords may be swollen
    d. The patient probably has cricoarytenoid involvement, which combined with airway oedema post intubation can cause complete airway obstruction in the post operative period.

2. Regarding anaesthesia for patients with RA (true/false):
    a. Spinal and epidural anaesthesia should be used where possible
    b. Regional nerve blocks are contraindicated
    c. Awake fibreoptic intubation (AFOI) may be needed in cases of severe atlanto-axial subluxation
    d. An LMA can be used for airway management to limit neck manipulation
    e. Cervical spine involement in RA is always accompanied by symptoms

3. Regarding atlanto axial involvement in RA (true/false):
    a. The most common type of atlanto-axial subluxation (AAS) is posterior AAS
    b. Subluxation exists when the distance between the atlas and the odontoid peg exceeds 4 mm in patients older than 44 and 3 mm in younger patients
    c. Flexion of the neck is more harmful than extension
    d. AAS can be diagnosed only by a CT scan
    e. Severe AAS may necessitate an awake tracheostomy for airway management

INTRODUCTION

Rheumatoid arthritis (RA) is a chronic systemic inflammatory disorder that affects 1-2% of the population. The multisystem nature of the disease, issues with airway management and polypharmacy makes the anaesthetic management of these patients challenging. Anaesthetists may come across patients with RA during orthopaedic surgery relating to their disease, joint injections, incidental surgery, pregnancy and delivery and ICU management.

The aetiopathogenesis, clinical features, diagnosis and treatment of RA are discussed in "Rheumatoid Arthritis and Anaesthesia – part 1" (ATOTW 266). This article focuses on the anaesthetic considerations in patients with RA.

PRE-OPERATIVE ASSESSMENT AND PREPARATION

- A thorough history of the RA including duration of the disease, severity, drug treatments and systemic complications should be taken.
- Rheumatoid patients are often in pain and suffer with deformities that restrict simple movements; care should be taken during examination.
- The range of movement of all joints should be noted so as to optimise patient position and minimise injury during anaesthetic procedures (venous access, nerve blocks) and positioning for surgery. Involvement of the joints of the wrists and fingers may limit function enough to preclude the use of a standard patient-controlled analgesia (PCA).
- These patients have very fragile skin that is easily damaged. Fragile veins makes peripheral venous access unreliable and central venous access is often difficult due to neck deformity.
- Preoperative neurological deficit, if any, should be documented.
- Patients taking more than 10 mg prednisolone per day should be given appropriate peri-operative steroid cover. Patients should continue their regular prednisolone and receive hydrocortisone intra-operatively to cover the stress response to surgery. Depending on the type of procedure, hydrocortisone may need to be continued into the postoperative period as shown in Appendix 1.
- Patients are likely to have anaemia (normocytic normochromic anaemia due to chronic disease or microcytic anaemia due to gastric bleeding and drug toxicity of bone marrow) and there may be increased requirement for red-cell transfusion.
- Patients may have cachexia, which is indicative of poorly controlled disease and an increased long-term cardiovascular risk. Cachexia and poor muscle bulk may also indicate myopathy which may impair respiratory muscle function, and such patients may need to be considered for postoperative mechanical ventilation.
- Methotrexate can be continued in the peri-operative period without impaired wound healing or a substantially raised risk of peri-operative infection[1]. Furthermore, good disease control in the peri-operative period is beneficial. There is lack of data regarding the use of other immunosuppressants. Peri-operative discontinuation of biological therapy for elective surgery remains controversial. Recent studies have suggested that their use does not cause specific adverse effects and may improve recovery from postoperative anaemia.

Airway assessment

- A detailed airway assessment including mouth opening, TMJ function, neck flexion and extension is essential.
- Temporomandibular joint involvement should be assessed pre-operatively using the Mallampati score, mouth opening and mandibular protrusion.
- Any history of cervical surgery should be elicited, as cervical fixation devices may cause impaired neck extension.
- There are no published evidence-based guidelines or general consensus on the need to obtain cervical spine X-rays before surgery in asymptomatic patients. However it may be prudent to obtain neck X-rays in long term patients with severe disease.
- If atlanto-axial subluxation (AAS) is suspected, plain X-ray films in flexion and extension of the neck are often diagnostic. Subluxation exists when the distance between the atlas and the odontoid peg exceeds 4 mm in patients older than 44 years and 3 mm in younger patients. A flexion/extension CT or MRI should be considered if symptoms are associated with severe pain, neurological signs are present or if there is significant abnormality noted on plain X-ray.
- Fibreoptic nasopharyngoscopy is indicated for patients with hoarseness because of the likelihood of cricoarytenoid involvement

Sam Shinde 18/7/12 3:02 PM
Deleted: in flexion and extension

Management of the airway

The issues in airway management are the increased prevalence of a difficult airway (RA patients needing cervical spine surgery have a high prevalence of grade 3 or 4 laryngoscopy) and the presence of AAS, which may result in spinal cord injury during airway management. The extent of neck flexion and extension should be assessed and documented. Peri-operatively, care should be taken to avoid any movement beyond this range.

The risks are dependent on the type of AAS. The most common is anterior AAS (80%), which is worsened by C1/C2 flexion. Direct laryngoscopy is usually well tolerated. Subluxation is worsened by the head moving anteriorly whilst the upper cervical spine remains static, e.g. putting a pillow behind the head. A useful technique is to keep the upper cervical spine supported whilst the head is not moved anteriorly, e.g. using a doughnut head ring with a large enough hole to accommodate the occiput. This supports the cervical spine without anterior movement of the head, and is the best choice for rheumatoid patients.

Posterior and vertical AAS both pose the risk of spinal cord compression during C1/C2 extension, the movement of which occurs during direct laryngoscopy, which should therefore be avoided. They are much less common than anterior AAS, and are mostly symptomatic.

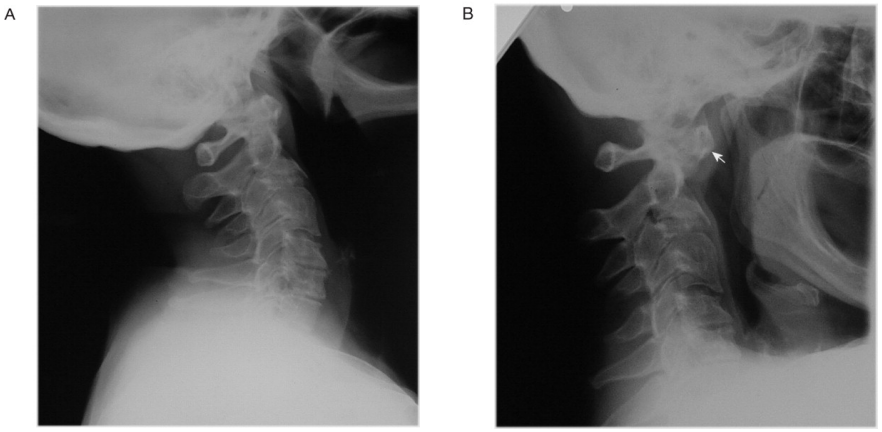

Figure 1. Cervical spine X-rays in a patient with severe rheumatoid arthritis on long term steroids showing anterior atlanto-axial subluxation (with permission from Oxford University Press). **A**- extension. **B**- flexion: Demonstrates severe anterior atlanto-axial subluxation. Note the position of dens axis (arrow). There is a 13 mm dislocation between the dens and the main body of the axis. C3 shows degenerative changes.

Cricoarytenoid arthritis is variable in frequency and often unrecognised. Patients have both joint and soft tissue swelling causing stenosis. Symptoms may include hoarseness, stridor, a sense of pharyngeal fullness when speaking and swallowing or dyspnoea. If cricoarytenoid involvement is suspected, avoid endotracheal inubation in favour of supraglottic airway devices. If intubation is essential, use the smallest internal diameter tracheal tube possible. Problems occur post extubation, when the oedema combined with an already narrow airway can cause complete obstruction. Consider the use of an airway exchange catheter at extubation, and observe patient in a high dependency area for some time post extubation. In severe cases, a pre-operative tracheostomy may be required.

Pre operative investigations

- Routine full blood count, renal function and electrolytes.
- Liver function tests in patients on long term disease modifying anti-rheumatic drugs (DMARDs).
- Low threshold for ordering respiratory investigations (chest radiographs, arterial blood gases and lung function tests) due to the possibility of pulmonary involvement or respiratory myopathy.
- An ECG should be performed to check for left ventricular hypertrophy and conduction disturbances. An echocardiogram should be performed to look for evidence of diastolic dysfunction, left ventricular hypertrophy and valvular abnormalities. Left ventricular ejection fraction may be normal and falsely reassuring in the presence of diastolic dysfunction.

INTRA-OPERATIVE MANAGEMENT

There is no one recommended anaesthetic technique; choice of technique will depend on the patient's general condition, type of surgery, patient preference and skill of the anaesthetist. Regional anaesthesia, general anaesthesia or a combination of the two may be employed.

Regional anaesthesia, if possible, should always be considered, as it avoids airway manipulation, provides good postoperative pain relief and reduces polypharmacy. However, regional and neuraxial blocks may be technically difficult due to spinal arthritis and loss of anatomical landmarks from contractures or deformities. A higher than normal level should be anticipated during a subarachnoid block[1].

If a general anaesthetic is indicated, there are several options for managing the airway depending on the patient and the type and duration of surgery.

- Laryngeal mask airways (LMAs) and other supraglottic airway devices have the advantages of requiring minimal neck manipulation for insertion and causing lesser trauma and subsequent laryngeal oedema compared with a tracheal tube. They should be used where possible. They may be difficult to insert in patients with fixed flexion deformities of the neck.
- If tracheal intubation is indicated, neck manipulation should be minimised, ideally with manual in-line stabilisation, even in the absence of overt cervical spine instability. There are no case reports to date of spinal cord injury secondary to direct laryngoscopy, nor is there any evidence of outcome difference with a particular technique. However, all due care must be taken during airway management. The intubating LMA could be used to aid intubation with minimal neck manipulation, although it is not a popular technique due to high risk of failure and associated trauma to the airway.
- Fibreoptic intubation is considered the appropriate and safer option in rheumatoid patients with an anticipated difficult airway or known cervical spine instability. It generally carries less risk of major difficulties than tracheal intubation using direct laryngoscopy in this subgroup of patients. Awake fibreoptic intubation should be considered in patients with known cervical spine subluxation, as it allows for assessment of neurological symptoms indicating spinal compression. This technique is not useful under emergency conditions, or if excessive blood or secretions are in the airway.
- A surgical tracheostomy under local anaesthesia may be indicated in emergency situations and in patients who have symptoms of upper airway obstruction.

Intra-operatively, patients with RA present problems with positioning due to joint deformities and fragile skin due to steroid therapy. Pressure points should be meticulously padded, the neck adequately supported and skin handled with care. Excessive manipulation of stiff and fixed joints should be avoided.

It is worth noting that the prolonged, relative spinal malposition during general anaesthesia, in a patient with possible spinal stenosis, may cause cord injury. It has been suggested that the patients position themselves on the operating table before being anaesthetised. Attention to the maintenance of spinal cord perfusion may be important and hypotension should be avoided.

The use of immunosuppressive treatments put patients with RA at an increased risk of infections. Strict aseptic technique should be adopted for intravascular access and regional blocks. Appropriate antibiotic prophylaxis should be given before starting surgery.

POSTOPERATIVE MANAGEMENT

Careful observation of the airway and breathing are required in the immediate postoperative period. Previously asymptomatic cricoarytenoid arthritis may cause airway obstruction postoperatively as a result of the additional oedema caused by tracheal intubation. This may occur several hours postoperatively, necessitate reintubation or in some cases a tracheostomy.

Pain should be adequately controlled to permit early mobilisation. Multimodal analgesia is recommended. Some patients may have chronic pain issues and their pain may be difficult to manage. Opioid analgesia can be used in carefully monitored doses to avoid respiratory compromise. Patients with joint deformities of the hand may not be able to use a standard PCA, but can be instructed in the use of a mouth controlled device.

Patients with RA tend to have a slower recovery and return to mobilisation, and also are considered to be in a hypercoagulable state, hence appropriate thromboprophylaxis should be prescribed. Standard physiotherapy and breathing exercises should be instituted as early as possible due to the increased infection risk. If signs of a postoperative infection develop, DMARDs should be suspended temporarily and appropriate antimicrobials started.

SUMMARY

Anaesthesia for the patient with severe rheumatoid arthritis is challenging. It requires a good knowledge of the multisystem effects of the disease, the drugs used to treat it, and meticulous attention to detail, to safely anaesthetise these patients.

ANSWERS

Answer 1

D

Hoarse voice in a patient with longstanding RA, should lead to suspicion of cricoarytenoid arthritis, which is variable in frequency and often unrecognised. Other symptoms include stridor, a sense of pharyngeal fullness when speaking and swallowing or dyspnoea. Pre operative nasoendoscopy may aid in diagnosis. If cricoarytenoid involvement is suspected, avoid endotracheal int inubation in favour of supraglottic airway devices. If intubation is essential, use the smallest internal diameter tracheal tube possible. Problems occur post extubation, when the oedema combined with an already narrow airway can cause complete obstruction. Consider the use of an airway exchange catheter at extubation, and observe patient in a high dependency area for some time post extubation. In severe cases, a pre-operative tracheostomy may be required.

Answer 2

TFTTF

Regional anaesthesia in the form of neuraxial blocks or peripheral nerve blocks should always be considered as it avoids airway manipulation, provides good postoperative pain relief and reduces polypharmacy. However, regional and neuraxial blocks may be technically difficult due to spinal arthritis and loss of anatomical landmarks from contractures or deformities. LMAs and other supraglottic airway devices should be used where possible as they require minimal neck manipulation for insertion and cause lesser trauma and subsequent laryngeal oedema compared with a tracheal tube. AFOI is the technique of choice in patients with an expected difficult airway or known cervical spine instability needing intubation. Cervical spine involvement is not always symptomatic.

Answer 3

FTTFT

The most common type of AAS is anterior AAS, occurring in 80% cases. Anterior AAS is worsened by flexion. Subluxation exists when the distance between the atlas and the odontoid peg exceeds 4 mm in patients older than 44 and 3 mm in younger patients; this can be diagnosed by plain radiography of the neck. Severe cervical spine instability may necessitate an AFOI or a tracheostomy under local anaesthesia for safe management of the airway.

REFERENCES AND FURTHER READING

1. Samanta R, Shoukrey K, Griffiths R. Rheumatoid arthritis and anaesthesia. *Anaesthesia*. 2011; 66: 1146–59.
2. Fombon FN, Thompson JP. Anaesthesia for the adult patient with rheumatoid arthritis. *CEACCP*. 2006; 6: 235–9.
3. Keith Allman, Barry Baker, Iain Wilson. Anaesthesia for the patient with rheumatoid arthritis. Oxford Handbook of Anaesthesia 3rd edition. Oxford University Press (2011)
4. Temprano K. Rheumatoid arthritis. Emedicine. http://emedicine.medscape.com/article/331715-overview
5. Calder I. Airway management in cervical spine disease. In: Calder I, Pearce A, eds. Core Topics in Airway Management, 2nd edn. Cambridge: Cambridge University Press, 2010: 244–54.

APPENDIX 1

Perioperative steroid supplementation

Patients currently taking regular corticosteroids

- <10mg / day of prednisolone or equivalent - assume normal HPA axis – no additional cover required
- >10mg / day of prednisolone or equivalent
    - Minor surgery e.g. hernia – routine preoperative steroid or 25mg IV hydrocortisone at induction
    - Intermediate surgery e.g. hysterectomy – routine preoperative steroid plus 25mg IV hydrocortisone at induction, then 6 hourly for 24 hours.
    - Major surgery e.g. cardiac – routine preoperative steroids plus 25mg IV hydrocortisone at induction, then 6 hourly for 48-72 hours

Resume normal oral therapy when gastrointestinal function has returned.

Patients not currently on corticosteroid therapy

- <3months since stopping steroids – Treat as if on steroids
- >3 months since stopping steroids – No perioperative steroids necessary

Patients on high dose immunosuppression

- Should continue usual immunosuppressive dose parenterally until able to revert to normal oral intake. For e.g. if a patient takes 60mgs of prednisolone / 24 hours, he/she should receive 240mgs of hydrocortisone / 24 hours until oral intake can be resumed.

Equivalent drug doses: 10mgs prednisolone=dexamethasone 1.5mgs=hydrocortisone 40mgs=methylprednisolone 8mgs=betamethasone 1.5mgs.

References:

Allman KG, Wilson IH (2011) The patient on steroids. *Oxford Handbook of Anaesthesia*. 3rd ed. London: Oxford University Press.