Review article

Pre-operative anesthetic assessment of patients with rheumatoid arthritis

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Abstract

The management and surgical interventions of problems directly or indirectly arising from rheumatoid arthritis vary drastically. Anesthesiologists and rheumatologists should be aware of the peculiarities of the anesthetic preoperative assessment of these patients, including the assessment of possible disorders of the airways, in addition to the intra-operative management and analysis of relevant pharmacological parameters. It is critical that the anesthetist is familiar with the peculiarities of the disease and the specific characteristics of drugs used in its treatment; thus, he/she will be able to plan the best possible anesthetic technique for the surgery in question, offering safety and comfort to his/her patient. It is up to the rheumatologist to know the procedure to which the patient will be submitted to and be aware of the most appropriate anesthetic technique in each case. This will allow a better interaction between the rheumatologist and the anesthesiologist in the pre-anesthetic evaluation, through the sharing of relevant information on the articular and systemic involvement by the disease that might interfere with preoperative and intraoperative management. Furthermore, the information on the pre-anesthetic assessment and the choice of anesthetic technique will enable the rheumatologist to clarify any doubts that his/her patient and family may have, as well as to guide them as to whether or not the medications in use should be maintained, and eventually about the need for a supplemental dose of corticosteroid. The objective of this review is to acquaint the rheumatologist with key concepts related to the anesthetic preoperative assessment of patients diagnosed with RA, mainly including general notions that dictate the choice of the anesthetic technique.
Introduction

Rheumatoid arthritis (RA) is a systemic, chronic, progressive inflammatory disease, which mainly affects the synovial membrane, and which can lead to bone and cartilaginous destruction. The management and surgical interventions of conditions directly or indirectly arising from RA vary dramatically.1,2

Anesthesiologists and rheumatologists should be aware of the peculiarities of the anesthetic preoperative assessment of these patients, including the assessment of possible disorders of the airways, in addition to the intra-operative management and analysis of relevant pharmacological parameters.3

The objective of this review is to acquaint the rheumatologist with key concepts related to the anesthetic preoperative assessment of patients diagnosed with RA, mainly including general notions that dictate the choice of the anesthetic technique.

Methodology

From June to December 2012, a literature review was performed, including searches using the following databases: Medline (1990-2012), Cochrane Library, Lilacs, Pubmed (1990-2012) and Scopus, in English, Portuguese and Spanish languages. The key words used were “artrite reumatoide” (rheumatoid arthritis), “avaliação pré-operatória” (preoperative evaluation), “propofol” (propofol), “etomidato” (etomidate), “anestesia venosa total” (total intra-venous anesthesia), “anestesia geral” (general anesthesia), “anestesia regional” (regional anesthesia) and “controle das vias aéreas” (airway control).

Preoperative evaluation

The goals of a preoperative assessment of patients with RA are assessing the extent of disease involvement, its systemic consequences and possible adverse effects of therapies in use, to minimize the risk of anesthetic and surgical procedures.4

In the preoperative evaluation of patients with RA, in addition to a routine history and physical examination applicable to all patients (a record of the surgical procedure that will be performed, systemic medical evaluation, a history of drug use, prior surgeries, allergies, a detailed physical examination and relevant ancillary tests), an evaluation of the extent of involvement of the disease and its possible implications regarding the anesthetic technique should be performed.

We list the affections (divided by topics) of the sites most commonly involved by RA which entail special considerations for the anesthetic procedure.

Cervical spine

Regarding the involvement of peripheral joints, especially the hands, RA may affect the axial skeleton in the neck.1 This involvement may occur both in an early as in a late stage of the disease. Most patients are asymptomatic, but about 40-85% may have neck pain associated with the radiographic
presence of instabilities (atlando-axial subluxation and superi-
or migration of the odontoid process).5,7

An interesting prospective observational trial that includ-
ed 100 patients with early RA (<1 year of symptoms) showed
atlando-axial subluxation in 12% of the cases within the first
5 years of the disease.8

A radiological evaluation of the cervical region in a neutral
profile, with maximum flexion and extension, prior to elec-
tive surgical and endoscopic procedures, can be performed in
patients with RA.5,9 Trials that show the actual cost-effective-
ness of this routine assessment in the management of anes-
thesia and surgery are still lacking.9

Fiber optic laryngoscopes can be employed in the man-
gement of patients with RA when general anesthesia with
intubation is considered necessary.10 In this situation, it is im-
portant that efforts are employed to prevent hyperextension
of the neck, a common occurrence in airways manoeuvres.

**Temporomandibular joint**

RA can also affect the temporomandibular joints. For the an-
esthesia, the implication will be the reduction of mouth open-
ing and a commonly occurring cervical stiffness that make
difficult both the intubation procedures and the positioning
of head and neck in surgeries performed in this region.11

Some authors recommend the use of the Mallampati
score, mouth opening and mandible protrusion as preopera-
tive predictors of temporomandibular dysfunction.12

**Cricoarytenoid dysfunction**

The larynx may be affected in approximately 80% of pa-
tients with RA.13 Generally, patients are asymptomatic, but in
those cases with symptoms, these can be represented by a
foreign body sensation in the oropharynx, dysphagia, dyspnea,
hoarseness, stridor, and also by an airway obstruction.5,14,15

The direct visualization of the larynx may reveal cricoary-
tenoid and vocal cords dysfunction during inspiration.16

In patients in whom this disorder is suspected, nasoen-
doscopy with visualization of the larynx is recommended,
besides the use of the tracheal tube with a smaller diameter,
a quiet intubation without trauma on the laryngeal struc-
tures, administration of oxygen by catheter after extubation,
removal of the tracheal tube in an appropriate environment
prepared for emergencies and, in severe cases, the possibility
of a preventive preoperative tracheostomy.15,17

In the postoperative phase of RA patients, after the trache-
al extubation the patient should be observed closely for signs
of laryngeal dysfunction and airway obstruction.

**Respiratory system**

Another important aspect to be considered is the presence
of lung injury. In fact, trials have shown a reduction in vital
capacity and total lung volume in patients with RA, even in
the absence of pulmonary fibrosis.18,19 The presence of rheu-
matoid nodules is another possible injury that can lead to in-
flammation with possible dyspnea and accumulation of lung
fluid.18,19 The use of medications such as methotrexate brings
a potential risk of lung disease.19

**Cardiovascular system**

Patients with RA may present early atherosclerosis secondary
to dyslipidemia (particularly a reduction in HDL-cholesterol),
presence of systemic hypertension and smoking.20 The activ-
ity of inflammatory disease is also a factor to be considered.21
Heart failure is a major cause of mortality in RA. Thus, a story
addressed to atherosclerotic disease is mandatory in patients
with RA who will be submitted to anesthetic procedures. In
those patients with symptoms or risk factors, an assessment
of cardiovascular situation through non-invasive methods
such as ECG, echocardiography and myocardial scintigraphy
is recommended. If ischemic lesions are detected, catheter-
ization and possible corrections (i.e., angioplasty or CABG) are
mandatory.

Impairment of the conduction system and valvular in-
volvelement are also possible.22

The risk for developing cardiovascular disease appears to
be underestimated by the current methods employed; thus,
an even greater attention to this group of patients is neces-
sary.23

**Renal system**

The use of medications such as nonsteroidal anti-inflamma-
tory drugs (NSAIDs) and cyclosporine may lead to a risk of
kidney damage in patients with RA.2,24

**Gastrointestinal system**

The almost universal use of NSAIDs in patients with RA car-
rries the risk of gastrointestinal tract injury.24 In fact, trials
show a higher prevalence of gastritis and ulceration with pos-
sible risk of bleeding in the digestive tract of these patients.15,26
The prophylaxis of peptic ulcer and gastrointestinal bleeding
should be performed, especially in NSAIDs users. Patients us-
ing glucocorticoids and with diverticulitis should be consid-
ered at high risk for perforation of the gastrointestinal tract.27

**Endocrine system**

The Cushing’s syndrome characteristic effects of the gluco-
corticoids are well known. For those patients who are under
prednisone or who used this drug within an year, there is a
need to perform an intravenous injection of hydrocortisone
100 mg at the time of anesthesia induction.28,29

General measures such as prophylaxis of venous thrombo-
sis should also be considered in patients with RA, such as the
use of elastic stockings, adequate hydration and prophylactic
use of heparin. One must bear in mind that these patients
have limited mobility and some of them will have a longer
post-operative recovery than patients not affected by this
condition (50).25

Difficulties may emerge while handling catheters used
for continuous blockages in patients on immunosuppres-
sive therapy, corticosteroids and biologic drugs, due to an
increased risk of infections. Some joint deformities resulting
from RA can impact the conduct of anesthesia and the choice
of the anesthetic technique, because they compromise the
patient positioning during surgery and hinder the access to
the techniques of regional blockade, causing difficulties associated with nervous plexus blocks.4

Choice of the anesthetic technique

The choice of anesthetic technique generally depends on the general condition of the patient and on the type of proposed surgical procedure; there is not one specific optimal technique for patients with RA.5,30 One should take into account the risks inherent to each technique, the possible side effects of the anesthetics used and the experience of the anesthesiologist. Table 1 summarizes the main anesthetic techniques used, including a brief description of the technique, its indications and absolute and relative contraindications, in addition to considerations on the appropriate choice for patients diagnosed with RA.

The use of general, inhalatory, total venous or balanced anesthesia may provide better control of the cardiovascular and respiratory systems, without imposing a time limit for the duration of surgery,5 as it occurs with the use of non-continuous techniques of regional anesthesia. The use of general anesthesia is also useful in situations where there is a need to keep the patient in unusual or uncomfortable positions, as it occurs in some orthopedic and neurosurgical procedures.5 Special attention should be paid to a proper protection of the limbs and neck in order to avoid worsening of pre-existing injury or the onset of a new lesion.28,31

Another very important aspect in general anesthesia procedures refers to the maintenance of airway patency. In this situation, the risk is due to pathological changes caused by RA, which are atlanto-axial subluxation and temporomandibular ankylosis.30 During the manoeuvres of airway instrumenta-
tion, one incurs in the risk of worsening the situation and of possible permanent neurological injury.28,31 Thus, a careful assessment of the presence and intensity of subluxation is required in the pre-anesthetic evaluation. In suspected or proven cases, the tracheal intubation manoeuvres should be gentle, avoiding sudden or exaggerated manoeuvres. As previously mentioned, the use of fiber optic bronchoscopy is of great help in such cases, because it allows an adequate access to the airways with minimal cervical mobilization.28,32 In extreme cases, intubation with the patient awake can be easily achieved by a suitably trained anesthesiologist, with minimal sedation.28,32

Also with regard to the airways, the occurrence of ankylosis of the temporomandibular joint can bring additional risk during anesthesia, since the occurrence of small mouth openings to less than 2 cm is possible. Such cases will also benefit from the use of a flexible fiber optic bronchoscope.31,33 An alternative to endotracheal intubation would be the use of a laryngeal mask, which provides a clear airway with less airway trauma.28 Even so, the anesthesiologist must be careful, since there are reports that its use can worsen the symptoms of cricoarytenoid involvement of RA.35

Another aspect to be considered is the effect, on pharmacokinetics, of psychotropic drugs by the organic changes caused by the disease, or by its treatment. Cardiac changes could imply in the need of changes in hypnotic inducing drugs, with an option by less cardiodepressant medications such as etomidate or midazolam.24,26,37 Hepatic or renal impairment may require drugs with less dependence on its exception, e.g., cisatracurium, the neuromuscular blocker of choice in cases of these organ dysfunctions (metabolism by plasma esterases)38,39 and propofol or etomidate as hypnotic drugs and remifentanil as an opioid with plasma metabolism.40 All these procedures are important in order to reduce the risk of drug recirculation, with possible deleterious effects such as respiratory depression and the eventual risk of an emergency approach to airways.51,42

An alternative to general anesthesia would be the use of one of the several techniques of regional anesthesia, in which sodium channel blocking drugs, the local anesthetics, are applied near peripheral nerves or nerve trunks, with no need for airway instrumentation.43 The most common contraindications for the use of regional techniques are the use of anti-coagulant drugs or of potent antiplatelet agents, patient objections, hemodynamic instability (in neuraxial techniques, because of the extensive sympathetic blockade) and infection at the puncture site.

The most common type of anesthesia for procedures on the lower limbs is the spinal anesthesia with the application of local anesthetics administered alone or in combination with opioids for the provision of an effective postoperative analgesia. The addition of clonidine or soluble opioids (e.g., sufentanil) to intratecal bupivacain significantly improves the duration and quality of spinal anesthesia and provides an extended perioperative analgesia, without significant side effects.40,42 There is evidence of increased extent of subarachnoid blockade in patients with rheumatoid arthritis, and this may justify a reduction of the doses of anesthetics in these individuals.44 Prolonged postoperative analgesia can be achieved through a combination of peripheral nerve blocks (e.g., femoral nerve, lumbosacral plexus, and tibial, saphenous or fibular nerves); this strategy yields an excellent analgesia with minimal side effects and less need for systemic opioids.5

Likewise, the anesthesiologist can choose the peridural use of local anesthetics as the selected technique; in this case he can recur to continuous techniques with peridural catheters, which ensures an extension of the anesthetic effect and the possibility of an efficient post-operative analgesia, contributing to less risk of thromboembolism, facilitating early ambulation and reducing the risk of pulmonary complications such as atelectasis and pneumonia.45-48

For the upper limbs, the brachial plexus anesthetic blockades fulfil a similar function, providing high quality anesthesia to the surgeon for prolonged periods and also allowing the option in favour of a continuous technique for the postoperative analgesia.49,50

Also with regard to the choice of drugs, attention should be paid to the use of drugs to treat the disease or to control the symptoms. NSAIDs can lead to gastrointestinal haemorrhages, and the steroids may predispose to adrenal insufficiency in stress situations, such as the surgical procedure, imposing the need for supplementation in the perioperative period.29 Disease modifying drugs, such as methotrexate and leflunomide, may trigger peripheral neuropathies; their previous documentation is important in those cases in which the anesthesiologist favoured a regional technique, which use of the risk of nerve trauma can always be questioned.7
Table 1 – General characteristics of the most commonly used anesthetic techniques and considerations for their indications and contraindications in patients with RA

<table>
<thead>
<tr>
<th>Anesthetic technique</th>
<th>Description</th>
<th>Indications</th>
<th>Relative contraindications</th>
<th>Absolute contraindications</th>
<th>Considerations for use in patients with RA</th>
</tr>
</thead>
<tbody>
<tr>
<td>General intravenous anesthesia</td>
<td>The analgesia, loss of consciousness and muscle relaxation are maintained through the use of various drugs. Currently there are infusion pumps that allow a controlled target infusion of medication (with the objective of achieving a certain plasma concentration) with rapid awakening. Intubation and controlled ventilation are required.</td>
<td>Any surgical procedure.</td>
<td>Possible difficulty in airway control.</td>
<td>If propofol was the chosen drug, allergy to any of the drugs used, mainly to egg and soy.</td>
<td>Need for airway manipulation; allows maintenance of the patient even in awkward positions.</td>
</tr>
<tr>
<td>Inhalational anesthesia</td>
<td>The unconsciousness and analgesia remain by continuous inhalation of a halogenated anesthetic. Widely used in children without orotracheal intubation or with laryngeal mask.</td>
<td>Surgical procedures with less painful potential, as very high inhaled fractions are required to achieve surgical anesthesia for major surgery, with the emergence of side effects such as myocardial depression and vasodilatation.</td>
<td>Possible difficulty in airway control.</td>
<td>Past or suspected malignant hyperthermia, which can be triggered by the halogenated agent.</td>
<td>Need for airway manipulation; allows maintenance of the patient even in awkward positions.</td>
</tr>
<tr>
<td>Balanced general anesthesia</td>
<td>Association of intravenous drugs and inhaled agents, seeking lower doses of each class, and minimizing the side effects. Intubation and controlled ventilation required.</td>
<td>Any surgical procedure.</td>
<td>Possible difficulty in airway control.</td>
<td>Past or suspected malignant hyperthermia, which can be triggered by the halogenated agent.</td>
<td>Need for airway manipulation; allows maintenance of the patient even in awkward positions.</td>
</tr>
<tr>
<td>Regional anesthesia</td>
<td>Administration of local anesthetics near nerve trunks or plexuses, or at cauda equina. Provides analgesia in great regions of the body, with consciousness and spontaneous ventilation maintained.</td>
<td>Surgical procedure restricted to the area of coverage of the anesthetized nerve trunk or plexus. The duration of the surgical act limited to the duration of the chosen local anesthetic agent.</td>
<td>Hypovolemia, coagulopathy, use of potent antiplatelet agents, anticoagulants, sepsis, infection at the puncture site.</td>
<td>No agreement by the patient.</td>
<td>Provides long-lasting analgesia; can be difficult to implement due to improper body positioning; obviate the manipulation of the airways.</td>
</tr>
</tbody>
</table>
Conclusion

With the evolution of RA treatment, the consequent increase in patients’ life expectancy and reduction of morbidity and mortality, it will be increasingly common that these people have a need for any surgical procedure throughout their lives. It is therefore critical that the anesthetist is familiar with the peculiarities of the disease and the specific characteristics of the pharmacological agents used in its treatment. Thus, this professional can plan in the best possible way the anesthetic technique for the surgery in question, offering safety and comfort to his/her patient.

It is up to the rheumatologist to know the procedure that his/her patient will be submitted to and be aware of the most appropriate anesthetic technique in each case. This will allow better interaction between the rheumatologist and the anesthesiologist in the pre-anesthetic assessment, through the sharing of relevant information on the articular and systemic involvement by the disease that might interfere with the pre-operative and intraoperative management. Furthermore, the information on the pre-anesthetic assessment and the choice of anesthetic technique will enable the rheumatologist to clarify any doubts that his/her patient and family may have, as well as to guide them as to whether or not the medications in use should be maintained and eventually about the need for a supplemental dose of corticosteroid.

Conflicts of interest

The authors declare no conflicts of interest.

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The authors declare no conflicts of interest.


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