Perioperative Management of Patients with Rheumatic Diseases

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Manal Alotaibi, Khaled Albazli, Lina Bissar,
and Hani Almoallim

18.1 Introduction

The aim of this chapter is to present a simple approach to the assessment of patients with different rheumatologic diseases, especially rheumatoid arthritis (RA), before undergoing orthopedic surgery. Perioperative assessment confirms an early diagnosis of the patient's medical condition and comorbidities, overall health, and the assessment of the risk factors associated with the proposed interventions. Perioperative assessment allows for proper postoperative man-

agement of complications. It can also aid in the management of high-risk drugs used by rheumatologic patients such as disease-modifying antirheumatic drugs (DMARD), antiplatelets, and corticosteroids. The assessment also supports postoperative plans and patient education [1–3].

18.1.1 Objectives

1. To present a comprehensive preoperative medical evaluation for patients with rheumatologic disorders before undergoing orthopedic surgery.
2. To clarify the assessment of specific clinical issues in patients with RA and systemic lupus erythematosus (SLE).
3. To present the perioperative management of medications for patients with rheumatologic disorders before undergoing orthopedic surgery.
4. To clarify how to follow-up and educate the patient postoperatively.

M. Alotaibi
Northwestern University Feinberg School of
Medicine, Chicago, IL, USA

Internal Medicine Department, College of Medicine,
Umm Al-Qura University, Makkah, Saudi Arabia
e-mail: manal.alotaibi@northwestern.edu

K. Albazli
Department of Medicine, Faculty of Medicine in
Al-Qunfudhah, Umm Al-Qura University, Makkah,
Saudi Arabia

The George Washington University School of
Medicine and Health Sciences, Washington, DC, USA

L. Bissar (✉)
Department of Medicine, King Faisal Specialist
Hospital and Research Center (General
Organization), Jeddah, Saudi Arabia
e-mail: lbissar@kfshrc.edu.sa

H. Almoallim
College of Medicine, Umm Al-Qura University,
Makkah, Saudi Arabia
e-mail: hmmoallim@uqu.edu.sa

18.2 The Preoperative Medical Evaluation

18.2.1 History Taking

Detailed information should be obtained. There are several components of the history that should

be outlined. These include the patient's age, duration of rheumatologic disorder, current functional level, specific joint involvement with arthritis, any extra-articular manifestations of the disease, current medications including DMARDs and previous use of steroids, previous complications associated with surgery, and any comorbidities like hypertension and/or diabetes mellitus.

18.2.2 Physical Examination

Obviously, for any rheumatic disease patients, there should be specific focus on the musculoskeletal system during the physical examination. This should include posture, location and pattern of joint involvement, gait, and range of motion (ROM) of the examined joints. Furthermore, underlying disorder must be identified. The skin should also be assessed for any manifestations suggestive of an underlying rheumatologic diseases that may impact skin integrity.

18.2.3 Investigations

The following tests may be considered along with routine tests:

- A complete blood count for an examination of possible drug related hematologic side effects. This may include anemia due to gastric or duodenal irritation, leukopenia, and/or pancytopenia from massive bone marrow suppression. This is essential in situations where significant blood loss is expected, such as total hip replacements.
- A complete renal profile, liver enzymes, and liver function tests to screen for DMARDs side effects.
- A urinalysis and urine culture should be obtained. It is important to rule out urinary tract infections in patients undergoing total joint arthroplasty [4, 5].
- A 12-lead electrocardiogram (ECG) is necessary as a baseline cardiovascular evaluation for patients undergoing surgeries. ECG is recommended in men over the age 40 and women over 50 having major surgery. This is essential

even in the absence of history or physical exam findings.

- Chest x-ray is necessary as a baseline for pulmonary evaluation. It is indicated for patients over the age 50 undergoing major joint or spine surgery. This is even in the absence of symptoms and/or signs suggestive of active pulmonary disease [6, 27].

18.2.4 Assessment of Specific Clinical Problems in Patients with RA

18.2.4.1 Cardiovascular

Special focus should be made to risk stratify RA patients for coronary artery disease. Many contributing factors including accelerated atherosclerosis put RA patients at high risk for cardiac morbidity and mortality. RA patients presenting for orthopedic surgery for any kind of procedure and/or intervention should receive careful preoperative cardiac risk stratification. There are several measures to be taken. Dipyridamole thallium scintigraphy (DTS) conducted preoperatively is found to be most useful to stratify selected nonvascular surgery patients at intermediate or high risk by clinical assessment [6–9, 28].

18.2.4.2 Pulmonary

Multiple pulmonary complications including fibrosis, bronchiolitis, and pleuritis can have significant impact on RA patients. Serial pulmonary function test (PFT) among patients with RA is recommended. This can help in early detection of defected ventilation. [10]

18.2.4.3 Cricoarytenoid Arthritis

This is a common involvement in RA patients. It places concerns of complicated intubation or obstructed airway after surgery. Most patients are asymptomatic, but despite that they may present with symptoms such as hoarseness, sore throat, and/or difficult inspiration. Therefore, it is extremely essential to avoid intraoperative musculoskeletal trauma in patients with RA by applying generous padding during joint positioning and by avoiding sudden movements of the neck and torso [11, 23–26].

Table 18.1 Perioperative management of antirheumatic drugs

Antirheumatic drug	Comments
Methotrexate (MTX)	<ul style="list-style-type: none"> • There is no increased risk of infection or other postoperative complications in patients with RA who continued MTX. • Continue the current dose of methotrexate for patients undergoing elective total hip arthroplasty (THA) or total knee arthroplasty (TKA). • Withheld the week before and the week after surgery if there are additional concerns regarding the perioperative safety of MTX such as renal insufficiency or if a more complex surgical intervention is required. • MTX should be reinstated as soon as the patient is stable postoperatively. • MTX treatment should be discontinued until full recovery if prolonged surgery or artificial respiration is anticipated or in case of pulmonary complications, to reduce the risk of pneumonia [30, 31].
TNF blockers	<ul style="list-style-type: none"> • It is recommend stopping TNF blockers use 1 to 4 weeks before surgery, proportional to the drugs half-lives. • Withhold TNF blockers and other biologic agents prior to surgery in patients undergoing elective THA or TKA, and schedule the surgery at the end of the dosing cycle. • Treatment may be restarted at minimum 14 days postoperatively if there is no evidence of infection and once wound healing is satisfactory [32].
Tocilizumab	<ul style="list-style-type: none"> • Infection rates attributed to tocilizumab are comparable to those associated with other biologic DMARDs. • Discontinuing tocilizumab 11 to 13 days before surgery, based on the drug half-life, is a safe approach to perioperative therapy [31, 33].
SLE specific medications: Mycophenolate mofetil Azathioprine Cyclosporine Tacrolimus	<ul style="list-style-type: none"> • Withhold their current doses 1 week prior to surgery in all patients with stable SLE undergoing THA or TKA. • Continue their current doses through the surgical period in all patients with severe SLE undergoing THA or TKA.
Rituximab	<ul style="list-style-type: none"> • Rituximab has been shown to be safe in patients with prior recurrent bacterial infections. • Compared with TNF blockers, rituximab is associated with a lower risk for bacterial infections, which are the primary concern in perioperative management, although the presence of low immunoglobulin levels in a small proportion of patients raises the infection risk. • Elective surgery can be arranged in the 7th month from the last given dose [31].
Abatacept	<ul style="list-style-type: none"> • The risk of infection in patients treated with abatacept is not significantly increased over baseline non-biologic-treated RA patients. • Abatacept is administered either as a monthly infusion or a weekly subcutaneous injection, and conservative timing of surgery should be at the end of the dose cycle [31].
Steroid	<ul style="list-style-type: none"> • In general, limiting minimal doses of steroids preoperatively should be considered to prevent impairment of wound healing and surgical site infections. • Chronic use of steroid also increases the potential risk of subversive consequences of an inadequate adrenal response [31].

18.3 Perioperative Drug Management

18.3.1 Perioperative Management if Antirheumatic Drugs [12–16]

(See Table 18.1)

18.3.2 Perioperative Management of Other Systemic Medications [12–14, 16, 17]

(See Table 18.2)

Table 18.2 Perioperative management of medications

Category	Medications and treatments	Comment
Cardiac	<p>Continue most medications through surgery</p> <p>Continue most antihypertensive drugs through surgery with sips of water, or consider non-oral forms</p> <p>Consider transdermal, IV, or sublingual equivalents</p> <p>Avoid abrupt withdrawal of beta-blockers and alpha-blockers</p> <p>Diuretics</p> <p>It is recommended that diuretics be continued in patients with heart failure, but rapid diuresis before surgery must be avoided</p> <p>Nitroglycerin</p> <p>Nitrates should be continued if in use.</p> <p>Perioperative nitroglycerin use for the prevention of adverse ischemic events in high-risk patients may be considered</p> <p>ACE inhibitors</p> <p>It is recommended that ACE inhibitors be continued during non-cardiac surgery in stable patients with LV systolic dysfunction</p> <p>Beta-blockers</p> <p>Continuation of beta-blockers is recommended in patients previously treated with beta-blockers because of ischemic heart disease (IHD), arrhythmias, or hypertension</p> <p>Beta-blockers should be considered for patients scheduled for intermediate-risk surgery if their blood pressure is not controlled</p> <p>Heart-rate-reducing calcium channel blockers, particularly diltiazem, may be considered before non-cardiac surgery in patients who have contraindications to beta-blockers</p> <p>Antiplatelet therapy</p> <p>Continue aspirin around the time of surgery in patients at moderate- to high-risk for cardiovascular events</p> <p>Stop aspirin 7 to 10 days</p> <p>Before surgery in patients at low risk for cardiovascular events. Usually may safely resume 24–48 h postoperatively</p>	<p>Most patients can safely have surgery as long as the systolic BP is less than 180 and the diastolic BP is less than 110, and there is no evidence of end organ damage</p> <p>Correct electrolyte disturbances before surgery</p> <p>Patients taking aspirin and NSAID may have a higher risk for developing perioperative bleeding complications</p>

Endocrine	<p>Thyroid disease</p> <p>Continue thyroid supplements with sips of water</p> <p>Reduce L-thyroxine dose by 20% for long-term parenteral use, if applicable</p> <p>Corticosteroids</p> <p>For moderate stress procedures (total joint replacement), it is a good practice to provide:</p> <ol style="list-style-type: none">1. intraoperatively: Hydrocortisone 50 mg intravenously2. postoperative day 1: Hydrocortisone 20 mg intravenously every 8 h for 3 doses3. postoperative day 2: Return to preoperative glucocorticoid dose or parenteral equivalent. The glucocorticoid target is 50 to 75 mg per day of hydrocortisone equivalent for 1 or 2 days <p>Diabetes mellitus [34]</p> <p>The sole use of sliding scale insulin in the inpatient hospital setting is discouraged</p> <p>More stringent goals, such as 110–140 mg/dL (6.1–7.8 mmol/L) may be appropriate for selected patients, as long as this can be achieved without significant hypoglycemia</p> <p>All patients with type 1 and type 2 diabetes should be transitioned to scheduled subcutaneous insulin therapy at least 1–2 h before discontinuation of continuous insulin infusion</p> <p>Type 1 diabetes mellitus, critically ill patients, or those going through major surgery require an intravenous insulin therapy for achieving the desired glucose range of 140–180 mg/dL (7.8–10 mmol/L) without increasing risk for severe hypoglycemia. Strict glycemic control in critically ill patient is detrimental by increasing mortality and should be avoided</p> <p>For non-critically ill patients or those undergoing minor surgery, the preferred method for maintaining glucose control is to schedule subcutaneous insulin with basal, nutritional, and correction components.</p> <p>There is no clear evidence for specific blood glucose goals</p> <p>Pre-meal blood glucose target is 140 mg/dL (7.8 mmol/L) and random blood glucose is 180 mg/dL (10.0 mmol/L).</p> <p>More stringent targets may be appropriate in stable patients with previous tight glycemic control.</p> <p>Less stringent targets may be</p> <p>Appropriate in those with severe</p> <p>Comorbidities</p> <p>Type 2 diabetes controlled with diet usually does not require perioperative therapy; however, blood sugars must be checked and short-acting insulin as a correction dose may be given</p> <p>Type 2 diabetes treated with oral agents or non-insulin injectable should hold their hypoglycemic agents on the morning of surgery. Blood sugar should be checked and correction dose of short-acting insulin may be administered subcutaneously</p> <p>Glucose must be monitored for all patients and for patients on therapies associated with increased risk for hyperglycemia, including high-dose glucocorticoid therapy</p>	<p>Prolonged anesthetic effect after surgery may suggest hypothyroidism</p> <p>All patients with diabetes admitted to the hospital should have their diabetes clearly identified in the medical record, and an order for blood glucose monitoring, with results available to all members of the health care team</p> <p>A plan for preventing and treating hypoglycemia should be established for each patient to avoid risky situations</p> <p>Obtaining an HbA1c on patients with diabetes admitted to the hospital should be considered if the result of testing in the previous 2–3 months is not available</p> <p>Obtaining an A1C in</p> <p>Patients with risk factors for</p> <p>Undiagnosed diabetes who</p> <p>Exhibit hyperglycemia in the</p> <p>Hospital</p> <p>Patients with hyperglycemia in the hospital who do not have a prior diagnosis of diabetes should have appropriate plans for follow-up testing and care documented at discharge</p> <p>A hypoglycemia management</p> <p>Protocol should be adopted and implemented by each hospital or hospital system</p> <p>A plan for preventing and treating hypoglycemia should be established for each patient</p> <p>Episodes of hypoglycemia in the hospital should be documented</p> <p>In the medical record and</p> <p>Tracked</p>
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(continued)

Table 18.2 (continued)

Category	Medications and treatments	Comment
Gastrointestinal and hepatic	Malabsorption, dysmotility of bowel, and hepatic dysfunction may significantly alter pharmacodynamics of perioperative medications including anesthetic	Nutritional status and liver disease must be assessed and monitored preoperatively History of risk factors for hepatitis B or C and history of alcohol use should be determined
Renal	Perioperative renal function is the best predictor of postoperative renal failure Nephrotoxic drugs are to be avoided Urine volume status, output, adequate perfusion, and drug levels should be monitored if applicable Less nephrotoxic induction protocols should be used Nephrology consultation should be considered in patients with worsening renal function or decreased urine output	Patients with chronic kidney diseases (CKD) may have multi-organ dysfunction, general disability, and specific problems associated with renal replacement therapy (RRT) In patients with mild-to-moderate CKD, surgical trauma and perioperative hemodynamic instability may precipitate acute kidney injury
Rheumatologic	NSAIDs 1. To be stopped 1–3 days before surgery depending on half-life. 2. They can be started again postoperatively for pain relief. 3. May continue the use of COX2 inhibitors. Codeine, oxycodone, methadone Are to be continued until morning of surgery, and then decision is up to the anesthesiologist to determine narcotic use intraoperatively DMARDs see below	Patients with severe SICCA syndrome, an autoimmune disease, also known as Sjögren syndrome , which classically combines dry eyes, dry mouth, and another disease of connective tissue such as RA (most common), lupus, scleroderma , or polymyositis require lubricant eye drops
Hematology	Anticoagulation can be associated with increased risk of bleeding, especially in the immediate postoperative period In major orthopedic surgery, physicians should consider low-molecular-weight heparin (LMWH) as venous thromboprophylaxis 12 h prior to surgery and extend to 35 days after surgery In patients who require temporary interruption of a vitamin K antagonists (VKA) before surgery: 1. VKAs should be stopped 5 days before surgery 2. VKAs should be resumed 12 to 24 h after surgery when there is adequate homeostasis In patients who are receiving bridging anticoagulation with therapeutic-dose SC LMWH and are undergoing high-bleeding-risk surgery: 1. the last preoperative dose of LMWH should be administered 24 h before surgery 2. LMWH can be resumed 48 to 72 h after surgery 3. IV unfractionated heparin (UFH) should be stopped 4 to 6 h before surgery Erythropoietin, with or without iron supplement, is recommended preoperatively in patients with a baseline Hct < 34% to avoid or reduce allogeneic blood transfusion preoperatively	Patients may have anemia that places them at risk for requiring blood transfusion during major surgeries associated with significant blood loss Anemia in RA patients is a common and dynamic condition that may increase the patient's risk for myocardial ischemia. Physicians should consider autologous blood transfusion requirements well in advance of surgery
Neurology	To continue anti-convulsion therapy Treatment with atropine may precipitate delirium in Parkinson's disease	Delirium is a predictor of poor outcome (i.e., potentially preventable) Formal assessment of preoperative cognitive function can help target prevention efforts by identifying high-risk patients
Miscellaneous	Ask about nonprescription drugs including dietary and herbal supplements Recommend smoking cessation and Offer behavioral support combined with nicotine replacement therapy or varenicline Alcohol and illicit drug use should be considered possible Asymptomatic bacteriuria in patients undergoing total joint arthroplasty must be treated to avoid risk Among HIV positive patients, perioperative management should include hands-on pharmacy support	Patient may be unaware of pregnancy Patient's fears and expectations should be explored

18.3.3 DVT Prophylaxis

- Meta-analysis showed that extended-duration prophylaxis against deep vein thrombosis (DVT) with low-molecular-weight heparin (LMWH) or unfractionated heparin (UFH) in patients with major hip or knee replacement surgery can reduce the risk of symptomatic venous thromboembolism significantly [18].
- There are many options for the prevention of venous thromboembolism in patients undergoing elective hip or knee arthroplasty and who are not at increased risk beyond that of the surgery itself for venous thromboembolism or bleeding. Prophylaxis should be started after surgery (specific timing given separately for each drug) and continued for 28–35 days for hip patients and 10–14 days for knee patients: dabigatran, fondaparinux, LMWH, rivaroxaban, and UFH (for patients with renal failure) are all options [18, 19, 35].
- It has to be considered that the benefit here is associated with increased risk of minor bleeding but with no excess major bleeding [18].
- In patients undergoing hip fracture surgery (HFS), it is recommended to use one of the following rather than no antithrombotic prophylaxis for a minimum of 10 to 14 days: LMWH, fondaparinux, LDUH, adjusted-dose VKA, or aspirin.
- There are specific considerations for patients undergoing major orthopedic surgery, total hip arthroplasty (THA), total knee arthroplasty (TKA), hip fracture surgery (HFS), and receiving LMWH as thromboprophylaxis; it is recommended to start either 12 h or more preoperatively or 12 h or more postoperatively, rather than within 4 h or less preoperatively or 4 h or less postoperatively [19, 36].
- It has to be noted that in patients undergoing THA or TKA, irrespective of the concomitant use of an intermittent pneumatic compression device (IPCD) or length of treatment, it is suggested to use LMWH in preference to the other agents recommended as alternatives: fondaparinux, apixaban, dabigatran, rivaroxaban, low-dose UFH, adjusted-dose vitamin K antagonist (VKA), or aspirin.

18.3.4 Prophylactic Antibiotics [20, 29]

- Prophylactic antibiotics are needed for RA patients who will be undergoing long procedures especially patients with TKA, joint replacement, and prosthetic joints. This is to prevent surgical site infections.
- Obviously, antibiotics must be administered to patients undergoing surgery in an infected area with a high bacteremia risk.
- Cefazolin or cefuroxime antibiotics are the antibiotic of choice and should be given 30 to 60 min before skin incision.
- In case of a confirmed β -lactam allergy, vancomycin may be used. It should be started within 2 h prior to incision.
- The dose of antibiotic varies according to patient's weight; for patients >80 kg, the doses of cefazolin should be doubled.
- It has to be noted that additional intraoperative doses of antibiotic might be needed. It should be given for prolonged procedures and if there is significant blood loss during the procedure.
- Prevention of wound infection is essential. This can be prevented after surgical repair of closed fractures by a single dose of cephalosporin.
- Prophylactic antibiotics should be stopped within 24 h of the end of surgery.

18.4 Assessment of Specific Clinical Problems in Patients with SLE

Specific perioperative concerns must be considered for patients with SLE undergoing orthopedic surgery. This should include assessing risk factors for worse outcomes including smoking or use of oral contraceptive pills (OCP), adequate blood pressure (BP), and lipid control. It has to be noted that SLE patients undergoing both non-elective and elective hip and knee surgery have a high mortality and morbidity rate compared to RA patients [21].

It is also necessary to assess medication management around the operation time. SLE patients

have multiple organ involvement. This should be assessed as well including hematologic abnormalities, renal disease, and immune dysfunction, and thromboembolic disease. Moreover, a careful balance should be addressed in the risk assessment in patients with antiphospholipid antibody syndrome (APS). The aim is to evaluate these patients preoperatively to decrease the risk of major bleeding and the risk of a thromboembolic event.

18.5 Postoperative Follow-Up

There has to be a thorough postoperative risk assessment for the following patients:

- Careful follow-up for patients with RA and SLE assessing the risk of prosthetic joint infections, DVT, and pulmonary embolism. These patients have greater risk for the development of these complications postoperatively.
- Hospitalized patients with autoimmune disease have a high risk of postoperative venous thrombosis. These patients can be offered a regional anesthesia, as it reduces the postoperative DVT significantly.
- Patients with gout should be assessed for the risk of flare of gout postoperatively.
- There are special precautions for patients with Raynaud's phenomenon. Hypothermia must be avoided postoperatively and pressure ulcers must also be prevented [22].
- They should also be aware about the importance of a comprehensive physical activity program following surgery.
- Each patient should be aware of the pain control plan. The associated fluctuation of pain with different medication withdrawal or institution must be explained.
- More details should be delivered to patients according to their needs, issues like possible drug-drug and/or drug-food interactions of new medication regimens. The classical and common examples are the potential risk of anticoagulant drugs and foods affecting potency of warfarin. Patients should be aware about any follow-up instructions including monitoring of laboratory investigations.
- Obviously, patients should be aware about the importance of early immobilization [22].

18.7 Physical Activity and Rehabilitation

Patients should undertake physical therapy since physical activities are essential for patients with rheumatologic disease. The major benefits are to prevent disabilities, restore function, and relieve pain. These activities should be evaluated preoperatively to verify consistency with treatment goals. These are greatly augmented by prescribed therapeutic exercises and functional activities. Special precautions should be given for patients with active inflammatory joint or soft tissue diseases. The therapeutic exercises should be balanced with essential rest periods for a successful treatment. The aim is usually dedicated at preserving or increasing functional level, decreasing pain and joint inflammation, and increasing range of motion and strength [22].

Figure 18.1 illustrates a summary of perioperative management of patients with rheumatic diseases.

18.6 Patient Education

To assure patients' safety, it is recommended to inform the patient of the following:

- Patients should be aware about the expected duration of movement limitations and options for pain control. This is immediately after the surgery and in the following weeks to months.

Fig. 18.1 Summary of the Perioperative Management of Patients with Rheumatic Diseases

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