MINI-SYMPOSIUM: SURGICAL RHEUMATOLOGY

(ii) Hip and knee reconstruction in the rheumatoid patient

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Summary
Surgical management of the rheumatoid patient requires a multidisciplinary approach. A successful outcome necessitates appropriate management not only of the joint disease but also of the soft tissues, polyarthropathy, co-morbidities, and polypharmacy. At the hip standard implants give good long-term function and implant survivorship, with a complication rate that is similar to other patient groups. At the knee it is important to appreciate the pan-articular nature of the joint involvement and use appropriate implants. Severe ligamentous laxity and fixed deformity may require the use of constrained implants. Complication rates and implant survivorship after hip and knee arthroplasty in patients with rheumatoid arthritis are broadly similar to patients with osteoarthritis. Late functional outcome is dictated, in part, by polyarthritis, rather than the diagnosis of rheumatoid arthritis in itself. Patient satisfaction after hip and knee arthroplasty for rheumatoid arthritis is high.

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Background

Rheumatoid arthritis (RA) is a systemic inflammatory disorder that affects approximately 1% of the adult population worldwide and is twice as prevalent in women versus men. The aetiology of RA remains unclear, but is thought to comprise both heritable and environmental factors. Twin and family studies suggest that the overall heritable contribution to RA is approximately 60%.

Smoking is associated with an increased incidence of RA, and low socio-economic status is associated with a poorer prognosis. Remission of RA is well-documented in pregnancy and oral contraceptive use may postpone disease onset.

The natural history of RA is chronic, progressive poly-articular joint destruction, such that by 3 years 20–30% of patients may become permanently work-disabled.² By 20 years following diagnosis up to 80% of patients have functional disability.³ Extra-articular manifestations affecting the cardiovascular, respiratory, and neurological systems...
also contribute to functional impairment and reduce life expectancy by 5–10 years compared to populations without RA.4 The clinical course of RA varies between individuals. Ten percent of patients present with an acute and rapidly progressive pattern of disease, and 70% of patients have a polycyclic course characterised by periodic flares in inflammatory activity.5 Twenty percent of patients experience a single episode of inflammation that is not followed by progressive joint destruction. Where active disease is present for greater than 3 months, this usually progresses to chronic disease. The musculoskeletal manifestations of RA are characterised by symmetrical inflammatory polyarthritis that affects both small and large joints.6 Patients with RA may be referred for a surgical opinion for a variety of reasons including joint destruction and deformity, ligamentous instability, tendon rupture or dislocation, bone fracture, and the neurological sequelae of spinal involvement.

In a previous article we reviewed the surgical management of the rheumatoid patient with reference to general clinical assessment, decision-making regarding surgical priorities, pre-operative assessment, and peri-operative management in relation to medical co-morbidities commonly present in this population.7 This article focuses on the role of hip and knee arthroplasty, including the changing incidence and pattern of disease progression, clinical presentation and radiological features, indications for surgery, choice of prosthesis and surgical challenges, functional outcomes, complications, and implant survivorship.

Changing incidence and disease progression

The proportion of patients presenting for hip and knee reconstruction with a diagnosis of RA relative to other diagnoses is decreasing in Western societies. Data from the Norwegian Arthroplasty Register demonstrates a decrease in RA as the primary diagnosis for total hip arthroplasty (THA) surgery from 3.7% in 1987–1990 to 2.4% in 2004,8 although the absolute number of patients undergoing THA for RA remained static during this period. During the period 1975–2003 the yearly number of arthroplasties for RA reported to the Swedish Knee Arthroplasty Register decreased marginally.9 A recent retrospective population-based analysis by Sokka et al.10 examined the incidence of THA and total knee arthroplasty (TKA) in RA versus non-RA for the period 1987–2003. Whilst they found that the age-adjusted incidence of THA and TKA in non-RA patients increased by 2- and 9.8-fold, respectively, the incidences of THA and TKA in RA patients had not changed significantly.

Part of this observed change in epidemiology can be explained by an increase in the number of patients with osteoarthritis presenting for surgery. However, evidence also suggests that the prevalence and pattern of disease progression of RA is also changing. Studies in the UK indicate that the prevalence of RA in women aged 45–64 years has decreased by approximately 50% to 1.2% over the 30 years up to 1992, and secular decreases in both the incidence and prevalence of RA in North American, European and Asian populations have also been reported.11,12 Recent years have seen major developments in the role and efficacy of disease modifying drugs (DMARDs) used to treat RA, particularly with the emergence of a new class of ‘biological’ DMARD therapies that target specific cytokine pathways. The results from clinical trials and observational studies suggest that these agents slow disease progression.13 In a cohort study of 482 patients with RA, Verstappen et al.14 found that treatment with DMARDs immediately after diagnosis resulted in less joint surgery when compared with a delayed start.

Clinical assessment

Destruction of the hip joint occurs late in the course of RA and affects 50% of patients. The knee is affected earlier in the course of RA (usually within 10 years of onset) and affects approximately 80% of patients. Bilateral joint involvement is common at both sites.6

The typical presentation of a patient with hip or knee involvement includes chronic and progressive pain, with deterioration in mobility and ability to perform activities of daily living. Presentation with an acute episode of hip pain and impaired function may indicate acute conditions such as femoral head collapse secondary to avascular necrosis, femoral neck fracture, or rarely, septic arthritis. Patients with RA affecting the knee may present with symptoms of instability, deformity secondary to collateral ligament insufficiency or avascular necrosis of the femoral or tibial condyles, or occasionally with knee stiffness due to fibrous ankylosis.

Clinical assessment of the patient presenting with hip or knee involvement includes a full medical and social history, and appropriate local and systemic examination (Table 1). At the hip the patients’ gait and posture, leg lengths, and range of joint motion should be assessed. Deformities and limitations in the functional range of motion at the neck, back, knee, ankle and foot should also be assessed. A screening examination of the cervical spine, and upper and lower limb neurological function should also be made to exclude a neurogenic cause (such as cervical myelopathy) for deterioration in walking ability. An assessment of the skin condition over the hip and the leg is made, with particular reference to the sole of the foot, together with an examination of the vascular tree of the leg and foot. In general, significant involvement of the forefoot should be addressed surgically before management of the hip, as skin loss and secondary infection may put a hip prosthesis ‘at-risk’ of infection (Fig. 1). Involvement of the shoulders and elbows is common in RA, and an assessment of the upper limbs with respect to the potential for mobilisation with crutches post-operatively is also made.

Radiological features

The plain radiographic features of RA include global joint space narrowing and periarthritis osteoporosis that commonly involves joints symmetrically (Table 2). The former is due to enzymes from the inflammatory pannus that cause dissolution of articular cartilage, the latter is thought to be due to synovial hyperaemia. At the hip protrusio acetabuli is common due to axial or superior migration of the femoral head with reactive bone remodelling in the pelvis (Fig. 2). Occasionally, large rheumatoid cysts in the pelvis or femoral
features (marrow oedema, and pannus formation. At the knee, in addition to the typical radiological involvement, a patient might have effusion, erosion, diffuse cartilage loss, bone erosions at the junction of the femoral head and neck may also be seen. Segmental avascular necrosis of the femoral head may be present due to primary disease, or as a complication of steroid therapy. Reactive bone formation in the form of subchondral sclerosis and osteophytes is absent in pure RA, but commonly seen where secondary osteoarthritis follows joint destruction. Fibrous ankylosis may be seen occasionally. Magnetic resonance imaging features include effusion, erosion, diffuse cartilage loss, bone marrow oedema, and pannus formation.

At the knee, in addition to the typical radiological features (Table 2), lateral bulging of the normal fat lines seen on the anteroposterior view, and suprapatellar pouch distension seen on the lateral view are features of a large effusion. Erosion of the anterior femoral cortex at the level of the suprapatellar pouch secondary to pannus erosion also occurs (Fig. 4). Valgus malalignment of the joint arises as a result of bone loss in the lateral femoral condyle and to a lesser extent the lateral tibial condyle, and is exacerbated by laxity of the medial collateral ligament. An external rotatory deformity of the tibia on the femur occurs, with contracture of the ilio-tibial band.

### Indications for arthroplasty

The primary indications for arthroplasty are progressive pain that is inadequately controlled with conservative measures, loss of function, difficulty with activities of daily living, and progressive deformity. The aims of surgery are to provide a sterile, pain-free, stable, mobile, and long-lasting joint replacement. Contra-indications to arthroplasty include uncontrolled medical co-morbidity, skeletal immaturity, and active infection. Relative contraindications include neurological deficits that limit mobility (myelopathy: Ranawat stage 3 or 4), peripheral vascular disease, and poor skin condition that increases the potential for infection (e.g. active vasculitic lesions).

### Choice of prosthesis and surgical challenges

In the setting where the hip and knee are symptomatic and warrant joint reconstruction, the hip is usually addressed prior to the knee. THA restores correct femoral alignment and length, facilitating correct implant alignment at subsequent TKA. In practice however, hip disease typically presents later in the natural history of RA than knee involvement. A more common scenario is presentation with symptomatic bilateral hip or knee involvement that requires bilateral total joint arthroplasty. Parvizi et al. found no difference in 90-day mortality rates between age and sex matched patients undergoing unilateral versus bilateral simultaneous THA. At the knee bilateral TKA may also be performed successfully as a single procedure, or staged, depending upon the individual patients co-morbidities. However, these studies were conducted in non-RA populations, and should be extrapolated to the patient with RA with caution.

### Hip reconstruction

#### Prosthesis selection

Either cemented or cementless THA components may be used in the patient with RA. For implants using a metal-on-conventional polyethylene bearing, current data favour cementless or cemented femoral components in combination with a cemented acetabular component. Eskelinen et al. have reported the results of THA surgery in 2557 patients with RA under the age of 55 years from the Finnish Arthroplasty register. They reported a 15-year survival rate for cementless proximally circumferentially porous-coated stems of 87%. The 15-year survivorship for cemented stems was 81% (relative risk for failure cemented versus cementless stems 2.0, \( p = 0.01 \)). In contrast, cementless...

### Table 1 Pre-operative assessment of the rheumatoid patient.

<table>
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<tr>
<th>History</th>
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<tr>
<td>Disease onset</td>
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<tr>
<td>Pattern and temporal sequence of joints involved</td>
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<tr>
<td>Presence and persistence of joint swelling</td>
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<tr>
<td>Pain—site, severity and radiation</td>
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<td>Morning stiffness and duration</td>
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<td>Functional difficulties</td>
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<tr>
<td>Presence of non-articular features (e.g. nodules)</td>
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<tr>
<td>Systemic features (e.g. anorexia, fatigue, weight loss)</td>
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<tr>
<td>Psychological effects</td>
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<td>Full review of systems</td>
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<td>Previous anaesthetic and surgical history</td>
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<td>Drugs and allergies</td>
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<tr>
<th>Examination</th>
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<tr>
<td>Complete medical</td>
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<tr>
<td>Evidence of joint inflammation</td>
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<tr>
<td>Joint damage, range of motion, and previous surgical scars</td>
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<tr>
<td>Tendon and ligamentous damage</td>
</tr>
<tr>
<td>Presence of extra-articular features (e.g. splenomegaly, leg ulcers, vasculitis)</td>
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<tr>
<td>Grip strength</td>
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<tr>
<td>General health, anaemia, muscle atrophy</td>
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<tr>
<td>Dental inspection, assessment of mouth opening ability, dysphonia</td>
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<tr>
<td>Neurological assessment for cervical myelopathy and peripheral neuropathy</td>
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<tr>
<th>Investigations</th>
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<tr>
<td>Full blood count, urea, creatinine, electrolytes, and liver function tests</td>
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<tr>
<td>Chest radiograph, lateral cervical spine flexion and extension radiographs</td>
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<tr>
<td>Electrocardiogram</td>
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<tr>
<td>Urine dipstick+culture to exclude occult infection</td>
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<tr>
<td>Pulmonary function tests in patients with limiting lung disease</td>
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<td>Echocardiogram in patients with limiting cardiac involvement</td>
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cup 15-year survivorship was poorer than for cemented cups, 67% versus 80%, respectively (relative risk for failure 1.4, \( p = 0.001 \)). Odent et al.\(^2\) in a long-term follow-up study of 62 cementless Zweymuller THAs in 34 patients with juvenile chronic arthritis report 13-year survivorship of the femoral component of 100% and 90% for the acetabular component. Sochart and Porter\(^2\) reported the 25-year survivorship of cemented Charnley THA in young patients with RA (63 patients, 100 hips) versus osteoarthritis (54 patients, 66 hips). Survivorship of the femoral component was 85% in patients with RA versus 74% in patients with OA, survivorship of the acetabular component was 79% versus 59%, respectively. The role of resurfacing arthroplasty in RA remains unclear. Although there are short-term data on the efficacy of this intervention in juvenile idiopathic arthritis,\(^2\) there are no intermediate or long-term data on clinical outcome or survivorship in RA.

### Surgical challenges

The local surgical considerations at THA are the management of local bone defects such as found in protrusio acetabuli, and osteoporosis, which carries an increased risk of intra- or perioperative periprosthetic fracture. One of the goals in the management of protrusio is to restore the centre of hip rotation to its anatomic position. This may be achieved using cemented or cementless acetabular components in combination with impacted morsellised bone allograft (Fig. 2).\(^{23,24}\) In the elderly patient, or where the severity of protrusio is mild, the defect may be filled using a conventional cemented acetabular component without the use of bone graft. Large geodes (Fig. 4), if present, should be managed using impaction grafting of the femoral head or using allograft.

### Knee reconstruction

#### Prosthesis selection

At the knee the gold standard implant is the cemented TKA. The cumulative 10-year revision rate of cemented TKA between 1993 and 2002 in RA patients reported to the Swedish Knee Arthroplasty Register (\( n = 4417 \) implants) was 5%.\(^9\) Good early clinical outcomes are also reported for cementless implants,\(^25\) although large-scale and long-term

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**Figure 1** Soles of the feet in a patient with rheumatoid arthritis. There is distal subluxation of the forefoot fat pad with exposure of subluxed metatarsal heads and resultant callosity formation.

**Table 2** Common radiographic features in rheumatoid arthritis.

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<thead>
<tr>
<th>Soft tissues overlying the joint</th>
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<tr>
<td>• Swelling</td>
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<td>• Effusion</td>
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<tr>
<td>• Rheumatoid nodules</td>
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<tr>
<td>Intrarticular changes</td>
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<tr>
<td>• Global joint space narrowing</td>
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<tr>
<td>• Marginal erosions</td>
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<tr>
<td>• Secondary osteoarthritic change (osteophytes, sclerosis, cysts)</td>
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<tr>
<td>• Condylar bone collapse</td>
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<tr>
<td>Periarticular changes</td>
</tr>
<tr>
<td>• Juxta-articular osteoporosis</td>
</tr>
<tr>
<td>• Metaphyseal cysts (geodes)</td>
</tr>
<tr>
<td>• Periostitis (common at the digits, rare at large joints)</td>
</tr>
<tr>
<td>• Joint mal-alignment (alignment abnormalities due to ligament incompetence, joint subluxation, joint dislocation)</td>
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follow-up outcome data in rheumatoid patients are limited. Sharma et al. reported the 16-year survivorship of the cementless 'Low Contact Stress' TKA in 47 patients with RA as 94%.

In contrast to osteoarthritis, where degeneration may be limited to a single compartment, in RA the degenerative change is pan-articular necessitating replacement of the entire tibio-femoral articulation. The merits of including patellar resurfacing remain less clear. In a review of 4381 TKAs for RA in the Swedish Knee Arthroplasty Register, Robertsson et al. found a 10-year cumulative revision rate for unicompartmenal prostheses of 25%, versus 5% for TKA. However, there was no significant difference in revision rates between patellar resurfaced versus non-resurfaced TKAs. Kawakubo et al. in a retrospective review of 60 TKA patients, found that thickness of the non-resurfaced patella decreases with time, particularly in the RA patient. The incidence of anterior knee pain following TKA was 12% in OA patients versus 28% in RA patients. A recent meta-analysis of patellar resurfacing in TKA has also demonstrated that resurfacing reduces the risk of anterior knee pain and re-operation after TKA. However, patients with RA were
included in only 2 out of the 12 trials studied and clear conclusions cannot be drawn in this patient group. The relative benefits of the use of a mobile-bearing versus a fixed-bearing TKA in the patient with RA also remain unresolved for similar reasons.

Surgical challenges
The reconstructive challenges faced in TKA in the setting of RA include ligamentous instability, focal bone loss, and periarticular osteoporosis. In general, knee deformity is associated with ligament incompetence rather than contracture, with the exception of severe fixed flexion deformities that result from wheelchair dependence, rather than local disease at the knee. Valgus deformities are associated with a variable degree of hyperextension, more commonly than fixed flexion. Varus deformities are seen where secondary OA change occurs and may be associated with a variable degree of fixed flexion.

Fixed valgus deformity is due to loss of height within the lateral compartment, mainly due to femoral condylar bone loss, with contracture of the iliotibial band (that also causes fixed external rotatory deformity), lateral collateral ligament, popliteus muscle, postero-lateral capsule, and biceps femoris muscle (Fig. 4). There is secondary laxity within the medial collateral ligament. Lateral maltracking of the patella is associated with fixed valgus deformity due to secondary contracture of the lateral patello-femoral ligament and capsule. Fixed varus deformity arises as a result of loss of height within the medial compartment, mainly due to tibial condylar bone loss with shortening of the medial collateral ligament, postero-medial capsule, pes anserinus, and semimembranosus muscle. Secondary laxity within the lateral collateral ligament occurs late.

Symmetrically balanced collateral ligaments are important for satisfactory outcomes in TKA. Incorrect soft tissue balance leads to unequal loading, asymmetric stresses on the implant, and eventual implant loosening. Ligament balancing requires a stepwise approach to the release of the contracted tissues. Those causing fixed valgus may be accessed through a medial parapatellar approach using techniques described by Insall et al. and others. Alternatively, a lateral approach to the knee has the advantage of allowing direct access to the contracted structures and allowing a complete lateral capsular release that helps correct patellar tracking, whilst maintaining the medial blood supply to the patella. The necessary releases for fixed varus deformities are readily accessed through a medial parapatellar approach.

Severe coronal plane deformities are commonly associated with significant loss of condylar bone that may be corrected by use of a thick tibial condyle bone resection and a polyethylene insert of appropriate thickness to restore the level of the tibial joint line. Structural bone graft or prosthetic augmentation blocks may be required to restore large bone defects. Where large cysts are present in the metaphyseal region, these should be managed using impact bone grafting, and may require the use of a stemmed prosthesis to bypass the defect and protect the graft during its incorporation.

The severity of the ligamentous incompetence and associated bone loss dictates the choice of implant that can be used for the joint reconstruction. In mild deformities of less than 15° a cruciate-retaining or sacrificing implant...
may be used. A recent Cochrane meta-analysis of 8 clinical trials of retention versus sacrifice of the posterior cruciate ligament (PCL) in TKA found no clear evidence to support a difference in surgical outcomes between the two approaches. However, data were not stratified for effect of underlying disease, so a potential effect in RA has not been excluded by this analysis. Where deformity is 15–30°, resection of the PCL is often required in order to achieve appropriate collateral ligament balance. In such cases reconstruction is made using a posterior-stabilised implant. Where deformity is greater than 30–40°, collateral ligament incompetence necessitates use of a constrained prosthesis in most cases.

A stepwise approach is also taken to management of patellar maltracking. An adequate lateral capsular release is combined with medialisation of the patellar button, lateralisation of the femoral component on the femoral condyle and external rotation of the tibial component, in order to achieve correct patellar tracking on the femoral trochlea.

Functional outcome

Data from patients with OA of the hip or knee suggest timing of surgery has a significant impact on clinical function after surgery. Patients with poorer pre-operative function scores do not achieve the same post-operative scores as those with better pre-operative function, although their improvement relative to their pre-operative function is similar.

The hip

The post-operative improvement in function after THA for RA is good. Katsimihas et al. reported an improvement in Harris hip score from 22 pre-operatively to 82 at a mean of 9 years later in 50 patients. Tang and Chiu reported an improvement in Harris hip score from 25 pre-operatively to 89 at 11 years in 20 patients. Espehaug et al. in a case matched study, found that patients with RA had similar post-operative improvements in modified Merle d'Aubigne scores for pain and walking ability as patients undergoing THA for OA at a mean of 5 years post-operatively. Creighton et al. have suggested that the functional outcome is poorer in RA compared to patients undergoing THA for other diagnoses. In contrast, Bischoff-Ferrari et al. in a study designed to examine the effects of a number of variables on function after THA, found that RA was not a significant independent predictor of poor function (poor function was defined as a WOMAC score of <50).

We have reviewed and compared the late functional outcome of THA in patients with RA versus OA. Sixty-one patients (92 hips) were reviewed at a mean of 12 years post-operatively. The underlying diagnosis was RA in 26 patients (45 hips) and OA in 35 patients (47 hips). The mean age of subjects in the RA group was 67 ± 11 years versus 77 ± 8 years in the OA group (p < 0.001), and a greater proportion of rheumatoid patients had received bilateral THA (p < 0.001). The number of medical co-morbidities was similar between patient groups (p > 0.05), however, a greater proportion of patients with RA were of Charnley grade C (p < 0.001).

Patients with RA had SF-12 physical scores that were 15% poorer than patients with OA (Fig. 5, p = 0.004). There was no difference in the SF-12 mental score between groups (p > 0.05). The SF-12 summary score (physical score+mental score) was 8% poorer in patients with RA versus those with OA (p = 0.01). There was no difference between RA and OA patient groups for the Oxford hip score or Harris hip score (Fig. 1, p > 0.05 both comparisons). Within the individual
domains of the Harris hip score patients with RA had poorer function scores versus patients with OA for walking distance ($p = 0.003$), stair climbing ($p < 0.001$), putting on of socks and shoes ($p < 0.001$), and the ability to use public transport ($p < 0.001$). Pain relief, limp, sitting comfort, use of walking aids, absence of deformity and range of movement were similar between groups ($p > 0.05$ all comparisons).

Our results agree with the findings of Creighton et al. that functional outcome is poorer in subjects with RA than in subjects with non-inflammatory arthritis, although with the caveat that this is more apparent for some activities only, and that this association with RA is likely a function of polyarthropathy rather than the disease itself. Bischoff-Ferrari et al. have also highlighted the role of multiple joint involvement in influencing functional outcome after THA. They also found that poor mental health, obesity, presence of 2 or more chronic diseases, and less than college education are risk factors for poor functional outcome. Roder et al. in a long-term study of the results of THA also found Charnley grade to be an important determinant of functional outcome.

The knee

Patient satisfaction after TKA is generally high in the RA population, and correlates better with pain relief than with restoration of clinical function. Bullens et al. found that satisfaction after TKA was higher in patients with RA versus those with OA, despite similar improvement in Knee Society Scores. Ritter et al. found that patients with OA had greater pre-operative to post-operative improvement in knee society score versus patients with RA in 207 subjects younger than 55 years of age undergoing cruciate-retaining TKA, although implant survivorship was similar.

Patients with RA can also expect good long-term functional outcomes after TKA. Crowder et al. reported the long-term results of 47 cemented condylar TKAs in 32 patients under the age of 55 years at surgery with a minimum follow-up of 15 years. They reported an improvement in knee society score from 41 pre-operatively to 86 at late review. The 20-year implant survival was 94%. Ito et al. have reported the 15-year functional results of condylar TKA in 25 Japanese patients (36 TKAs) with RA. 78% of knees were classified as good or excellent using the Hospital for Special Surgery (HSS) knee scoring system, and mean range of flexion was 99°. Implant survivorship was 94% at 15 years. Kristensen et al. have reported similar improvement in HSS knee scores from 99% poor or fair pre-operatively to 77% good or excellent at follow-up in 46 European patients (71 knees) with RA and a mean age at surgery of 52 years.

Complications

Life expectancy is decreased by 5–10 years in patients with RA versus the general population, which is accounted for mainly by excess cardiovascular deaths. However, risk of early post-operative death after THA or TKA is not increased in patients with RA versus those with OA, but is greater than the background population. In the Norwegian arthroplasty register death in the first 60 days after primary THA was compared in RA versus general, non-operated, age-matched Norwegian population. The standardised mortality ratio (SMR) was 1.48. Parvizi et al. examined 30-day mortality rates after THA in 30,714 patients, and after TKA in 22,540 patients operated at the Mayo Clinic (Rochester, MN, USA) in the period 1969–1997. Age over 70 years, pre-existing cardiovascular disease, and male sex were associated with a higher 30-day mortality. Patients with RA had a similar mortality rate to those with OA.

There is little contemporary information examining the risk of venous thromboembolic events (VTE) after surgery in the patient with RA. Buchanan and Kraag compared the rates of deep venous thrombosis in patients with OA versus RA in patients undergoing THA and TKA. OA was associated with a 2.3 times higher risk of DVT versus RA. This decreased risk of VTE in patients with RA may be explained by greater use of non-steroidal anti-inflammatory agents in the rheumatoid population. The incidence of heterotopic ossification is also reported to be lower in patients with RA versus those with OA, which might also be accounted for by non-steroidal anti-inflammatory agent use.

Recent data from 14,314 patients reported to the Scottish Arthroplasty Register suggests that the rate of dislocation after THA in patients with RA is similar to other patient groups. However, van Stralen et al. have previously reported a dislocation rate of 3.8% in patients with RA versus 1.4% overall in a study of 884 THAs inserted using a posterior approach to the hip.

Infection, aseptic loosening, and implant survivorship

Although historical data sets have suggested a higher rate of infection and aseptic loosening after THA in RA patients versus other patient groups, this has not been supported in subsequent studies. Poss et al. reported a higher infection rate after 138 THAs in 98 subjects with RA versus that found in OA. However, data from the Norwegian arthroplasty register in 53,698 THAs showed no difference in the rate of revision for infection or aseptic loosening after THA in RA patients versus those with OA. A study by Nercessian et al. in 633 Charnley TKAs inserted from 1970 to 1984 (16% for RA) found no increased risk of osteolysis associated with RA. Sochart and Porter reported higher 25-year survivorship for both implant components for the Charnley prosthesis in subjects with RA versus those with OA. A study by Himanen reported the 10-year survivorship of the AGC knee implant in 6306 subjects with OA versus 2161 with RA from the Finnish Arthroplasty Register. They identified male sex and young age as risk factors for revision. The survival rates for OA and RA were similar at 94% and 96%, respectively. The 10-year cumulative all-causes revision rate for TKA in the Swedish Knee Arthroplasty Register in patients with RA versus OA is also similar at 5%, however the revision rate for infection was higher in RA, particularly in men. In a review of 9200 TKA’s from the Mayo Clinic, Rand and Istrup reported 10-year implant survivorship of 83% in patients with RA versus 80% in patients with OA ($p < 0.01$).
Summary

Total joint arthroplasty at the hip and knee are effective treatments for RA both in terms of functional improvement and implant survivorship. Patients with RA have a greater number of co-morbidities compared to the general arthroplasty population, and polyarticular involvement is the norm rather than the exception. Optimal care of this patient group requires a co-ordinated multidisciplinary approach involving physician, anaesthetist, surgeon and rehabilitation specialists in order to achieve optimum results. Bone loss, osteoporosis, deformity, ligamentous laxity, and delicate soft tissues may present challenges in joint reconstruction. Implant selection choices are broadly similar to those made for the osteoarthritis patient with the exception that at the knee unicompartmental joint replacement is not recommended. Early mortality after joint replacement in RA is similar to other groups. The rate of VTE and heterotopic ossification may be slightly lower due to a higher prevalence of NSAID use. Rates of dislocation, infection, and aseptic loosening are broadly similar to those in patients with OA. Late functional outcomes in RA are limited by polyarticular disease, rather than local factors at the replaced joint. However, patient reported satisfaction scores are high.

References