

Orthopedic Management of Total Knee Arthroplasty in the Patients with Rheumatoid Arthritis

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Abstract

Total knee arthroplasty (TKA) is known to be most successful procedure for advanced knee rheumatoid arthritis. If it is performed with meticulous pre-operative assessment and preparation, appropriate surgical technique, and efficient post-operative rehabilitation it has the potential to improve functionality and overall quality of life. Because of the early degeneration of knee joints, RA patients are younger at TKA and the potential revision rate may be increased in this patient population. In addition, bone and soft tissue are poorer and also deformity patterns are different from other patients. Therefore this population requires special attention in the orthopedic management. The aim of the present article was to describe current perspectives of total knee arthroplasty in the patients with RA.

Keywords: Total knee arthroplasty; Rehabilitation; Knee joints; Soft tissue; Rheumatoid arthritis; Synovium

Introduction

Rheumatoid arthritis (RA) is a chronic and progressive disease, accompanied by varying degrees of functional limitation especially in the joints and the reduced quality of life. It mainly affects synovium by chronic inflammation and that results joint erosion and destruction [1,2]. Knee is affected up to 90% of the cases and 70% of them are bilateral [3]. Nowadays some disease-modifying anti-rheumatic drugs (DMARDs) including inhibitors of tumor necrosis factor (TNF) and some biologic immunomodulating agents have been studied for reducing inflammation and disease progression and found to be very effective in a considerable number of patients and provided reduced incidence of primary arthroplasty [4]. In spite of newer or traditional disease modifying treatment methods the disease is continue to progress in some of the patients and eventually leads to the need for joint arthroplasty [5]. Total knee arthroplasty (TKA) is known to be most successful procedure for advanced knee rheumatoid arthritis. If it is performed in the correct time, appropriate indications and technique, it has the potential to improve quality of life measures [6-9]. Because of complexity of the disease, TKA procedures are difficult and have much more complications than other diseases, thus special consideration should be given in this group population [10,11].

Pre-operative management

Because RA patients have early degeneration of knee joints, and are generally younger at TKA, the potential revision rate may be increased in this patient population, in spite of all the technological developments about implant design and duration [11]. Thus this possibility of a future revision must be explained to patients.

Also they live longer with TKA and walk more than older patients. This caused to increased poly wear and aseptic loosening [12]. Therefore durable materials like, highly cross-linked polyethylene, highly polished tibial base plate must be selected. In addition, the mortality of patients with RA is actually 40% greater over time than non-RA counterparts [13].

Patient expectations may be higher than surgical outcomes; they want painless prosthesis that has perfect alignment and stability. Some candidates want to participate in dance or sports activities [12]. Therefore patients must be fully informed and explained, permitted activities such as cycling, calisthenics, swimming, low-resistance rowing, skiing machines, walking, hiking, low-resistance weight-lifting; and avoided activities such as, baseball, basketball, football, hockey, soccer, high-impact aerobics, gymnastics, jogging, power lifting.

The bone quality is lower in the patients with RA, because of immunosuppressive effects of chronic steroid usage; prostaglandin levels at synovial liquid or rheumatoid granulation tissue in the trabecular bone. Moreover osteoarthritic changes exacerbates in a shorter time period when comparing the other causes of OA [14]. Therefore careful implant selection, bone grafting, adjuncts and augments must be performed to compensate the advanced deformed knees. Un-cemented implants rely on a strong subchondral platform for osseous integration. Because of poorer bone quality and biological factors, uncemented implants more prone to failure, for this reason cemented implants should be preferred [4].

61% of the patients have cervical spine problems and atlanto-axial subluxation is the most common problem [15]. C-spine atlanto-axial instability is noted, it may be helpful to include what the pre-operative work-up would include such as flexion-extension films, and the peri-operative concerns, such as fiber-optic intubation [16].

RA can also affect many systemic organs as it contributes to lung fibrosis, renal amyloidosis and atherosclerosis, and increases the risk of myocardial infarction and stroke [17].

In conclusion this population requires specific attention than other patients groups therefore, pre-operative management is essential for surgical success.

Intraoperative management

Not only bones and also soft tissue surrounding the knee may be affected and also be of poor quality, this commonly caused to ligamentous laxity and joint deformity. Some RA knees are a bit tight, that is in contrast to a routine they tend to loosen up over time. Soft tissue balancing is one of the most critical issues in the surgery and is a bit different from non-RA patients [18]. Little and efficient soft tissue procedures can be enough for majority of the patients with RA; [19] however it is difficult to provide the arrangement of soft tissue balance in some rheumatoid knees and also soft tissue healing may be delayed in these group [20].

In order to wheel chair dependence and lower movement capability, flexion contractures and fixed flexion deformities may usually occur in the patients that candidate to TKA. Some authors recommend intensive physiotherapy or serial casting before the surgery. Soft tissue release may be adequate in majority of patients but some in patients this problem is resolved with increased distal femoral cut.

Valgus knee is the rare form of knee degeneration; however, rheumatoid knees usually accompanied by valgus deformity because of contractures of lateral structures. It is essential of the lateral release and if it is necessary, to use more constrained prostheses in the patients with valgus deformity. In the lateral release procedure primarily osteophytes are removed than tibial lateral capsule, iliotibial band and popliteus and after all lateral collateral ligament are released. Then more constraint implants are selected and use it with more attention not to damage medial and lateral collateral ligament.

Some authors recommend synovial removal because of bleeding and recurrent haemarthrosis; however, some of them do not and suggests that it makes no difference [21].

Many of the patients with RA have reduced bone quality and osteopenia. In addition care must be taken to prevent peri-prosthetic stress fractures during implant fixation in the already weakened bone. The risk of periprosthetic fractures is greater in rheumatoid patients, particularly if patients have been on long-term steroid [22,23].

Post-operative management

Because of the pre-operative decreased ambulation and advantage deformity of the patients, post-op physical rehabilitation is crucial for the success. Effective rehabilitation is aimed to improve ambulation, range of motion and muscular strength. Recent studies have suggested that postoperative rehabilitation influences short and long-term functional outcomes [24,25]. Due to poor bone quality, higher rate of infection, poor healing of soft tissue, pre-operative joint deformity, and involvement of multiple joints, the risk of complications increased and all of them make adequate rehabilitation difficult to perform.

Certain potential complications including common peroneal nerve injury, infection, early revision and periprosthetic fractures which are more common, however must be kept in mind [26-28].

Conclusion

RA is a multisystem disorder therefore a multi-disciplinary management is crucial for the functional outcomes. Despite all unfavorable characteristic features of RA, TKA is the most effective and successful method in the patients with advanced knee rheumatoid arthritis. Meticulous pre-operative assessment and preparation, appropriate surgical technique and efficient post-operative rehabilitation improve the functional outcomes.

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