World Journal of Pharmaceutical Sciences
ISSN (Print): 2321-3310; ISSN (Online): 2321-3086
Available online at: https://wjpsonline.com/
Review Article

A CLEAR REVIEW ON KNEE JOINT REPLACEMENT

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Received: 09-09-2025 / Revised Accepted: 11-09-2025 / Published: 13-09-2025

ABSTRACT
Knee stiffness, commonly referred to as restricted mobility range, is one of the major side effects following an intra-articular or extra-articular injury. Following ligament restoration, patellar tendon repair, burn, and total knee arthroplasty, it is mostly caused by scarring adhesions in the quadriceps-femoral apparatus and articular fibrosis (intra and extra). While preserving patient safety and happiness, improved recovery programs can aid in lowering hospital stays after knee replacements. Common evidence-based pre, intra, and postoperative therapies used in improved recovery protocols after TKR are described in this review. It is now difficult to give patients early relief and pain-free postoperative treatment when it comes to knee discomfort after surgery. Reducing opioid needs, post-operative pain, and opioid-related adverse events are the main goals of post-operative analgesic management. Documenting post-operative analgesic strategies following total knee arthroplasty (TKA) was the goal of this narrative review. One of the numerous patient-reported outcome measures (PROMs) is patient satisfaction. Two categories—determinants of satisfaction and components of satisfaction—can be used to assess patient satisfaction. Age, gender, personality, expectations, medical and psychiatric comorbidity, and other patient-related characteristics have all been defined as the former. The severity of the arthropathy and the diagnosis that led to TKA. The latter include all TKA procedures and technical elements, such as surgical and anesthetic considerations, implant types, and postoperative recovery.

Keywords: knee stiffness, rehabilitation, total knee arythroplasty, physical therapy, patient satisfaction, clinical function, knee prosthetic design.

INTRODUCTION

The main causes of restricted mobility range, commonly referred to as knee stiffness, are scarring adhesions in the quadriceps-femoral apparatus and intra- and extra-articular fibrosis. Post-operative knee stiffness can result after a variety of musculoskeletal injuries, including as burns, patellar tendon repair, total knee arthroplasty (TKA), anterior cruciate ligament (ACL) reconstruction, and arthrofibrosis of the knee. Although TKA is regarded as the gold standard for treating end-stage osteoarthritis in the knee, recovery is not always consistent, and the majority of patients experience post-operative stiffness, functional restrictions, and lower extremity muscle weakening. In Arthrofibrosis, or exaggerated pathologic fibrous hyperplasia, is a crippling surgical complication that can restrict accessory joint motion, inhibit muscle activation, and result in a general reduction in physiologic range of motion (ROM). This condition may be the cause of post-operative knee stiffness[1].

The idea of improved recovery is gaining traction as a means to reduce post-arthroplasty hospital stays and increase patient function. A recent study comparing patients with an enhanced recovery programme (ERP) with those just prior to launching them revealed that these nonoperative interventions were safe and effective in

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How to Cite this Article: Paras Jain, AN OVERVIEW OF ARTIFICIAL INTELLIGENCE AND ITS APPLICATIONS IN OVARIAN CANCER, World J Pharm Sci 2025; 13(03): 148-152; https://doi.org/10.54037/WJPS.2022.100905

reducing median length of hospital stay (LOS) from six to four days with significant reduction in blood transfusion and urinary catheterisation. The vast majority (95%) of these patients were mobilised within the first 24 hours postoperatively. Other research revealed similar outcomes[2].The use of arthroscopic knee surgery has grown in popularity in contemporary orthopaedics. However, a number of professionals continue to face difficulties in managing post-operative knee pain that includes prompt treatment and pain-free postoperative care for the patient. In many instances, pain management has taken precedence over other management practices in daycare. For many patients, persistent discomfort following knee arthoplasty is still a problem. Because each person experiences pain differently and at a distinct threshold, pain is regarded as a highly subjective experience. It is consequently very challenging to standardize any pain management plan for a specific procedure. Anterior fat pad, synovial tissue, and irritation of the free nerve endings of the joint capsule are some of the causes of knee discomfort[3]. The following elements, among others, affect post-arthroplasty pain:

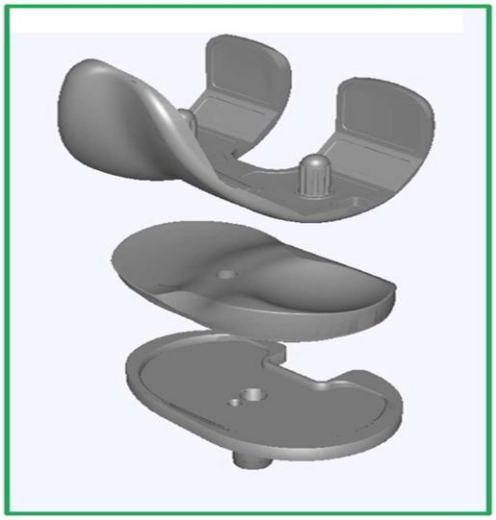

Figure 1. Medial Stabilized Total Knee Joint Replacement Construct Design .

- Anesthetic technique,
- Patient pain threshold,
- Residual effects of perioperative analgesia,
- The use and duration of tourniquet exsanguinations,
- Pre-operative pain level,
- Volume of drug injected,
- Surgical trauma involved,
- The sex of the patient,
- The experience of the surgeons, and finally,
- The postoperative activity level of the patients.

Approximately 100,000 primary total knee replacements (TKRs) were performed in the UK in 2015, and the demand is expected to rise sharply[4]. In order to alleviate chronic pain and enhance their functional ability, patients opt for TKR. However, 20% of patients develop persistent postsurgical pain, which is defined as pain that appears three months following surgery. Following total knee replacement, chronic pain has a significant impact, and patients may find it difficult to manage and adapt to this discomfort. Services for patients with chronic pain following TKR are inconsistently and patchily provided, and there are no clear entry points. According to a comprehensive review, a single intra-articular injection of botulinum toxin has been the only intervention tested for the treatment of this condition[5]. Patients are typically less satisfied with the results of their treatments than the surgeon is 331 TKA patients had a discordance in surgeon and patient satisfaction at 12 months following surgery (90.3% vs. 94.5%), according to Harris et al. It has been reported that 75% to 92% of patients are satisfied with TKA. According to an analysis of the Swedish Knee Arthroplasty Registry (Dunbar et al., 2008), 17% of patients expressed dissatisfaction with the results of total knee arthroplasty[6].A comprehensive evaluation by Schulze and Scharf of research on post-TKA patient satisfaction completed between 1990–1999 and 2000–2012 revealed that patient satisfaction rose from 81.2% in the former decade to 85% in the latter 13 years. 71% of patients said that their knee symptoms had improved, but only 22% thought the results were "excellent," according to Baker's analysis of data from the National Joint Registry for England and Wales. Kim stated that despite the obvious improvement with TKA in terms of pain reduction and the return to normal activities of daily living, patient satisfaction was only modest. Managing post-operative knee pain, including giving the patient pain-free postoperative care and prompt relief, continues to be a challenge for many

specialists[7]. Social aging has increased the occurrence of TKA for end-stage arthritis and the prevalence of arthritis in some circumstances. Total knee arthroscopy (TKA) has resulted in a substantial amount of research on its benefits, the majority of which has been on outcomes that can be measured from the surgeon's point of view, like implant survival, postoperative range of motion (ROM), and radiographic improvement." Since it regularly occurs that a treatment that the surgeon thinks would be beneficial does not yield the desired outcome, pain management has become a crucial area of focus for post-surgical management. Many people who get knee replacements nevertheless have persistent pain[8]. Everyone has a different threshold and perception of pain, making it a highly subjective experience. Patients with end-stage knee arthritis are supposed to benefit from TKR by experiencing less pain, regaining function, and leading happier lives. Clinical research has shown that TKR is a cost-effective procedure in this respect. Nonetheless, a significant number of patients are unhappy with TKR's results[9].

Patient's personality

Gong and Dong looked back at the association between TKA results and four different personality types. They found that following TKA, patients with extroverted personalities were happier than those with introverted or nervous personalities. However, we believe that because it is challenging to classify different human personalities, it is not easy to assess how personality affects TKA outcomes[10].

Diagnosis for TKA

Patients with rheumatoid arthritis have been found to be more satisfied than those with other surgical indications (18). This may be explained by 1) the fact that people with rheumatoid arthritis have relatively low expectations, while patients with other diseases are more concerned with functional improvement40, or 2) the fact that pain reduction is the most important expectation among rheumatoid arthritis patients.

MATERIALS AND METHODS

Physiotherapy Interventions for Post-operative knee stiffness

There are a number of widely used techniques for treating post-operative knee stiffness, and while these techniques are frequently tailored to the needs of individual physiotherapists, none of them are generally acknowledged[11]. The following research all aim to determine whether or not physiotherapy has a substantial impact on post-operative stiffness, although none of them delve into detail on the characteristics of particular rehabilitation procedures. Hydrotherapy, the other rehabilitation method the authors studied, demonstrated better functional outcomes, including a reduction in pain, stiffness, and functional deficits, when administered to patient six months following total knee arthoplasty on the second postoperative day, cryotherapy was found to be beneficial in reducing blood loss, improving early knee flexion, and reducing pain and swelling, according to two literature studies[12]. Furthermore, two controlled studies showed that pulsed electromagnetic field therapy (PEMF) had a beneficial effect in the first month following surgery. They explained that PEMF has an anti-inflammatory effect (through A22 adenosine receptors) that reduces pain and swelling in patients who had TKA1.

Knee extension

Give the patient instructions to lie on the plinth in a supine position to enhance knee extension. The plinth's level should then be low enough to achieve the maximum 0° knee extension. Next, securely hold a towel at the distal end of the femur shaft or instantly above the patella to knot a mobilization belt around the knee[13]. To achieve the necessary range of knee extension, the plinth must then be lifted very slowly until a constant force is delivered. According to the author, one to two minutes is enough at first, and depending on the patient's tolerance, this can be extended by five minutes. One might place a foam roll beneath the patient's ankle1 if they wish to attain extension range of motion greater than 0[14].

Knee flexion:

To enhance knee flexion, tell the patient to stay in a prone-lying position with a pillow under their stomach and a towel wrapped over their ankle and shoulder for comfort. One end of each of the two mobilization belts should then be strapped over the patient's ankle, passed over their shoulder, and lastly fastened to the lower portion of the hydraulic plinth[15]. After that, the physiotherapist would gradually lift the plinth to achieve flexion of 10 to 120°. As with knee extension, the duration will be the same, and the patient's tolerance level will determine how much force is applied over time and how long it lasts [16]. When the patient reaches the desired range of motion, a single mobilization belt is strapped or fastened to the table rather than the patient's shoulder in order to reach ROM greater than 120°.

Wound care

After knee replacement surgery, wound infections can hinder rehabilitation and lengthen hospital stays. Following knee replacement, the risk of infection might be increased by both hemorrhage and wound leaking[17]. It was discovered that the subvastus technique, periarticular local anesthesia, and shorter tourniquet times dramatically decreased wound oozing stoppage, which decreased hospital stays and improved recovery.

Modern wound dressings (such as Aquacel® Surgical; ConvaTec, Uxbridge, UK) are becoming more and more popular in the context of improved recovery. Even though the modern type (Aquacel® Surgical) had significantly less blistering and a significantly shorter wear time than the traditional form (Mepore®;

Mölnlycke, Dunstable, UK), a prospective audit comparing two types of wound dressings (modern vs. traditional) as part of an enhanced recovery non-operative intervention in a district hospital failed to find any significant difference in LOS between these groups[18].

2. Anesthesia and postoperative pain management

Anaesthesia and postoperative pain treatment have been linked in several studies to patient satisfaction. TKA is often carried out while under general or regional anesthesia. A study of the literature by Fischer et al. suggests that after TKA, patients seem to be more satisfied when under regional anesthetic[19]. The general anesthesia group, however, had better outcomes than the spinal anesthesia group in terms of early recovery, pain relief, dizziness or nausea, and early ambulation in a study by Harsten et al. that compared the outcomes of total knee arthroplasty among patients randomly assigned to receive either general anesthesia or spinal anesthesia during surgery. Numerous attempts have been made to increase patient satisfaction and provide immediate pain relief following total knee arthroplasty[20-25]. Narcotic analgesics were once used for pain management following total knee arthroplasty (TKA), but their use has decreased recently because of the possibility of problems. Intraoperative periarticular injections may help lessen discomfort and the need for narcotic analgesics, claim Andersen and Kehlet. Narcotic analgesics may be less necessary if femoral nerve blocks are successful in managing postoperative pain. Nonetheless, there is still disagreement over the effectiveness of sciatic nerve blockage.

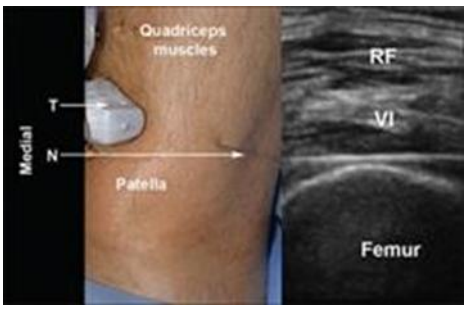

Figure 2. Ultrasound-guided local infiltration

3. Surgical technique

Minimally invasive TKA performed through a small incision accelerates recovery after surgery. Thus, it has been expected to improve patient satisfaction after TKA. However, Hernandez-Vaquero et al. reported that minimally invasive technique and the traditional surgical technique did not demonstrate significant differences in satisfaction among TKA patients. Therefore, the influence of surgical technique on patient satisfaction should be investigated in further research spite of being established as an effective surgical technique, TKA has evolved continuously to better accommodate patients' desire for functional improvement. The impact of implant design on the outcome of TKA has been studied by many researchers, and some of which have demonstrated a relationship between the type of implant and postoperative satisfaction. Hamilton conducted a prospective, double-blind randomized control trial for comparison of Kinemax TKA and Triathlon TKA, which showed that the outcome of TKA could be influenced by the prosthesis design. Baker carried out comparisons of 6 different TKA implants: the NexGen implant (Zimmer, Warsaw, IN, USA) resulted in greater improvement after TKA than the other 5 implant types. Contrary to these studies, a multi-center randomized controlled trial by Wylde showed no significant difference in patient satisfaction between the Kinemax fixed- and mobile-bearing TKA. A tiny incision used for minimally invasive TKA speeds up the healing process following surgery. After TKA, it has been anticipated that patient satisfaction will increase. But according to Hernandez-Vaquero, there were no appreciable variations in TKA patients' satisfaction between the minimally invasive and standard surgical approaches. The impact of surgical technique on patient satisfaction should thus be examined in future studies[26,27].

Types of implant

Although TKA has been proven to be a successful surgical procedure, it has consistently changed to better meet the needs of patients who want to increase their functional abilities. Many researchers have examined how implant design affects TKA outcomes, and some have shown a connection between implant type and postoperative satisfaction. Hamilton's prospective, double-blind, randomized control trial comparing Kinemax TKA and Triathlon TKA shown that prosthesis design may have an impact on TKA results. After comparing six distinct TKA implant types, Baker found that the NexGen implant (Zimmer, Warsaw, IN, USA) produced improved outcomes more than the other five implant types. The Kinemax fixed- and mobile-bearing TKAs did not significantly differ in patient satisfaction, according to a multi-center randomized controlled experiment conducted by Wylde[28-30].

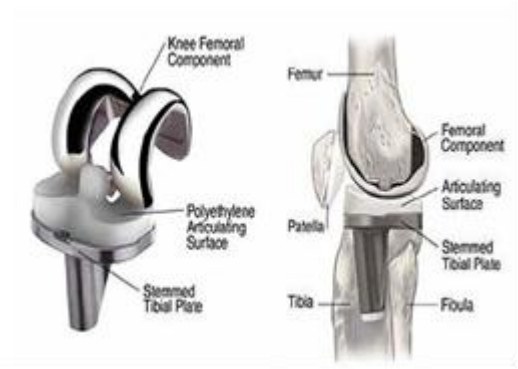

Figure 3. Total knee replacement implant

RESULT

Following the elimination of duplicates, 16430 articles were reviewed; 857 of them were considered to be possibly pertinent[31]. A thorough review of full-text publications led to the inclusion of 14 studies containing data from 1613 people (figure 1). Following TKR surgery for less than six months and failing to evaluate patient-related characteristics were the most frequent grounds for rejecting potentially pertinent studies[32-35]. A total of 2448 medial stabilized TKJRs implanted in 2195 patients were included in the review. Between 29 (33) and 89 (17) years old, the median age of the medial stabilized group was 69.48 years. 1,777 non-medial stabilized TKJRs were implanted in 1,734 study participants. This cohort was 75.56 years old on average, with ages ranging from 42 (21) to 84 (26). The medial stabilized group's mean BMI was 27.18 kg.m2 (range 17.8 to 38.9 kg.m2), while the non-medial stabilized group's was 27.09 kg.m2 (range 21–41.6 kg.m2)[35-40].

CONCLUSION

The best independent predictors of chronic pain following total knee arthroplasty are preoperative knee discomfort, mental health, catastrophizing, and pain at other locations. We discovered statistically significant mean differences in the final mean WOMAC values favoring the medial stabilized group and statistically significant differences in the final mean KSS values favoring the non-medial stabilized group within the parameters of the studies that were available. The preoperative and final mean knee ROM values, as well as the final mean KSFS values, did not differ statistically significantly between the two groups. A definitive judgment on the relative clinical performance of the medial stabilized TKJR construct cannot be made based on the literature review study. The two main prerequisites for the initial functional recovery following total knee arthroplasty are early rehabilitation and high-quality analgesia. Both the patient and the interventional surgeon believe that these two requirements are crucial. Essential elements include post-operative physical therapy, a technically superior regional nerve block administration approach, and the proper combination of multimodal and preventive analgesia. This method reduces the negative effects of conventional opioid-based analgesia while also accelerating functional recovery. In conclusion, it shortens hospital stays overall and lowers related expenses while also improving patient satisfaction.

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