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THERAPY IN PRACTICE

Postoperative Pain Management After Total Knee Arthroplasty in Elderly Patients: Treatment Options

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Abstract Total knee arthroplasty (TKA) is a common surgical procedure in the elderly and is associated with severe pain after surgery and a high incidence of chronic pain. Several factors are associated with severe acute pain after surgery, including psychological factors and severe preoperative pain. Good acute pain control can be provided with multimodal analgesia, including regional anesthesia techniques. Studies have demonstrated that poor acute pain control after TKA is strongly associated with development of chronic pain, and this emphasizes the importance of attention to good acute pain control after TKA. Pain after discharge from hospital after TKA is currently poorly managed, and this is an area where increased resources need to be focused to improve early pain control. This is particularly as patients are often discharged home within 4–5 days after surgery. Chronic pain after TKA in the elderly can be managed with both pharmacological and non-pharmacological techniques. After excluding treatable causes of pain, the simplest approach is with the use of acetaminophen combined with a short course of non-steroidal anti-inflammatory drugs (NSAIDs). Careful titration of opioid analgesics can also be helpful with other adjuvants such as the antidepressants or antiepileptic medications used especially for patients with neuropathic pain. Topical agents may provide benefit and are associated with fewer systemic side effects than oral administration. Complementary or psychological therapies may be beneficial for those patients who have failed other options or have depression associated with chronic pain.

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1 Introduction

Total knee arthroplasty (TKA) is a painful and common orthopedic procedure amongst elderly patients that frequently results in moderate to severe pain in the immediate postoperative period as well as chronic pain in up to 35 % of patients [1, 2]. Good postoperative pain control is important to facilitate rehabilitation [3, 4] and may also decrease the likelihood of developing chronic pain [1, 5]. As the population ages, the number of patients requiring TKA is increasing and, therefore, understanding the potential morbidity associated with the procedure and how to prevent and manage pain-related complications is imperative [6]. The majority of patients having TKA are classified as elderly (>65 years) and may present particular difficulties with otherwise common pain management strategies used in younger patients.

This review will discuss the factors associated with acute and chronic pain after TKA. In addition, we discuss common, effective, and evidence-based methods of managing both acute and chronic pain with an emphasis on management in the elderly patient. Although emphasis is given to pharmacological treatments, non-pharmacological therapies and the relevance of surgical approach to postoperative pain are also discussed briefly.

2 Predicting and Preventing Acute and Chronic Pain after Total Knee Arthroplasty (TKA)

Due to the debilitating impact of acute pain and chronic pain months and years after TKA, attention has turned to

understanding predictive and preventive factors (Table 1). Several studies have indicated that a high proportion of patients will suffer significant acute and chronic pain after TKA [1, 2]. Puolakka et al. [1] demonstrated that 35 % of patients suffer severe pain at least 4 months after TKA. Although at the present time the data in the literature are not well established, Puolakka et al. [1] found that factors that predicted development of chronic pain after TKA included severe postoperative pain, long duration of preoperative pain, and female gender. Singh and Lewallen [7] examined the Mayo Total Joint Registry with data from over 7,000 patients in order to examine factors that predicted use of medications for persistent pain after TKA and found that female gender and younger age (≤60 vs. 70–80 years) were associated with greater use of opioids and nonsteroidal anti-inflammatory drugs (NSAIDs). In addition, preoperative depression was associated with greater chronic NSAID use and preoperative anxiety with higher chronic opioid use [7].

Studies examining other surgical populations have found an association between chronic post-surgical pain and severe postoperative pain [5, 8]. Other associated factors include prolonged preoperative pain, increased surgical duration, intraoperative nerve injury [5], and psychological factors such as increased anxiety, depression, and pain catastrophization [9, 10]. Many of these factors remain inadequately explored and are the subject of current and potential future investigations.

Given the potential benefit of improved perioperative pain control on acute pain, chronic pain, and rehabilitation, emphasis should be given to optimizing this area as much as possible. Patients with significant preoperative knee pain may benefit from optimization of pain control prior to surgery [11, 12]. Discussion of pain control options and other education strategies with the anesthetist or surgeon prior to surgery has been shown to reduce hospital length of stay and may help to reassure patients and improve postoperative pain control and rehabilitation.

Table 1 Factors associated with pain after total knee arthroplasty

Preoperative	Intraoperative	Postoperative
Pain severity/duration [1, 9, 10]	Intraoperative nerve injury [5]	Acute pain severity [1]
Pain catastrophizing [10]		Anxiety and depression [10]
Preoperative depression[a] [7]		
Preoperative anxiety[b] [7]		

[a] Association with greater chronic non-steroidal anti-inflammatory drug use

[b] Associated with greater chronic opioid use

The introduction of unicompartmental and minimally invasive techniques had the potential to reduce pain after knee arthroplasty. However, to date, there remains conflicting evidence on the topic. One prospective observational study found that unicompartmental knee arthroplasty (UKA) was associated with greater postoperative range of motion than TKA; despite these differences, Knee Society knee and function scores showed no differences between the two groups and TKA appeared to be more reliable with fewer revisions than the UKA group [13]. The difference in postoperative pain between traditional UKA and minimally invasive UKA also remains uncertain. One study found no differences in postoperative pain or discharge readiness between minimally invasive and traditional UKA approaches [14]. However, another study comparing traditional TKA versus a minimally invasive technique documented decreased pain and length of stay in addition to increased range of motion in the latter group [15]. It remains unclear as to whether minimally invasive approaches improve postoperative pain or long-term outcome [16].

3 Managing Acute Pain after TKA

Managing acute pain after TKA can be challenging, and clinicians and researchers continue to investigate ways of improving patient care at this juncture. A multimodal pain management strategy can alleviate pain in many patients although there continue to be gaps that cause some patients to experience significant pain. The components of the pain management strategy after TKA include both regional and systemic analgesics, typically intravenous opioids, NSAIDs, and femoral nerve blockade (FNB) with or without anticonvulsant agents such as gabapentin or pregabalin. The advantages and limitations of these strategies are explored below.

3.1 Preventive Analgesia Has Been Shown to Improve Early Pain Control after TKA

Broadly speaking, preventive analgesia refers to the administration of analgesics prior to surgery in order to decrease the magnitude of postoperative pain [17]. The administration of drugs prior to surgery has been shown in many studies to decrease postoperative pain and analgesic consumption. For patients having TKA, a preoperative regimen of the selective cyclooxygenase (COX)-2 inhibitor rofecoxib that is continued postoperatively was associated with lower pain scores, epidural analgesic consumption, and in-hospital opioid consumption compared with placebo [12]. This is thought to diminish the surgical inflammatory response involving prostaglandins that leads to hyperalgesia [18]. Pregabalin administration beginning preoperatively

and continuing for 2 days postoperatively was also associated with similar improvement in pain outcomes compared with placebo [19]. In addition to mitigating early postoperative pain, the opioid-sparing effect of COX-2 inhibitors, gabapentin, and regional anesthesia is important for reduction of opioid-related side effects, including nausea and vomiting, which contribute to the postoperative morbidity associated with TKA.

3.2 Neuraxial Anesthesia Reduces Perioperative Morbidity and Mortality

Neuraxial anaesthesia (epidural and spinal anaesthesia) is an important component of the multimodal approach to pain management both during and after total knee replacement. Compared with general anaesthesia, neuraxial and combined neuraxial-general anaesthesia was associated with lower 30-day mortality, length of stay, and in-hospital complication rate in a large population-based study of hip and knee arthroplasty patients [20] and supported earlier data also demonstrating reduction in morbidity and mortality [21]. This reduction in perioperative morbidity and mortality may be especially relevant for elderly patients who frequently have pre-existing risk factors for perioperative complications. For postoperative pain management, continuous epidural analgesia has been shown to provide pain relief similar to that of continuous FNB (cFNB); however, it is associated with more frequent side effects than cFNB [4]. Intrathecal morphine has also been demonstrated to provide effective analgesia after TKA with similar results [22] compared with single-injection FNB (SFNB) [23]. Intrathecal morphine is associated with a greater frequency of side effects including nausea, vomiting, and pruritus, and decreased patient satisfaction [23]. A meta-analysis of side effects related to intrathecal morphine (non-specific to knee arthroplasty) suggested that low-dose intrathecal morphine was associated with more nausea, vomiting, and pruritus than placebo but only high-dose morphine was associated with more frequent respiratory depression [24]. Overall, the addition of intrathecal morphine to spinal anesthesia can provide effective pain relief but, because of the significant risk of side effects, would not be a technique of first choice, especially when used in isolation [25].

3.3 Use of Peripheral Regional Anesthesia Techniques

Regional anesthesia has become an important component of the multimodal anesthesia regimen, particularly for orthopedic surgery, because it allows targeted analgesia along with reduced adverse effects [4, 26]. A meta-analysis by Liu et al. [27] found that regional anaesthesia (both central neuraxial anaesthesia and peripheral nerve blocks [PNBs]), was associated with decreased postoperative pain scores and need for analgesics. PNBs in particular were associated with greater patient satisfaction, decreased time in the post-anesthesia care unit (PACU) and decreased postoperative nausea than general anesthesia [27]. In the context of knee arthroplasty, FNB is a commonly used technique. Presently, it is unknown whether concentration, volume, or mass of local anesthetic is the primary determinant of efficacy in FNB [28]. Nonetheless, studies have shown that the cFNB provides superior pain relief and reduces opioid consumption compared with both SFNB [29, 30] and intravenous opioids alone (patient-controlled analgesia) [4]. One meta-analysis found cFNB and SFNB to be equivalent in terms of both opioid consumption and pain scores at 24 and 48 h after surgery [31]. However, due to their methodology, several high-quality articles evaluating cFNB were excluded and this may have contributed to a significant underestimation of the benefit of cFNB [3, 4].

A limitation of FNB is local anaesthetic-induced quadriceps weakness, which can impair rehabilitation and increase the risk of falls. This may be especially problematic among the frail elderly, and care is necessary in the use of cFNB in this population [32]. The saphenous nerve block and adductor canal block may be useful adjuncts for providing pain relief while avoiding quadriceps weakness. In one randomized controlled trial, the adductor canal blockade combined with local infiltration analgesia (LIA) was associated with improved early pain scores and performance during physiotherapy compared with placebo [33]. However, a retrospective cohort study found that adductor canal blockade did not provide additional benefit in terms of pain scores compared with LIA alone [34]. A recent randomized trial compared cFNB with continuous adductor canal block and found equivalent analgesia but significantly less motor weakness in the adductor canal group [35]. However, this study only examined patients for 24 h after surgery and limited evaluation of function was performed. Overall, there remains a need for further good-quality studies comparing adductor canal block with FNB.

Local infiltration has risen in popularity over the past 5 years as an analgesic modality for TKA due to its simplicity and absence of quadriceps weakness compared with cFNB, with numerous trials supporting its use [36, 37]. Although several centers have adopted the technique, many of the trials that support the use of LIA suffer from methodological flaws, including lack of blinding and proper placebo controls. In addition, a theoretically increased risk of surgical infection with LIA if an indwelling intra-articular catheter is left in place may make this approach undesirable, and many surgeons remain uncomfortable with leaving a catheter in the joint after TKA (unpublished survey data). The single-injection LIA

technique, whilst providing pain relief, only does so for a few hours and may be limited in its overall utility. At this point, there is limited evidence to support the use of LIA, and further randomized controlled trials are needed comparing LIA with other local anesthetic techniques [38].

3.4 Multimodal Analgesia: Improves Pain Control, Reduces Opioid Consumption, and Facilitates Rehabilitation after TKA

Multimodal analgesia refers to the usage of multiple pain management modalities to exploit additive or synergistic effects of multiple medications. This allows for optimization of pain relief while avoiding negative side effects that may occur when relying on a single drug at higher doses [39]. Taken together, the use of systemic analgesics in addition to neuraxial and peripheral techniques where appropriate is required to ensure adequate pain management while preventing side effects associated with opioid analgesics. In a retrospective comparison of patients receiving an established multimodal analgesia regimen for hip or knee replacement with historical controls, the multimodal regimen was associated with lower visual analog scale (VAS) pain scores, lower opioid consumption, and faster attainment of postoperative milestones [40]. A typical multimodal regimen for TKA is described in Table 2.

Reducing opioid consumption may be important in the elderly patient due to normal and pathological decreases in renal and hepatic function that can act to increase plasma concentrations of certain drugs, such as morphine and metabolites while decreasing the effectiveness of others (Table 3). These age- and disease-related changes in drug metabolism and elimination should be considered when choosing and dosing analgesics in the elderly patient. Care with NSAIDs must be taken in those with renal impairment or significant cardiovascular disease, and doses of gabapentinoid drugs such as gabapentin or pregabalin should be reduced in older patients with renal or hepatic impairment. Polypharmacy is common in elderly patients, but the multimodal regimen may diminish potential drug toxicity by allowing lower effective doses of each medication. Nonetheless, a greater number of medications increase risk of drug interactions and non-compliance, particularly after discharge from hospital.

Table 2 Typical multimodal analgesia regimen for total knee arthroplasty at Holland Orthopaedic and Arthritic Centre (including preoperative preventive aspect)

Time	Analgesia
Preoperative	Celecoxib 400 mg po
	Acetaminophen 1,000 mg po
	Gabapentin 300–600 mg po
	Continuous femoral nerve block
Intraoperative	Spinal anesthesia + intravenous sedation
Postoperative (days 1–4)	Acetaminophen 1 g every 6 h
	Oral or parenteral opioid analgesics (commonly intravenous patient-controlled analgesia then transitioned to oral analgesia)
	Continuous femoral nerve block (ropivacaine 0.15 % at 5 ml/h) for 48 h
	Celecoxib 100–200 mg every 12 h
	Gabapentin 100–300 mg every 8 h
Post-discharge	Acetaminophen 1 g every 8 h
	Oxycodone 5–10 mg every 4 h or Hydromorphone 1–2 mg every 4 h prn
	Gabapentin 100–200 mg every 8 h
	Celecoxib 100 mg every 12 h

po oral administration, *prn* as needed

Table 3 Modifications to drug dosing for the elderly

Drug	Modifications
Opioids	No change in bioavailability but greater and longer analgesic effect in elderly patients. Renal clearance is decreased. Lower and less frequent dosing is recommended
NSAIDs	Avoid in renal dysfunction
	Add proton pump inhibitor to prevent gastric ulceration
	Use cautiously for chronic dosing because of risks in elderly patients and close supervision recommended
Gabapentin and pregabalin	May increase somnolence, dizziness, and peripheral edema. Lower doses recommended in the elderly due to reduced renal clearance
Acetaminophen	Care with hepatic disease and with patients taking warfarin (especially at higher doses of acetaminophen)

NSAIDs non-steroidal anti-inflammatory drugs

3.5 Ketamine

Low-dose ketamine has been shown to improve acute pain management after TKA but is not commonly used because of the availability of other effective agents and fear of psychomimetic side effects. In addition, ketamine is often restricted for parenteral use outside of high-dependency or intensive care units. Nonetheless, it is a useful drug and should be considered, especially when other agents have failed or for opioid-tolerant patients. A systematic review of the role of ketamine in preventive analgesia suggested that ketamine has a preventive analgesic effect by diminishing postoperative pain and analgesic consumption, probably through antagonism of the NMDA receptor [41]. One study found that small-dose intravenous infusion of ketamine after TKA was associated with less morphine

consumption and faster attainment of active knee flexion than placebo [42]. However, hallucinations and nightmares [43] may limit use of ketamine in elderly patients, who may be more prone to these side effects.

4 Acute Pain after Discharge from Hospital: Extent of the Problem, Limitations with Current Methods and Methods to Improve Overall Pain Control

Despite efforts to improve management of acute pain while in hospital, many patients are discharged with ongoing pain that can persist for several weeks or months after surgery. In recent years, there has been a trend to discharge patients more quickly after surgery and this has, if anything, exacerbated this problem. However, despite anecdotal impressions, the prevalence of acute pain post-discharge remains largely unstudied in the literature. One prospective cohort study documented a 52 % prevalence of moderate pain and a 16 % prevalence of severe pain at 1 month post TKA [44]. In another cohort, 31 % of patients were dissatisfied with their pain control between postoperative days 5 and 9 (discharge on postoperative day 5 or earlier); yet, despite the pain, many patients did not use the maximum amount of analgesics prescribed [45]. A recent Australian questionnaire study reinforces these data: of 171 participants, 23 % experienced severe or extreme pain at home, with a further 54 % experiencing extreme pain at least some of the time [46]. Adequate information on pharmacological and non-pharmacological methods of pain relief were reported by only 73 and 47 % of patients [46]. Finally, the impact of poor early pain control after discharge on functional recovery has not been studied.

Patients express several barriers to attaining adequate pain management post-discharge, including fears of side effects of opioid analgesics, fear of addiction, and dislike of oral medications [47]. It has been shown that most patients with pain related to osteoarthritis would prefer to be incapacitated by pain than take analgesics to achieve function [48]. Post-discharge education has not been examined but would make sense given the benefit of this strategy on preoperative and in-hospital outcomes after TKA [49]. Compounding these challenges is the possibility that, within any surgical population, there are individuals who are non-responders to certain analgesic modalities and, at this point in time, we are unable to distinguish which individuals are likely to benefit from each form of pain management [50]. Thus, good clinical management of pain requires frequent monitoring and possible modifications to the analgesic regimen to ensure that pain is being treated adequately [50].

At present, there is a significant contrast between in-hospital management of pain where the focus is on excellent pain management using a multimodal approach and management of pain after discharge, where a simple unimodal approach is usually used. Most often, post-discharge pain management is managed by the surgeon and frequently only a compound analgesic with an opioid and acetaminophen is prescribed. Effective pain control after discharge post-TKA appears challenging, and many patients have significant pain, seek further medical help, and have poor information about how to achieve pain control.

The extension of a multimodal analgesic regimen after discharge has been shown to improve pain scores in both the hip and knee arthroplasty populations [11, 51, 52]. The addition of celecoxib both pre- and postoperatively to the regular analgesic regimen was associated with less pain at 6 weeks and improved knee function compared with placebo [51]. In addition, pregabalin administered for 2 weeks post-TKA was associated with a decreased rate of neuropathic pain at 3 and 6 months [52]. These results suggest that the current limited prescription for an opioid alone that is received by most patients after TKA can be complemented by the addition of other modalities such as NSAIDs and gabapentin or pregabalin. Limited data and personal experience in our own institution suggest that this will improve overall pain management and possibly diminish opioid-related side effects that frequently deter patients from using opioid analgesics to manage their pain. A suggested regimen is listed in Table 2.

5 Managing Chronic Pain after TKA

Chronic pain after TKA is common, with up to 35 % of patients suffering pain 1 year after knee replacement [1, 2]. Although chronic pain is usually defined as either somatic (aching pain) or neuropathic (burning, lancinating), there have been no studies that have examined the quality of chronic pain after TKA. Management of pain in the elderly patient is further limited by the stoic nature of this population. Elderly patients are therefore at risk of poor pain control and limited function due to pain. Treatable causes of pain need to be excluded, such as infection and malalignment or loosening of the prosthesis, and consultation with an orthopaedic surgeon may be necessary to exclude treatable causes of pain or disability.

Management of pain after TKA depends on the type of pain experienced, with somatic type pain being more amenable to acetaminophen, NSAIDs and low-dose opioid analgesics. Typically, neuropathic type pain is treated with tricyclic antidepressants (TCAs) or antiepileptic medications. All elderly patients should be started on the lowest dose and carefully titrated until a therapeutic effect occurs.

A treatment algorithm can be used for the management of chronic pain in the elderly patient after TKA, and a

Table 4 Suggested approach to management of chronic pain after total knee arthroplasty in the elderly

Symptoms	Suggested treatment
Mild-moderate pain	Exclude treatable causes: infection, loosening of components or mal-alignment
	Initial treatment: acetaminophen 1 g every 6 h prn or compound analgesic (acetaminophen/opioid combination)
Moderate-severe pain	Add oral opioid such as oxycodone or hydromorphone to acetaminophen as required (e.g. hydromorphone 1–2 mg every 4–6 h prn)
	Short, carefully supervised courses of NSAIDS (especially COX-2 inhibitors) may be beneficial or topical NSAID
Moderate-severe pain (± neuropathic component)	Gabapentin 100–300 mg every 8 h titrated to effect up to 1,800 mg/day
	Nortriptyline 25 mg at night
	Topical capsaicin or lidocaine may be beneficial for selected patients
Non-pharmacological and complementary treatments	Treat depression. Cognitive behavioural therapy may be helpful
	Acupuncture, TENS and massage therapy

NSAIDs non-steroidal anti-inflammatory drugs, *prn* as needed, *TENS* transcutaneous electrical nerve stimulation

number of non-pharmacological strategies may also be useful (Table 4).

5.1 Acetaminophen

The use of acetaminophen in therapeutic doses up to 4 g/day should be strongly considered as a first step toward management of pain. There are few absolute contraindications to use of this medication, although care should be taken in patients with hepatic impairment.

5.2 NSAIDs

NSAIDs are useful for musculoskeletal pain and can be combined safely with acetaminophen. Care should be taken in their prolonged use in the elderly, and the use of a COX-2 selective agent combined with a proton-pump inhibitor such as omeprazole may be preferable because gastrointestinal toxicity increases in frequency with increasing age [53]. COX-2 inhibitors are contraindicated in patients with significant ischaemic heart disease or cerebrovascular disease and should be used with caution in those patients with risk factors such as hyperlipidemia, smoking, diabetes, and hypertension. NSAIDs should be used at the lowest dose and for the shortest possible time in the elderly. In addition, the concomitant use of NSAIDs and aspirin increases the gastrointestinal toxicity and should only be co-prescribed if absolutely necessary. Topical NSAIDs may be a useful option with lower risk of systemic side effects for chronic pain after TKA [54].

5.3 Opioid Analgesics

Opioids can form a useful part of a pain management strategy in the elderly, and studies have demonstrated efficacy and safety in the short term for musculoskeletal pain [55]. However, long-term safety has not been examined. Older people tend to require lower doses of opioids, but overall effectiveness does not vary with age [56]. Side effects, such as sedation, nausea, and vomiting, tend to be worse at initiation of therapy or on increase of dose, although tolerance rapidly occurs to these side effects. However, tolerance does not occur with constipation and this should be managed with laxative therapy.

Typically oral morphine (2.5–5 mg every 4 h), hydromorphone (1–2 mg every 4 h), or equivalent can provide effective immediate relief of pain. For those patients requiring more than four doses of opioid per day, pain may be more effectively managed with a controlled-release opioid at an equivalent total daily dose given in either two or three doses per day. Controlled-release versions of morphine, oxycodone, and hydromorphone are commonly available.

5.4 Analgesic Adjuvants

Neuropathic pain (burning or lancinating pain) is usually treated with TCAs or anticonvulsant drugs. The TCAs amitriptyline and nortriptyline may reduce pain by 25 % if side effects are tolerated, although discontinuation occurs in up to 37 % of patients due to undesirable side effects or lack of efficacy [57]. Care should be taken in the elderly with the TCAs due to their side effects including sedation, dry mouth, and other side effects. Nortriptyline produces less sedation and anticholinergic side effects than amitriptyline and may be preferred in the elderly. Typical dosing is commenced at 25 mg at night and then titrated carefully if necessary.

Anticonvulsants such as gabapentin and pregabalin are also effective at treating neuropathic pain [58], although sedation and dizziness are still problematic, especially at higher doses. Excretion of gabapentin and pregabalin is dependent on renal function, and dose reduction may be required in renal impairment. Treatment should start at the lowest dose (gabapentin 100 mg every 8 h) and titrated to effect.

5.5 Topical Treatments

Several agents are available as topical options and may be useful for patients with chronic pain post-TKA, especially

in the elderly where systemic side effects are often reduced compared with their systemic equivalent. Topical NSAIDs are effective for pain related to osteoarthritis although their effectiveness for patients with pain after TKA has not been assessed. The use of topical lidocaine and capsaicin can have some benefits, especially in patients with neuropathic pain [59]. Several studies have demonstrated the benefit of topical lidocaine for neuropathic pain but not specifically for pain after TKA. Topical capsaicin is indicated for the relief of osteoarthritis-related pain and neuropathic pain and may therefore be useful for chronic pain post-TKA. Limitations include the associated burning pain on application and the need for frequent application over several weeks to see a useful treatment effect.

6 Non-Pharmacological Strategies for Managing Chronic Pain after TKA

6.1 Psychological Interventions

A number of psychological interventions have been used successfully in elderly patients with chronic pain, although none specifically for pain after TKA. Depression is common in both the elderly and in patients who suffer chronic pain, and it has been previously found that treatment of depression of older people with osteoarthritis improved both function and pain [60]. Aside from pharmacological treatments, other treatments potentially include cognitive behavioral therapy, meditation, and biofeedback.

6.2 Complementary Therapies

Patients with chronic pain often try several complementary options for their pain, even before attending the chronic pain clinic. Treatments that have been shown to benefit patients with chronic pain include acupuncture, transcutaneous electrical nerve stimulation (TENS), and massage. Acupuncture has been demonstrated to provide improvement in function and pain control when used for knee osteoarthritis when compared with both education and placebo control groups [61]. TENS is commonly used for chronic pain, but there is a lack of evidence to support its use in chronic pain in general and after TKA in particular [62, 63]. Massage therapy has demonstrated benefits for patients with musculoskeletal pain and may be another useful option for patients with chronic pain after TKA.

7 Summary

TKA is a common surgical procedure in the elderly and is associated with severe pain after surgery and a high incidence of chronic pain. Several factors are associated with severe acute pain after surgery, including psychological factors and severe preoperative pain. However, good acute pain control can be provided with multimodal analgesia, including regional anesthesia techniques. Studies have demonstrated that poor acute pain control after TKA is strongly associated with development of chronic pain, and this emphasizes the importance of attention to good acute pain control after TKA.

Post-discharge pain after TKA is currently poorly managed, and this is an area where increased resources need to be focused to improve early pain control. This is especially as patients are often discharged home within 4–5 days after surgery.

Chronic pain after TKA in the elderly can be managed with both pharmacological and non-pharmacological techniques. After excluding treatable causes of pain, the simplest approach is the use of acetaminophen combined with a short course of NSAIDs. Careful titration of opioid analgesics can also be helpful, as can other adjuvants such as the antidepressants or antiepileptic medications used especially for patients with neuropathic pain. Topical agents may provide benefit and are associated with fewer systemic side effects than oral administration. Finally, complementary or psychological therapies may be beneficial for those patients who have failed other options or have depression associated with chronic pain.

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