

# The negatives of knee replacement surgery: complications and the dissatisfied patient

Henry Dushan Edward Atkinson

## Abstract

Total knee replacement (TKR) surgery is a very effective treatment option for patients with disabling and severe end-stage knee pain. It is usually life-changing surgery and most patients report improvements in outcome measures scoring pain, function and quality of life. However, around 14%–53% of TKR patients have some level of persisting knee pain, 7%–50% of TKR patients report poor knee function, and mean published dissatisfaction rates range between 15% and 30%.

This article reviews the negatives of knee replacement surgery, covering the risks of potential complications and the factors that should routinely be discussed in detail with patients as part of the informed consent process.

**Keywords** clinical outcomes; complications; dissatisfaction; primary total knee replacement; risks; satisfaction

## Introduction

Knee osteoarthritis is a common and disabling condition, and around 10% of men and 13% of women over the age of 60 are believed to suffer regular symptoms.<sup>1</sup> Total knee replacement (TKR) surgery is a very effective treatment option for patients with disabling and severe end-stage knee pain resulting from osteoarthritis, post-traumatic arthritis and inflammatory arthritis. It is usually life-changing surgery and most patients report improvements in outcome measures scoring pain, function and quality of life.<sup>2</sup> There are nearly 100 000 primary TKRs implanted per year in England and Wales, and numbers are expected to double over the next 15 years due to an ageing, heavier and more active population. The proportion of younger patients undergoing TKR surgery is also expected to increase for the same reasons.

As the title of this article suggests, all is not completely rosy. Despite the majority (71%) of TKR patients perceiving an improvement in their knee symptoms,<sup>3</sup> the literature suggests that 14%–53% of TKR patients have persisting knee pain and 7%–50% have poor knee function,<sup>4</sup> with mean published dissatisfaction rates ranging anywhere from 15% to 30%,<sup>5,6</sup> and with only 22% of patients rating their results as “excellent”.<sup>3</sup>

One particular multicentre study of 661 younger TKR patients with a mean age of 54 years found that about one third reported

residual symptoms and functional limitations. 33% reported some degree of pain, 41% reported stiffness, 33% reported grinding and other noises, 33% reported swelling/tightness, 38% reported difficulty getting in and out of cars, 31% reported difficulty getting in and out of chairs, and 54% reported difficulty on stairs. Despite this, 66% of patients indicated their knees felt “normal”, 47% reported a complete absence of a limp and 50% had participated in their most preferred sport or recreational activity in the previous 30 days. Overall, 89% of these patients were satisfied with their ability to perform their activities of daily living (ADLs) and 91% were satisfied with their pain relief.<sup>7</sup>

The causes of ongoing pain are not clearly understood and, despite advances in implant technology, patient reported outcomes appear to have worsened with time.<sup>8</sup> One explanation may lie with patients’ perception of what their surgery entails, as well as unrealistic expectations of what their functional outcomes and limitations are likely to be. Their worn-out native joints are not being replaced by brand new biomechanically matched natural biological knee joints. They are in fact being substituted with alternative joints; typically, a metal and plastic implant that does not restore the joint’s unique natural biomechanics and which can never fully behave like the original pre-arthritic knee.

Another issue may relate to surgical patient selection and a reduction in thresholds for TKR surgery. Those undergoing TKR surgery should have clear radiographic evidence of joint damage, suffer moderate-to-severe persistent pain that has not been adequately relieved through non-surgical means, with clinically significant functional limitation resulting in a diminished quality of life.<sup>4</sup> Many patients undergoing TKR surgery have a mismatch between minimal radiographic changes and severe pre-operative symptoms of pain and disability, and this may well also be skewing the results and published outcomes.

Notably, recent literature reports a high prevalence of features of maladaptive responses to pain and pain sensitization in patients with knee arthritis, and some studies have found that 70% of patients with radiographically confirmed knee arthritis have various somatosensory abnormalities, with 20% suffering neuropathic symptoms. These mechanisms of pain are not necessarily addressed by a joint replacement.<sup>4</sup>

Patients should be made fully aware that TKR surgery is not without risk, and with such a broad spectrum of possible clinical outcomes and varying degrees of function, patient education, counselling and the consenting process have become all the more important.

The standard of care during the process of informed consent is to discuss fully all the available treatment options with the patient; the risks of potential complications, the expected benefits and the likely outcomes. This conversation should then be reinforced with appropriate reading and reference material, and patients should be given adequate time to consider their choice of treatment and, in the case of a TKR, be given an invitation to a joint replacement class/school.

## Complications

When consenting for TKR surgery, as well as promoting the positives, the following ‘negatives’ should also be discussed:

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### Infection

Deep infection occurs in 0.4%–2% of TKR cases (and in 3%–5% of revision TKRs), despite standard precautions, including perioperative antibiotics. Of these infections, 1.55% occur within the first 2 years and 0.46% over the following 2–10 years.<sup>9</sup> Deep infections occur more commonly in patients with rheumatoid arthritis (RA), those with an American Society of Anaesthesiologists (ASA) risk score greater than 2, diabetics and the morbidly obese.<sup>10</sup>

Those infections occurring within 3 months of TKR implantation are classified as ‘early’, 3–24 months as ‘delayed’, and more than 2 years as ‘late’. Early and delayed infections are thought to be due to organisms introduced at the time of surgery, while late infections are more likely to be acquired haematogenously from another source.<sup>11</sup> Routine prophylactic antibiotics are not currently recommended to prevent prosthetic joint infection when undergoing dental surgery.<sup>12</sup>

The treatment of an infected TKR is complex and expensive, and requires more surgery and more inpatient time than a non-infected revision TKR. It is also more prone to failure. The treatment options include irrigation and debridement with component retention (with or without polyethylene exchange), one-stage or two-stage implant exchange, antibiotic suppression, resection arthroplasty and rarely arthrodesis or even amputation. Currently, a two-stage implant exchange with the use of a temporary articulating spacer is generally the most accepted treatment option.<sup>13</sup>

### Deep vein thrombosis (DVT), pulmonary embolus (PE) and venous thromboembolic events (VTE)

Without prophylaxis, the incidence of DVT after TKR ranges from 40% to 88%. The incidence of asymptomatic PE ranges from 10% to 20%, symptomatic PE from 0.5% to 3% and fatal PE up to 2%. The use of thromboprophylactic measures significantly reduces these risks to 0.63% for symptomatic DVT, 0.27% for symptomatic PE and 1.09% for VTE events prior to hospital discharge,<sup>14</sup> and thromboprophylaxis is strongly recommended in TKR patients.<sup>15</sup>

The incidence of asymptomatic DVT is greater than that of symptomatic DVT; however, its importance is unclear, as asymptomatic DVT rarely causes symptomatic PE.<sup>16</sup> In contrast, 40%–50% of untreated symptomatic DVTs will result in a PE within 3 months, and 10% of people with a symptomatic PE will die within 1 hour of onset.<sup>17</sup>

The potential benefits of VTE prophylaxis must, however, be balanced against the associated risks of bleeding, and the optimal form, combination and duration of VTE prophylaxis after TKR remains controversial.<sup>18</sup>

### Wound healing complications

A retrospective review found an incidence of 0.33% of wound healing problems requiring surgery within 30 days of index TKR surgery; there was a 5.3% chance of these patients subsequently requiring further major surgery (removal of implants, muscle flaps, amputation) and a 6% chance of deep infection within 2 years of the index surgery.<sup>19</sup> These risks are greater in the malnourished (albumin <3.4 g/dl), the obese, in smokers and in those with peripheral vascular disease (particularly if the ankle-brachial index is >0.9).

### Scar pain and lateral skin numbness

The infrapatellar branch of the saphenous nerve, or its terminal branches, are usually transected using the standard midline skin incision. This results in an area of numbness in the distribution of this nerve in most patients (skin areas lateral to the incision) and can potentially interfere with patient satisfaction<sup>20</sup>; rarely it can result in a painful neuroma requiring further surgery.

### Ligament and tendon injuries

One large series described ligament or tendon disruptions or attenuations as occurring in around 1.6% of patients. Most of these were injuries caused by the oscillating saw, and included injuries to the patellar tendon, quadriceps tendon and medial collateral ligament (these injuries require repair and are usually protected in a brace post-operatively); popliteus tendon injuries are usually left.<sup>21</sup>

Some studies have reported MCL midsubstance tears or avulsions in as many as 0.8%–2.7% of TKRs. These require repair and post-operative bracing, but can still result in longer-term knee instability and accelerated wear, which can necessitate the need for revision.<sup>22</sup>

### Longer-term quadriceps and hamstring weakness

TKR patients have weaker quadriceps and hamstrings until 3 years post-operatively.<sup>23</sup>

### Extensor mechanism disruption

Extensor mechanism disruption has an incidence of 0.17%–2.5% in TKR. Patellar tendon ruptures are reported in 0.17%–1.4% of primary TKRs, with higher rates in revision TKR. Almost all patellar tendon and most quadriceps ruptures require early surgery, often with hamstring or allograft augmentation. Some quadriceps ruptures can be managed expectantly if active extension is preserved. Patellar fractures should be fixed if there is more than 20 degrees loss of active extension. Clinical outcomes of extensor mechanism disruptions are often poor (in 30% of 40% of cases) and up to 50% require further surgery.<sup>24</sup>

### Common peroneal nerve (CPN) injury

The incidence of CPN injury is estimated to be 0.79%, and can be caused by compression, ischaemia, traction, crushing or laceration.<sup>25</sup> Traction of the CPN is more common when correcting a valgus knee deformity of more than 10 degrees and when there is a significant fixed flexion deformity. Tourniquet times greater than 120 minutes, tourniquet pressures of greater than 400 mmHg, co-existing peripheral neuropathies, tight dressings, post-operative bleeding, previous lumbar laminectomy surgery, RA and regional nerve blockade are also risk factors.

### Vascular injury

Vascular injury during TKR is quite rare and occurs in around 0.003%–0.23% of cases.<sup>26</sup> Most involve the popliteal artery, and though penetrating trauma and transection are the commonest causes, contracture correction and tourniquet damage to calcified vessels (with resultant thrombosis and plaque embolization) can also result in a vascular insult. Early identification and intervention is paramount, as the incidence of mortality and amputation can reach 7% and 10.5%–42% respectively.<sup>27</sup>

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