MANAGEMENT FACTORIALS IN TOTAL KNEE REPLACEMENT

Assuring the happy total knee replacement patient

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Total knee replacement (TKR) is one of the most common operations in orthopaedic surgery worldwide. Despite its scientific reputation as mainly successful, only 81% to 89% of patients are satisfied with the final result. Our understanding of this discordance between patient and surgeon satisfaction is limited. In our experience, focus on five major factors can improve patient satisfaction rates: correct patient selection, setting of appropriate expectations, avoiding preventable complications, knowledge of the finer points of the operation, and the use of both pre- and post-operative pathways. Awareness of the existence, as well as the identification of predictors of patient–surgeon discordance should potentially help with enhancing patient outcomes.

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Total knee replacement (TKR) is one of the most common operations in orthopaedic surgery worldwide, and its effectiveness in relieving pain and improving function in patients with a rheumatoid or osteoarthritic knee is undisputed. However, despite its scientific reputation as mainly successful, only 81% to 89% of patients are satisfied with the final result. In a prospective cross-sectional study of patient satisfaction after primary TKR, Bourne et al. identified that of 1703 patients, approximately one in five (19%) were not satisfied with their clinical outcome. Satisfactory pain relief varied between 72% to 86%, and a satisfactory functional outcome was seen in between 70% to 84% of patients. Another study identified even lower satisfaction rates (66%), and low rates of return to normal activity (52%) and leisure activities (44%) and this was not associated with differences between implants.

It seems clear that there is a disparity between the patients’ and surgeon’s satisfaction with the outcome of TKR surgery. Surgeons are more likely to be satisfied with findings on radiograph and excellent ranges of movement in patients who seem, medically, to be doing well. Despite these objective outcomes, subjectively a significant number of patients are not satisfied with their personal outcomes. Our understanding of this lack of concordance between patient and surgeon perception is limited. Awareness of the existence, as well as identification of predictors of patient–surgeon disagreement, should help improve the dialogue that goes on between patients and surgeons, thus improving the clinical decision-making processes and making expectations more realistic in an attempt to enhance patient outcomes.

Patient safety

The authors suggest surgeons can improve the situation by coordinating the many individual elements of patient care, including targeted patient selection, enhanced patient education, engagement in a multidisciplinary approach to post-operative analgesia, and early patient mobilisation through physiotherapy. Focus on each of the following headings can help to ensure that patient safety is maintained, and satisfaction enhanced:

- Correct patient selection
- Setting appropriate expectations
- Avoiding preventable complications
- The finer points of the operation
- Using pre- and post-operative pathways

Correct patient selection. The surgeon has to ensure that the operation is carried out based on the correct diagnosis: specifically, pain referred from the hip or the back must be excluded. When a patient presents with both a painful knee (whether it’s arthritic on radiograph or not) in association with a stiff or painful hip (again whether arthritic or not), diagnostic intra-articular injections with anaesthetic agents may provide important diagnostic information. A careful lumbar examination is essential to exclude referred pain from the lumbar spine, and when there are painful degenerative changes on clinical
examination and on conventional radiographs, further imaging in the form of CT or MRI can be indicated. In all cases, surgeons must ensure that the patient’s symptoms, signs and radiographic features are clinically clear\textsuperscript{18,19} before recommending surgery.

Evidence from previous studies suggests that BMI, age, gender, and comorbidity may be associated with poorer outcomes after TKR.\textsuperscript{20-23} Patients at especially high risk include smokers (particularly heavy smokers), those with severe cardiopulmonary disease or diabetes mellitus, those with severely compromised skin at the operation site and patients clearly not psychologically capable of understanding the surgical procedure or complying with the post-operative rehabilitation program.\textsuperscript{20-23}

**Setting appropriate expectations.** It is essential that surgeons consider and manage patients’ pre-operative expectations. It has been demonstrated that patients who have been managed in this way are more satisfied with the outcomes following total joint replacement surgery.\textsuperscript{24} Patient expectation refers to the level of anticipation that a certain result is likely to occur during or as a result of medical care, in contrast to patient desires which reflect the patient’s wishes that a certain result occurs.\textsuperscript{25} Patients must be made aware that despite being a highly successful procedure, only 81% to 89% of patients are completely satisfied with the final result of a TKR, and even in the event of a successful operation, there will likely be some pain some of the time.\textsuperscript{2-6}

**Avoiding preventable complications.** The overall mortality rate following TKR is less than 1%, a figure that increases with advancing age, male gender, and the number of pre-existing medical conditions. In order to reduce peri-operative complications, the identification and optimisation of pre-operative medical co-morbidities is important.\textsuperscript{2,5,8}

Skin necrosis and deep infection after TKR are not uncommon. Several predisposing factors, such as immunosuppression, malnutrition, steroid use, rheumatoid arthritis, multiple scars, and vascular disease contribute to the development of wound complications, as do prolonged tourniquet times.\textsuperscript{26} The skin requires diligent protection, both by ensuring that skin incisions are as long as necessary to minimise skin tension, and that soft tissue is treated with care, especially during retraction.

It is equally important to protect the supporting structures around the knee. Disruption of the extensor mechanism in TKR may be secondary to tibial tubercle avulsion, patellar or quadriceps tendon rupture, or patella fracture. Whether this occurs intra-operatively or post-operatively, extensor mechanism disruption is a difficult problem to manage, and is associated with a significant rate of failure and associated complications.\textsuperscript{27} Intra-operative disruption of the medial collateral ligament is an uncommon complication, but generally requires conversion to a prosthesis with increased varus–valgus constraint\textsuperscript{28} such as a rotating hinge.

The best surgical approach and technique used to displace the patella remains controversial.\textsuperscript{29} The senior author (DB) never everts the patella when performing TKR, and always ensures ligaments are well protected, especially when using a saw. Operative techniques such as raising full-thickness skin flaps and judicious placement of skin incisions in the presence of pre-existing scars can greatly reduce the incidence of wound problems. The significance of wound complications following TKR should not be underestimated. Understanding the blood supply to the skin around the knee is fundamental in order to prevent wound problems.\textsuperscript{30} Failure to obtain meticulous closure can result in the development of subcutaneous hematoma. The first step in treating such a wound is to recognise when a problem is present, as well as to know when a minor problem can turn into a major one. In summary, wound management associated with TKR requires expedient and aggressive care.\textsuperscript{30}

**The finer points of the operation.** The surgeon must have intimate knowledge of both the instruments and implants they are using, which is helped by experience and the volume of surgeries performed. There is evidence to suggest that TKR hospital and surgeon volume are both associated with outcomes such as mortality, medical complications such as pneumonia, deep infection rates, functional status, and composite end points.\textsuperscript{31-33} Patients managed by surgeons at hospitals who are involved in performing > 200 primary TKR procedures per year per hospital in the United States or > 50 procedures per year per hospital in Germany,\textsuperscript{35} have shown lower rates of peri-operative mortality and complications.\textsuperscript{31,34} In revision surgery the early complication-based learning curve for reverse total shoulder replacement has been demonstrated to be approximately 40 cases\textsuperscript{36} Thus, it would seem that TKR surgery should be performed as frequently as possible.

**Using pre and post-operative pathways.** It is important that routine pre-operative assessment avoids unnecessary investigations. In the authors’ institution a standardised pre-operative work up has been established in order clearly to indicate which tests need to be done and for which patients. This prevents excessive and unnecessary testing, which can in the authors’ opinion cause distress for patients. Education regarding what goes on before and after surgery is also an important aspect of the pre-operative process. All patients follow an identical post-operative plan, regardless of the treating surgeon. This allows both the patients and allied health care personnel to be aware of the normal course to be expected following surgery.

A fast-track surgery programme is made to discharge patients between two and four days post-operatively. This is based on the coordination of many individual elements of patient care into a multidisciplinary approach,\textsuperscript{11} and involves addressing the attitudes of patients, families and staff. Those at the authors’ institution emphasise the need for patient education and ensure that they are made to feel
normal” as soon as possible, for example, by encouraging the return to home clothes. Moreover, emphasising early patient mobilisation and physiotherapy is an essential part of the programme. A trouble free discharge is assisted by a routine follow-up phone call at 48 hours after discharge in order to anticipate problems and address patient concerns.

A multimodal approach to pre and post-operative analgesia is a very important component of patient care. Literature shows that spinal anesthesia is associated with lower post-operative rates of deep-vein thrombosis, shorter operative times, and reduced blood loss in comparison with surgery performed under general anesthesia. There is also evidence to suggest that multiple intra-articular injections of bupivacaine after wound closure reduces the need for analgesics, enhances rehabilitation and increases flexion after TKR. In a randomised study Essving et al compared a group of patients receiving a local injection of analgesics at the end of the operation, and an intra-articular bolus at 21 hours post-operatively with a control group reduced morphine consumption, post-operative pain, and improved functional scores.

As a result, all TKRs at the authors’ institution are performed under regional anaesthesia whenever possible, in combination with intra-articular injections of local anaesthetic, optimal systemic post-operative pain management, and prevention of nausea and vomiting. Because of risks and cost of allogenic blood transfusion, they are avoided whenever possible. We use tranexamic acid (TA) for all patients in order to reduce allogenic blood use, unless patients have certain contraindications (15 to 20 mg/kg just after final release of tourniquet). This is because it has been shown that TA therapy decreases the amount of blood salvaged intra-operatively, allowing a more rational use of blood salvage systems, and decreasing the cost of anaesthesia. In a prospective study, the use of TA has also been shown to decrease the incidence of peri-operative complications, including wound infection and haematoma, myocardial ischemia, respiratory failure and thromboembolic complications, compared with patients requiring allogenic blood transfusion. Furthermore, the mean duration from surgical procedure to patient discharge from the orthopaedic ward was shorter in those patients not receiving an allogenic blood transfusion.

**Conclusion**

Based upon the authors’ experience, it is recommended that in order to maximise patient satisfaction, orthopaedic surgeons should concentrate on correct patient selection, setting appropriate expectations, avoiding the preventable complications, knowing the finer points of the operation, and maximising the use of pre- and post-operative pathways wherever possible.

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**References**


