Unicompartmental Knee Arthroplasty: Incidence of Transfusion and Symptomatic Thromboembolic Disease

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abstract

Unicompartmental knee arthroplasty has been associated with faster recovery with less potential perioperative morbidity compared to total knee arthroplasty. This study investigates the rate of transfusion, symptomatic thromboembolic events, and length of hospital stay in 1000 consecutive, unicompartmental knee replacements performed by 2 surgeons. A rapid recovery protocol coupled with multimodal venous thromboembolism prophylaxis was used for all patients. Five patients (0.5%) received a blood transfusion for symptomatic postoperative anemia. One patient (0.1%) developed a symptomatic deep venous thrombosis within 90 days of follow-up. No patient experienced a symptomatic pulmonary embolism. Length of hospital stay averaged 1.4 days. Unicompartmental arthroplasty using less invasive surgical techniques, a rapid recovery protocol, and multimodal venous thromboembolism prevention is a safe and effective procedure associated with a low rate of morbidity.

Contemporary lower-extremity arthroplasty is focused on optimizing patient outcomes and minimizing patient morbidity through the use of less invasive surgical techniques, multimodal perioperative pain management strategies, early mobilization, and shortened hospitalizations. Rates of blood transfusion following total knee arthroplasty (TKA) have been reported to range from 4% to 46%.1-4 Fatal pulmonary embolism incidence is 0.1% without prophylaxis following primary TKA.5 Nonfatal pulmonary embolism has been reported to occur in <1% of patients following TKA, using various types of venous thromboembolism prophylaxis.6-10

Unicompartmental knee arthroplasty (UKA) is indicated to treat isolated arthritis confined to 1 of the 3 compartments of the knee. Excellent long-term clinical results have been reported with UKA.11,12 It has been reported that UKA has a faster recovery with better 6-week Knee Society functional scores than TKA.13 In addition, Lombardi et al16 reported no thromboembolic events following UKA using a multimodal prophylactic strategy. This study reports on the rate of blood transfusion, symptomatic thromboembolic disease, and length of hospital stay following UKA in a large, 2-surgeon series.

MATERIALS AND METHODS

This retrospective study reviewed the clinical records of 1000 consecutive UKAs in 828 patients. The 2 senior authors (K.R.B., A.V.L.) were the primary surgeons for all of the procedures performed between July 2001 and July 2008. Comparatively, 5009 primary TKAs were performed during the same period by these 2 surgeons for a 16.6% utilization of UKA. Since the availability of the mobile-bearing UKA in 2004, UKA represents 23% of primary knee arthroplasties.

Nine hundred sixty-seven (96.7%) of the partial knee replacements were medial UKA, and 33 (3.3%) were lateral UKA. Thirty-five patients underwent simultaneous UKA under one anesthetic, and 141
patients underwent staged UKA between 6 weeks and 6 months apart.

Eighty-eight percent of the implants were the Oxford Phase III mobile-bearing, unicompartmental knee prosthesis (Biomet, Warsaw, Indiana). More than 8% of the implants were the Vanguard M fixed-bearing, unicompartmental knee prosthesis (Biomet). Three percent of the implants were the Repicci II fixed-bearing, unicompartmental knee prosthesis (Biomet). All of the surgical implants were cemented.

Our rapid recovery protocol, which includes full weight bearing and range-of-motion exercises starting the day of surgery, was used in all patients.17 Perioperative medical management was performed by a group of medical internists who evaluated the patients preoperatively for medical optimization and risk stratification. The same group of internists cared for the patients during their postoperative hospitalization.

All patients received venous thromboembolism prevention using previously reported chemoprophylaxis protocols.18 Hypotensive regional anesthesia using intrathecal narcotic and local anesthetic spinal injection was implemented in all cases unless contraindicated.18 All patients received intermittent pneumatic compression devices throughout their hospital stay.18 Antithrombotic stockings were placed on both legs following surgery for use throughout hospitalization.18

Patients were risk stratified by the surgeons and medical internists based on history and physical examination.18 Patients with no risk factors were categorized as low risk and were prescribed oral aspirin (325 mg once to twice daily) for 6 weeks postoperatively. Moderate-risk patients, such as those with morbid obesity, history of carcinoma, or marked venous stasis, were scheduled to receive low molecular weight heparin for 2 weeks with transition to aspirin for an additional 4 weeks. High-risk patients, such as those with previous history of thromboembolic disease or long-standing warfarin therapy preoperatively, were anticoagulated postoperatively with warfarin supplemented by a therapeutic level of low-molecular-weight heparin. Symptomatic postoperative anemia was treated by the medical internists with allogeneic blood transfusion. The outcomes of all patients were known at 90 days.

Evaluation of a venous thrombotic event was undertaken if patients demonstrated symptoms or signs of potential deep venous thrombosis (DVT) or pulmonary embolus. Screening ultrasound was not performed on asymptomatic patients.

**RESULTS**

Average patient age at surgery was 62 years (range, 37-90; SD, 10). Fifty-five percent of patients were women. Fifty-one percent of procedures involved the right knee. Osteoarthritis was the underlying diagnosis in 98.4% of the cases. Avascular necrosis of the medial femoral condyle and post-traumatic arthritis were each involved in 0.8% of the cases.

Average length of hospital stay was 1.4 days (range, 0-9; SD, 0.7). Discharge disposition was home in 96.2% of cases, with 4.8% requiring an extended-care facility. Simultaneous versus staged UKA disposition to an extended-care facility was 8.9% and 5%, respectively, a finding that did not reach statistical significance ($P > .05$).

Chemoprophylaxis with aspirin was used in the treatment of 84.4% of patients. Low-molecular-weight heparin was used in 8.7% of patients. Warfarin therapy, with or without a low-molecular-weight heparin bridge, was implemented in 4.7% of the cases. Clopidogrel was used with or without aspirin in 2.1% of patients.

Five patients (0.5%) required a transfusion postoperatively for symptomatic anemia. Three patients (0.3%) required an operative hematoma evacuation; these 3 patients were receiving warfarin with a low-molecular-weight heparin bridge, low-molecular-weight heparin alone, and aspirin alone, respectively. One patient (0.1%) developed a documented symptomatic DVT that was treated with long-term anticoagulation therapy. No patient developed symptomatic pulmonary emboli.

**DISCUSSION**

The goals of lower-extremity arthroplasty include relieving pain, restoring function, and providing a lasting clinical result while minimizing perioperative complications. We have previously reported no thromboembolic events following UKA implementing a multimodal prophylactic strategy.16 This current report analyzes a larger cohort of patients with only 1 documented case of DVT and no cases of pulmonary embolism. This supports our risk-stratification protocol for postoperative prophylaxis.

In contrast, Chan et al19 reported rates of proximal DVT, pulmonary embolism, and death secondary to pulmonary embolism to be 1.9%, 3.8%, and 0.6%, respectively, in a study comparing simultaneous bilateral to staged bilateral medial UKA during the first 30 days postoperatively. All of the thromboembolic complications occurred in the simultaneous bilateral UKA group.19 However, no chemoprophylaxis was used in the study, which might explain the difference compared to our results.

Minimal bleeding events requiring operative intervention were encountered in our series. Two of these 3 patients were receiving a more aggressive chemoprophylaxis regimen. Two of the patients had no further sequelae. One patient later developed an infection that was successfully treated with 2-stage, radical debridement with organism-specific antibiotics for 6 weeks followed by reimplantation with a TKA. Whether anticoagulation was the cause of or a potential contributor to the hematomas is not known.

The incidence of transfusion in our series is much lower than most reported in the literature on TKA. The less invasive nature of the procedure coupled with rapid
Unicompartmental knee arthroplasty has additional perioperative benefits compared to TKA. We previously demonstrated increased range of motion at discharge (77° versus 67°), decreased length of hospital stay (1.4 versus 2.2 days), greater walking distance at discharge (187 versus 137 feet), greater independence with transfers (73% versus 60%), and greater disposition to home with outpatient physical therapy (67% versus 55%) in a previous study comparing UKA to TKA, respectively. Our previously described rapid recovery program includes:

- Preoperative education and disposition planning,
- Perioperative administration of cyclooxygenase-2-inhibiting nonsteroidal medications,
- Regional anesthetics,
- Aggressive antiemetic medication administration,
- Periarticular soft tissue injections with ketorolac, epinephrine, and ropivacaine,
- Long-acting oral narcotics for 24 hours,
- Short-acting oral narcotics for breakthrough pain, and
- Aggressive early postoperative physical therapy.

Coupled with the less invasive nature of UKA compared to TKA, this multimodal rapid recovery program appears to be safe and effective for UKA patients.

**CONCLUSION**

Unicompartmental knee arthroplasty is a less invasive surgical intervention than TKA. Unicompartmental knee arthroplasty has a low postoperative transfusion risk. Using a multimodal thromboembolic prevention protocol, the rate of symptomatic DVT was 0.1% in this cohort. In addition, there were no symptomatic pulmonary embolisms and no deaths within the first 90 postoperative days. Hospital stays were short, averaging 1.4 days. This study supports the concept that UKA is a safe and effective surgery for isolated unicompartmental disease when coupled with a rapid recovery protocol and a multimodal thromboembolism prevention strategy.

**REFERENCES**


