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The Journal of Arthroplasty

journal homepage: www.arthroplastyjournal.org

Complications - Other

Deep Venous Thrombosis Prophylaxis After Unicompartmental Knee Arthroplasty: A Prospective Study on the Safety of Aspirin



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ARTICLE INFO

Article history:

Received 14 March 2016
Received in revised form
6 September 2016
Accepted 21 September 2016
Available online 28 September 2016

Keywords:

unicompartmental knee arthroplasty
DVT prophylaxis
asymptomatic and symptomatic deep
venous thrombosis
Doppler ultrasound
aspirin
complication

ABSTRACT

Background: Although venous thromboembolism is one of the leading causes of morbidity after knee arthroplasty, little data exist on the risk of deep venous thrombosis (DVT) after unicompartmental knee arthroplasty (UKA).

Methods: We prospectively enrolled 112 patients undergoing UKA to determine the incidence of DVT utilizing aspirin 325 mg twice a day (BID) for 4 weeks postoperatively as DVT prophylaxis. The data were compared with a recent randomized controlled trial of patients undergoing total knee arthroplasty utilizing aspirin and Lovenox in conjunction with pneumatic compression devices.

Results: One patient (0.9%) had an asymptomatic DVT, and none developed clinical symptoms of either DVT or pulmonary embolus. The incidence of asymptomatic and symptomatic DVT was 0.9% and 0%, respectively.

Conclusion: Our data suggest that 325 mg of aspirin BID for 4 weeks results in a very low risk of DVT for patients undergoing UKA.

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Knee arthroplasty is one of the most successful surgeries performed. Owing to the superior functional results and fast recovery, unicompartmental knee arthroplasty (UKA) is becoming an increasingly popular alternative to total knee arthroplasty (TKA) [1]. The advantages of UKA includes preservation of bone stock, decreased blood loss, quicker postoperative recovery, decreased infection rate, increased range of motion, shorter hospital stay, increased cost effectiveness, and lower complication rate [2–5].

One of the leading causes for hospital readmission after knee arthroplasty is deep venous thrombosis (DVT) and pulmonary embolism (PE) [6]. The optimal DVT prophylaxis after TKA has been

extensively studied. The overall incidence of DVT in TKA using pneumatic compression devices and aspirin was 17.8% in a recent prospective randomized trial [7]. However, there are no data on the incidence of DVT and PE after UKA.

Initial reports suggested that the incidence of DVT after UKA was within the range of data reported for TKA [5,8,9], or to be lower [10].

To the authors' knowledge, there has been no prospective trial evaluating the incidence of DVT after UKA.

This current prospective study analyzes the Doppler ultrasound incidence of asymptomatic DVT for patient undergoing UKA utilizing in-hospital pneumatic compression and postoperative aspirin 325 mg BID for 4 weeks and compares the data to a previous prospective randomized trial of patients undergoing TKA utilizing a similar DVT prophylaxis in 1 treatment arm.

Material and Methods

One hundred and twelve patients who underwent unilateral UKA at the authors' institution between June 2010 and August 2014 were included in this prospective study. There were 65 female and 47 male patients (mean age 63 years; range 37–85 years). The study

Source of Funding: This study was funded by a research grant from the Adult Reconstruction and Joint Replacement Service at the authors' institution.

One or more of the authors of this paper have disclosed potential or pertinent conflicts of interest, which may include receipt of payment, either direct or indirect, institutional support, or association with an entity in the biomedical field which may be perceived to have potential conflict of interest with this work. For full disclosure statements refer to <http://dx.doi.org/10.1016/j.arth.2016.09.018>.

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<http://dx.doi.org/10.1016/j.arth.2016.09.018>

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received approval from the institutional review board, and all patients gave written consent before enrolling into the study.

Demographic data including gender, patient age, body mass index, side of surgery, presence/absence of symptomatic DVT, development of pulmonary embolus, and hospital length of stay were collected.

Patients with preexisting coagulopathy, history of venous thromboembolic event (either DVT or pulmonary embolus), patients on anticoagulant therapy other than aspirin, and patients with a contraindication or allergy to aspirin were excluded from the study.

Patients undergoing unicompartamental knee arthroplasty received single-shot spinal anesthesia. Postoperatively, a VenaFlow (DJO, Vista, CA) pneumatic compression device was used during the hospital stay. In addition, patients received 325 mg of enteric-coated aspirin twice daily for 4 weeks, starting from the night of surgery. Ambulation with full weight bearing and physical therapy were started on the day of surgery.

All patients underwent unilateral Doppler ultrasound at their first follow-up visit performed by a designated fellowship-trained radiologist at the authors' institution. Doppler ultrasounds were performed postoperative day (POD) 1–30 in 65 patients, POD 31–90 in 46 patients, and POD 90–111 in 1 patient.

To compare the DVT rates after UKA to TKA patients, we used historic data from a randomized controlled trial comparing low molecular weight heparin and aspirin in combination with pneumatic compression devices after TKA at the authors' institution [7]. The later compared the incidence of asymptomatic DVT in patients undergoing TKA receiving either low molecular weight heparin or aspirin in combination with a pneumatic compression device.

The Fisher exact test was used to compare the present study to the historic paper. *P* values less than .05 were considered significant.

Results

One hundred and twelve patients were included in the study. All patients underwent Doppler ultrasound at their first follow-up at an average of 28.1 days (range: 9–111 days).

Patients reported a preoperative height of 167 cm (range 145–193 cm), an average weight of 81.4 kg (range 50.3–125.4 kg), and a resulting average body mass index of 28.9 kg/m² (range 20.6–45.7 kg/m²). Sixty-two patients (55%) underwent left UKA, and 50 patients (45%) right UKA. The average length of stay was 2 days (range 0–7 days).

Three patients had a pathologic Doppler ultrasound (Table 1). Only 1 patient had a DVT. In this patient, a focally occlusive thrombus within one of the paired peroneal veins was diagnosed on POD 46.

Of the remaining 2 patients, 1 had a segmental thrombosis of one of the soleus intramuscular veins (POD 13), and the other patient had a focal small segmental chronic thrombosis of one of the peroneal veins (POD 44). No patient in the study group developed clinical symptoms suggestive of DVT or PE. The incidence of asymptomatic and symptomatic DVT was 0.9% and 0%, respectively.

Table 1
Patient Demographics for Patients With and Without Evidence of Venous Thrombosis During the Postoperative Ultrasound.

Ultrasound	Number of Patients	Age (y)	BMI (kg/m ²)	Length of Stay (d)	Ultrasound at Postop Day
Deep venous thrombosis (DVT)	1	63	26.4	1	46
Superficial venous thrombosis	2	55 (range 51–58)	32.5 (range 31.9–33.1)	4.5 (range 2–7)	28.5 (range 13–44)
No DVT	109	63 (range 37–85)	28.9 (20.6–45.7)	2 (range 0–6)	28 (range 9–111)

The current results were compared to a randomized controlled trial performed at the authors' institution between September 2000 and February 2004. The study compared the incidence of asymptomatic DVT during postoperative Doppler ultrasounds in patients undergoing TKA utilizing either low-molecular-weight heparin or aspirin in combination with pneumatic compression devices. The overall DVT rate for patients on Aspirin was 17.8% (23 of 129 patients). Compared with a historic control, the incidence of DVT is significantly lower in patients undergoing UKA compared with TKA (0.9% and 17.8%, *P* < .001).

Discussion

The present study reports an overall incidence of DVT of 0.9% in patients undergoing UKA utilizing aspirin for DVT prophylaxis. There was no symptomatic DVT or PE. This study suggests that 325 mg of enteric-coated aspirin is an adequate DVT prophylaxis for patients undergoing UKA.

DVT and PE are among the major causes for readmission after joint arthroplasty [6]. Although there is an extensive body of literature on DVT prophylaxis after total knee and hip arthroplasties, there are still little data regarding the incidence of DVT and PE after unicompartamental knee arthroplasty.

Lombardi et al [11] performed a retrospective study regarding the incidence of symptomatic thromboembolic diseases after UKA (*n* = 432). Eighty-two percent of their patients received a multimodal prophylactic protocol with aspirin and pneumatic compression devices. No patient experienced a symptomatic DVT or PE. In addition, Brown et al [2] compared 2235 TKAs and 605 UKAs in a retrospective study and reported symptomatic thromboembolic events in 1.0% of the TKA patients and 0.64% of the UKA patients. Both studies suggest that the incidence of thromboembolic events after UKA is very low; however, only symptomatic DVT and PEs are reported.

The incidence of thromboembolic events in TKA is considerably higher. Song et al performed a prospective study in patients undergoing TKA using computed tomographic pulmonary angiography and lower limb venography. The authors reported that an asymptomatic and symptomatic DVT rates were 22.9% and 4.6%, respectively. The most recent prospective study regarding venous thromboembolism after TKA demonstrated an incidence of asymptomatic DVT of 18.3% and a symptomatic DVT of 4.6% [12].

Two studies were published concerning the time span between surgery and the thromboembolic event after primary TKA. White et al [13] stated that postoperative day 7 is the median time for symptomatic DVT after primary TKA. This time span is supported by a recent study of Yamaguchi et al [14] who demonstrated that the asymptomatic DVT peak on POD 4 after primary TKA.

While more aggressive DVT prophylaxis reduced the risk of DVT after TKA, there has been concern about postoperative bleeding complications with aggressive postoperative anticoagulation [15]. However, considering that the incidence of DVT after TKA without prophylaxis is as high as 88% postoperative DVT prophylaxis is recommended after TKA [16].

The combination of aspirin and pneumatic compression devices together has been shown to be effective in preventing DVT and

minimizing postoperative bleeding complications in TKA [7,17]. The present study supports the use of postoperative 325 mg of aspirin twice a day in combination with in-hospital pneumatic compression as DVT prophylaxis in patients undergoing UKA.

The present study has the following limitations: (1) postoperative Doppler ultrasound was performed between 9 and 111 days (109 patients underwent the ultrasound between 9 and 57 days), (2) the study did not have a prospective control group; however, data were compared to historic data of a prospective trial on TKA at the authors' institution, and (3) the rather low number of patients included in this study.

Conclusions

Our data suggests that UKA patients have a substantial lower risk to develop an asymptomatic or symptomatic DVT compared with patients undergoing TKA and postoperative aspirin at a dose of 325 mg BID in combination with in-hospital pneumatic compression appears to be an adequate DVT prophylaxis after UKA.

Acknowledgments

The authors thank Seth A. Jerabek, Mark P. Figgie, Michael M. Alexiades, and Edwin P. Su for enrolling patients into the present study.

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