

VENOUS THROMBOEMBOLISM PROPHYLAXIS AFTER TOTAL HIP OR KNEE ARTHROPLASTY: A SURVEY OF CANADIAN ORTHOPEDIC SURGEONS

Michael Gross, MD;*† David R. Anderson, MD;‡§ Seema Nagpal, BScPharm;†§ Bernie O'Brien, PhD¶**

OBJECTIVE: To determine the pharmacologic and physical modalities used by orthopedic surgeons in Canada to prevent venous thromboembolism (deep venous thrombosis and pulmonary embolism) after total hip or knee arthroplasty.

DESIGN: Mail survey sent to all members of the Canadian Orthopaedic Association.

SETTING: A nation-wide study.

METHODS: A total of 828 questionnaires, designed to identify the type and frequency of prophylaxis against venous thromboembolism that were used after hip and knee arthroplasty were mailed to orthopedic surgeons.

OUTCOME MEASURES: Demographic data and the frequency and type of thromboprophylaxis.

RESULTS: Of the 828 surveys mailed 445 (54%) were returned, and 397 were included in this analysis. Of the respondents, 97% used prophylaxis routinely for patients who undergo total hip or knee arthroplasty. Three of the 397 (0.8%) did not use any method of prophylaxis. Warfarin was the most common agent used (46%), followed by low-molecular-weight heparin (LMWH) (36%). Combination therapy with both mechanical and pharmacologic methods were used in 39% of patients. Objective screening tests were not frequently performed before discharge. Extended prophylaxis beyond the duration of hospitalization was used by 36% of physicians.

CONCLUSION: Prophylaxis for venous thromboembolism with warfarin or LMWH has become standard care after total hip or knee arthroplasty in Canada.

OBJECTIF : Déterminer les moyens pharmacologiques et physiques utilisés par les chirurgiens orthopédiques du Canada pour prévenir la thrombo-embolie veineuse (thrombose veineuse profonde et embolie pulmonaire) après une arthroplastie totale de la hanche ou du genou.

CONCEPTION : Questionnaire postal envoyé à tous les membres de l'Association canadienne d'orthopédie.

CONTEXTE : Étude nationale.

MÉTHODES : Au total, 828 questionnaires conçus pour définir le type et la fréquence de la prophylaxie utilisée contre la thrombo-embolie veineuse après une arthroplastie de la hanche et du genou ont été envoyés par la poste à des chirurgiens orthopédiques.

MESURES DE RÉSULTATS : Données démographiques et fréquence et type de la thromboprophylaxie.

RÉSULTATS : Des 828 questionnaires postés, 445 (54 %) ont été renvoyés et 397 ont été inclus dans la présente analyse. Parmi les répondants, 97 % ont utilisé une prophylaxie de routine dans le cas des patients qui ont subi une arthroplastie totale de la hanche ou du genou. Trois des 397 (0,8 %) n'ont utilisé aucune méthode de prophylaxie. La warfarine a été l'agent le plus souvent utilisé (46 %), suivie de l'héparine de faible poids moléculaire (HFPM) (36 %). On a utilisé une thérapie mécanique et pharmacologique combinée chez 39 % des patients. On n'a pas effectué souvent de tests de dépistage objectifs avant la libération. Une prophylaxie prolongée après l'hospitalisation a été administrée par 36 % des médecins.

CONCLUSION : La prophylaxie contre la thrombo-embolie veineuse au moyen de la warfarine ou de l'HFPM est devenue le traitement normal après une arthroplastie totale de la hanche ou du genou au Canada.

*From the *Department of Surgery, †Department of Community Health and Epidemiology, ‡Department of Medicine, Dalhousie University, Halifax, NS, the §Department of Pharmacy, Queen Elizabeth II Health Sciences Centre, Halifax, NS, the ¶Centre for Evaluation of Medicines, St. Joseph's Hospital, Hamilton, Ont., and the **Department of Clinical Epidemiology and Biostatistics, McMaster University, Hamilton, Ont.*

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Correspondence to: Dr. David R. Anderson, Division of Hematology, Queen Elizabeth II Health Sciences Centre, 432 Bethune Bldg., 1278 Tower Rd., Halifax NS B3H 2Y9

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Arthritis is a major cause of morbidity in the aging North American population. Total hip and total knee arthroplasties have greatly improved the quality of life for patients with severe disease, by providing improved mobility and relief from pain.¹ Over the past 35 years the number of arthroplasty procedures has increased steadily. According to the Institute for Clinical and Evaluative Sciences, there were over 13 000 total

hip or knee arthroplasty procedures performed in 1995 in Ontario alone.²

Deep venous thrombosis is a common complication of lower limb joint arthroplasty.^{3,4} In the absence of prophylaxis, up to 75% of patients who undergo total knee arthroplasty and 50% who undergo total hip arthroplasty will experience deep venous thrombosis demonstrated by venography.⁴ Before the routine use of prophylaxis to prevent the development

of deep venous thrombosis, pulmonary embolism was the leading cause of death after hip arthroplasty, occurring in up to 2% of patients.^{1,3,5}

Much clinical research has demonstrated the efficacy and safety of various pharmacologic and mechanical regimens for preventing venous thromboembolism after lower limb arthroplasty, and consensus guidelines have strongly advocated their use.⁴ However, whether these study results or guidelines have influenced the practice of orthopedic surgeons in Canada is unknown. The objective of this survey was to determine the methods of prophylaxis for deep venous thrombosis and pulmonary embolism after total hip or knee arthroplasty being used by orthopedic surgeons in Canada.

METHODS

A questionnaire survey was designed to determine the type and frequency of venous thromboembolism (deep venous thrombosis or pulmonary embolism) prophylaxis used by orthopedic surgeons in Canada (Fig. 1). The survey (in English or French according to surgeon preference), accompanying letter and a return envelope were distributed in August 1997 with the Canadian Orthopaedic Association (representing approximately 70% of practising orthopedic surgeons in Canada) newsletter. If a response was not received, a reminder package was sent in February 1998.

Prophylaxis or screening tests were defined as “commonly used” if reported to be used by an orthopedic surgeon in 50% or more of patients after total hip or knee arthroplasty. Descriptive statistics were used to quantify the responses.

RESULTS

Of the 828 questionnaires, 445 were returned, a 53.7% response rate. Forty-eight responses were excluded

Prophylaxis for venous thromboembolism post joint arthroplasty	
In what percentage of patients do you use prophylaxis (mechanical or pharmacological) for venous thrombosis post knee or hip arthroplasty in hospital?	_____ %
Do you prescribe prophylaxis at the time of hospital discharge post hip or knee arthroplasty? YES / NO If YES..... i) Please indicate percent	_____ %
Do you routinely order screening tests for deep vein thrombosis prior to discharging your patients from hospital following hip or knee arthroplasty? YES / NO If YES..... i) Please indicate percent	_____ %
ii) Which test? (Please check)	<input type="checkbox"/> Ultrasound <input type="checkbox"/> Venography <input type="checkbox"/> IPG
Please indicate the percentage of patients undergoing total hip or knee arthroplasty in your practice in whom you would prescribe the following methods of inpatient prophylaxis:	
a) Elastic compression stockings	_____ %
b) Intermittent pneumatic compression stockings	_____ %
c) Dextran	_____ %
d) Warfarin	_____ %
e) Subcutaneous standard heparin	_____ %
f) Low molecular weight heparin	_____ %
Which of the following products do you prescribe?	
<input type="checkbox"/> enoxaparin (Lovenox®, Rhone-Poulenc Rorer)	
<input type="checkbox"/> dalteparin/tedelparin (Fragmin®, Pharmacia & Upjohn)	
<input type="checkbox"/> tinzaparin/logiparin (Innohep®, Leo Laboratories)	
What is the approximate size of the hospital in which you practice?	
<input type="checkbox"/> Less than 250 beds	
<input type="checkbox"/> 250 -500 beds	
<input type="checkbox"/> 500-1000 beds	
<input type="checkbox"/> Greater than 1000 beds	
How many years have you been practicing orthopedics?	_____
Approximately how many joint arthroplasty operations do you perform in one year?	_____
Do you consider thrombotic complications to be a significant problem post joint arthroplasty? YES/NO	
Do you wish to receive a copy of the results of this survey? If YES, please indicate the address to which results should be sent:	YES / NO
THANK YOU	

FIG. 1. Questionnaire mailed to all members of the Canadian Orthopaedic Association to determine the pharmacologic and physical modalities used to prevent venous thromboembolism after total hip or knee arthroplasty. A French version of this questionnaire was mailed to those who requested it.

from the analysis for the following reasons: the responding surgeon did not perform total hip or knee arthroplasty ($n = 33$), the responding surgeon practised pediatric orthopedics ($n = 14$) or the questionnaire was incomplete ($n = 1$). The remaining 397 responses were included in this analysis.

The responding surgeons had been practising orthopedics for a mean (and standard deviation) of 14.7 (8.9) years and performed an average of 80 total hip or knee arthroplasty operations annually. Most worked in small (31.5%) or mid-size (45.1%) hospitals, and 83.6% considered venous thromboembolism to be a significant medical problem after joint arthroplasty (Table I).

Frequency and type of prophylaxis

Most (386 [97.2%]) respondents used some form of prophylaxis after total hip or knee arthroplasty for more than 90% of their patients; 90.2% (358) indicated use in 100% of their patients. Three (0.8%) physicians did not prescribe prophylaxis to any of their patients.

Of the respondents, 184 (46.3%) orthopedic surgeons prescribed warfarin and 141 (35.5%) prescribed low-

molecular-weight heparin (LMWH) commonly as the sole method of prophylaxis. An additional 14% of surgeons indicated that they prescribed both LMWH and warfarin to over 50% of their patients (Fig. 2). It is uncertain if these were used as a combined treatment modality or if they were used individually in patient subgroups. Enoxaparin was the most frequently used LMWH product (40%), followed by dalteparin (20%) and tinzaparin (12%). Unfractionated heparin was routinely prescribed by 3.5% and acetylsalicylic acid by 0.5% of respondents. No respondents used dextran as prophylaxis.

Mechanical methods of prophylaxis were prescribed by 40% of orthopedic surgeons, with 34% using elastic compression stockings and 15% intermittent pneumatic compression. However, only 1.5% (6 surgeons) used mechanical methods as the sole means of prophylaxis.

Approximately 40% of orthopedic surgeons continued the prophylaxis after hospital discharge in at least 50% of their patients, and 29% continued prophylaxis in all of their patients.

Screening for deep venous thrombosis

Most surgeons (86% [333 respondents]) did not commonly perform screening tests for deep venous thrombosis after total hip or knee arthroplasty before discharge from the hospital. Of those who did screen at least 50% of their patients, ultrasonography was used most commonly (by 13% [53] of orthopedic surgeons), whereas venography was performed by 1% (4) of surgeons, and 1.5% (6) of surgeons performed both tests routinely. One respondent did not indicate the type of screening test performed. None of the respondents performed screening impedance plethysmography.

DISCUSSION

The results of our study indicate that prophylaxis is commonly prescribed to prevent deep venous thrombosis after total hip or knee arthroplasty by orthopedic surgeons in Canada. Over 97% of surgeons re-

Table I

Characteristics Related to Surgeons From the Canadian Orthopaedic Association Who Responded to a Questionnaire About the Use of Prophylaxis for Venous Thromboembolism After Total Lower Limb Arthroplasty

Characteristic	Response
No. of beds in respondents' hospital, % of respondents	
< 250	31.5
251-500	45.1
501-1000	19.9
> 1000	2.0
Years practising orthopedics, mean (and SD)	14.7 (8.9)
Lower limb arthroplasty procedures/yr, mean (and SD)	80 (64)

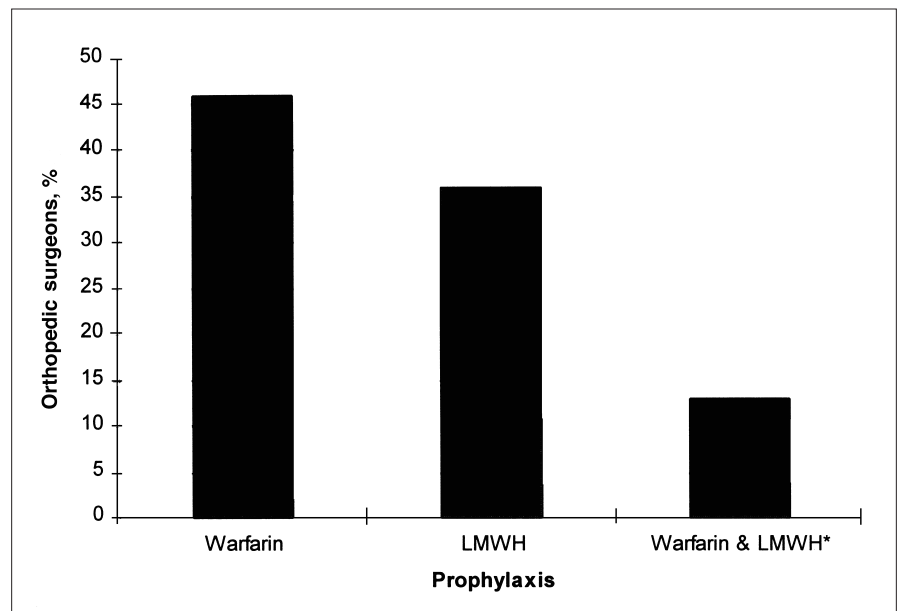


FIG. 2. Patterns of inpatient prophylaxis after total hip or knee arthroplasty. *Indicates that orthopedic surgeons prescribed both low-molecular-weight heparin (LMWH) and warfarin in 50% or more of their patients.

ported that they routinely used one or more methods of prophylaxis: warfarin alone by 46% and LMWH alone by 36%. In addition, 14% of surgeons reported they used both agents. Very few surgeons reported that they used unfractionated heparin or acetylsalicylic acid prophylaxis. Mechanical methods were frequently used for deep venous thrombosis prophylaxis, particularly elastic compression stockings. However, less than 2% of surgeons indicated that they used mechanical techniques as the sole method.

The questionnaire did not ask surgeons to distinguish if they used different methods in combination for the same patient or independently in subgroups of patients (hip versus knee arthroplasty patients, or patients at high risk for thromboembolism). We speculate that surgeons who commonly used both LMWH and warfarin may give the former to knee arthroplasty patients and the latter to hip arthroplasty patients in accordance with some guidelines.⁴ However, a recent study suggested that warfarin was equally effective for preventing symptomatic venous thromboembolic complications after either total hip or knee arthroplasty.⁶

Over 36% of surgeons commonly prescribed prophylaxis upon discharge from hospital. This practice is supported by data from recent randomized controlled trials, which have demonstrated that extending prophylaxis for 21 days beyond hospitalization reduced the rate of venographically confirmed deep venous thrombosis.⁷⁻⁹ Extending prophylaxis to at least 7 days postoperatively is endorsed by the American College of Chest Physicians; thus, prescribing prophylaxis upon hospital discharge may be becoming a greater consideration as the length of hospitalization for total hip or knee arthroplasty declines.¹⁰

Our study is consistent with a recent survey of American orthopedic surgeons, which indicated that 89% to

92% of all patients who undergo total hip or knee arthroplasty receive some method of deep venous thrombosis prophylaxis and only 3% to 5% of surgeons do not prescribe any prophylaxis for their patients.¹¹ However, surveys involving surgeons in the United Kingdom and New Zealand have reported only 10% and 37%, respectively, of orthopedists routinely prescribe prophylaxis after total hip or knee arthroplasty.¹²⁻¹⁵ There are clear differences in opinion regarding the benefits and risks of antithrombotic prophylaxis among orthopedic surgeons around the world.^{16,17}

Most surgeons do not routinely perform screening tests for deep venous thrombosis after total hip or knee arthroplasty. A recent study demonstrated that performing bilateral ultrasonography to detect asymptomatic proximal deep venous thrombosis was of no benefit in preventing subsequent symptomatic venous thromboembolic complications.⁶

There are limitations to our study. Surveyed members of the Canadian Orthopaedic Association constitute only about 70% of practising orthopedic surgeons in Canada. It is possible that this group may not be entirely representative of surgeons performing joint arthroplasty in this country. In addition, only 54% of surgeons responded to the survey, so our results may overestimate the use of prophylaxis. The orthopedic surgeons who responded may have been more likely to consider venous thromboembolism a significant problem. However, it is also likely that some of the nonrespondents do not perform total hip or knee arthroplasty.

Recently, prophylaxis studies have demonstrated that the rate of symptomatic venous thromboembolic complications after total hip or knee arthroplasty was far less than that reported in clinical trials using venography to detect asymptomatic disease.^{4,6,18} Only 1% to 4% of patients

receiving effective prophylaxis after total hip or knee arthroplasty had symptomatic venous thromboembolic complications in the 3-month postoperative period.^{6,18} Improvements in surgical technique and perioperative orthopedic management may have reduced the rate of venous thromboembolic complications independently of prophylaxis.

CONCLUSIONS

The results of this survey indicate that most orthopedic surgeons in Canada use prophylaxis for patients requiring total hip or knee arthroplasty and they believe that venous thromboembolism is a significant problem. Warfarin was the most commonly prescribed regimen followed by LMWH. Variation existed regarding the duration of prophylaxis with over one-third of surgeons routinely extending prophylaxis beyond the time of hospital discharge.

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