

# Compliance of Dutch orthopedic departments with national guidelines on thromboprophylaxis

## A survey of Dutch orthopedic thromboprophylaxis

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**ABSTRACT** All 110 Dutch orthopedic departments were sent a survey on perioperative thromboprophylaxis protocols, and 79% responded. After hip and knee replacements, all used pharmacological thromboprophylaxis: a low-molecular weight heparin (LMWH) in 87% of departments, which was most often combined with vitamin K antagonists (VKAs). LMWH was usually started preoperatively (91%). After discharge, VKAs were mostly prescribed (79%) for at least 6 weeks, and often for 3 months. 17% of departments used LMWH for 6 weeks, whereas in only 3% no post-discharge prophylaxis was given.

In day-care surgery, including arthroscopies, 58% use LMWH and in short-stay surgery 80% administer LMWH during the hospital stay. Because of lack of conclusive evidence for day-care surgery, the national guidelines cannot support pharmacological prophylaxis in this setting.

In general, Dutch orthopedic departments comply poorly with the national guidelines on extended thromboprophylaxis for hip and knee replacement surgery, which recommends postoperative LMWH for 6 weeks. They are divided in the use of pharmacological prophylaxis in day-care surgery.

prophylactic measures. Deep vein thrombosis, objectively confirmed by venography, occurs in 45–57% of patients following hip replacement and in 40–84% following knee replacement, with incidences of fatal pulmonary embolism of 0.1–0.4% and 0.2–0.7%, respectively (Geerts et al. 2001). Thromboprophylaxis aims to reduce this morbidity and mortality. Current pharmacological regimens reduce the risk of venous thromboembolic events (VTEs) by 24–70% (Geerts et al. 2001).

Even though national guidelines have been developed in the Netherlands regarding thromboprophylaxis (Buller et al. 2000), we were under the impression that they are not widely adopted. The DATA (Dutch Antithrombotic Treatment for Arthroplasties) survey was designed to review the compliance with national guidelines and scientific evidence, and also to obtain information about current practice patterns in the Netherlands. For this survey, we focused mainly on hip and knee arthroplasties and additional questions were asked regarding day-care, short-stay, and surgeons' opinions. Since practice guidelines are usually formulated in each hospital, we conducted our survey among all departments of orthopedic surgery, rather than directing it to individual surgeons.

Venous thromboembolic disease is the most common reason for postoperative readmission after elective major orthopedic surgery without

Thromboprophylactic regimens used after arthroplasties of the hip and knee in the orthopedic departments studied. All figures are percentages

	Until discharge	During admission and extended thromboprophylaxis			
	LMWH	LMWH	LMWH VKA and VKA <sup>a</sup>	VKA	Aspirin
THA primary	2	17	68	12	1
THA revision	2	16	67	14	1
HA hemi	9	15	63	12	1
TKA primary	2	20	65	12	1
TKA revision	2	19	65	13	1
KA hemi	4	8	75	13	–
Average	3	17	67	12	1

<sup>a</sup> LMWH until adequate INR is reached.

THA: total hip arthroplasty; HA hemi: hemi-arthroplasty of the hip; TKA: total knee arthroplasty; KA hemi: hemi-arthroplasty of the knee.

## Methods

A questionnaire on orthopedic departmental protocols for perioperative thromboprophylactic measures intended to prevent VTEs after surgery (8 pages with 27 questions and sub-questions) was sent to all Dutch orthopedic departments. We asked about: practice profile, case mix, and current choice, initiation and duration of thromboprophylaxis after several orthopedic procedures. In addition, surgeons were asked for their reaction to a selection of short statements.

We sent all Dutch orthopedic departments a package with the questionnaire, a personalized cover letter, and a stamped return envelope. All non-respondents were mailed a duplicate package with a new cover letter after 3 months. The non-respondents who still did not answer each received another package with a personalized cover letter and were telephoned if necessary. Collection of data started at the beginning of 2002 and ended August 2004. Categorical data and dichotomous variables were summarized as percentages of the responding departments.

## Results

All 110 departments, located in 126 hospitals, in the Netherlands were sent the questionnaire and 82 (75%) of those responded after the first reminder. Of the non-respondents, 5 more finally responded.

In total, we analyzed 87 (79%) properly completed forms. Together, these departments represent 347 orthopedic surgeons. Two respondents stated that protocols varied marginally between surgeons within the one department. For the other departments, the protocols were followed by all surgeons.

On average, the departments consisted of 4 (11–2) orthopedic surgeons. Each department performed an average of 190 (30–450) primary hip arthroplasties and 76 (0–150) primary total knee replacements, 56 and 24, respectively, per surgeon who performed the specific procedure. The setting is academic in 8% of departments and 20% are affiliated to a medical school.

All departments used pharmacological thromboprophylaxis during hospital admission after hip and knee arthroplasties (Table). Low-molecular weight heparin (LMWH) alone was given only until discharge in 3% of departments and also after discharge in 17%. LMWH combined with a vitamin K antagonist (VKA), generally acenocoumarol, was given in 67%. 12% of the departments gave a VKA alone, and 1% used aspirin. The first dose of LMWH was given the day before surgery in 62%, preoperatively in 29% and postoperatively in 9% of departments. VKA was started the day before operation in 24%, on the day of the operation in 36%, on the day after the operation in 28%, or later in 12%. These data do not differ for the various kinds of arthroplasty.

Of all departments, 97% also used extended out-of-hospital thromboprophylaxis. The exceptions were two departments that only used LMWH during admission for all their arthroplasties of the hip and knee, and 7 departments that prescribed LMWH only during admission with hemi-arthroplasty of the hip. LMWH was used for prolonged prophylaxis in 17% of departments and continued until 5–6 weeks after the operation. VKAs were used in 79%: in 67% of the departments combined with LMWH during the hospital stay until a predefined range of international normalized ratio (INR) was reached with a median of 2.5. Post-discharge, VKAs were prescribed for 6 weeks, 2 months or 3 months in 24%, 11% and 65% of departments, respectively. One department used aspirin for 6 weeks.

The standard dose of LMWH was increased for obese patients in 52% of departments, for patients with a history of deep vein thrombosis or pulmonary embolus in 43% of departments, for patients with malignancy in 7%, and was never increased in 27%. Different kinds of LMWH are administered: nadroparin (70%), dalteparin (20%), enoxaparin (6%), and tinzaparin (4%). 98% and 96% of respondents stated that for all primary cemented, uncemented and hybrid prostheses, they applied the same protocol for the hip, and for the total knee and hemi-knee, respectively.

In addition to pharmacological prophylaxis, some hospitals used mechanical prophylactic devices. Elastic stockings were used after total hip arthroplasty in 20% of departments and after knee arthroplasty in 11% of departments. Intermittent pneumatic compression after primary and revision knee arthroplasties was used in only 2 departments.

For day-care surgery, including arthroscopy, a regimen of no pharmacological prophylaxis was used in 40% of departments whereas in 58%, one or two injections of LMWH were administered. One department administered an LMWH for 1 week after day-care surgery and another department prescribed VKAs for 6 weeks following arthroscopy. In short-stay surgery, 16% of the departments prescribed no pharmacological prophylaxis, 80% administered an LMWH and 4% used some other modality.

57% considered thromboprophylaxis to be a substantial contributor to complications after surgery

i.e. increased blood loss. For 70% of departments, the use of aspirin (80 mg) until the day of operation was a reason for postponement of elective surgery and in a few cases spinal anesthesia was avoided. The use of non-steroid anti-inflammatory drugs at admission was a good enough reason for 30% of the respondents to take similar postponement measures.

## Discussion

Our survey reveals that there remains a wide variation amongst Dutch orthopedic surgeons concerning perioperative thromboprophylaxis.

The Dutch national guidelines advise thromboprophylaxis with an LMWH for a period of 6 weeks after major orthopedic surgery of the hip and knee, and VKAs are only considered an alternative (Buller et al. 2000). These guidelines are only partly followed. During a hospital stay, low-molecular weight heparin is most frequently used (87%), but this is mostly combined with a VKA for out-of-hospital prophylaxis. Only 17% of departments follow the national guidelines and employ LMWH for a period of 6 weeks. We believe that these results are representative, with the high survey response limiting non-responder bias.

A number of meta-analyses and pooled comparisons studying various prophylaxis regimens during the hospital stay have concluded that LMWH is more effective than other pharmacological modalities such as VKAs, aspirin and low-dose unfractionated heparin, although differences are generally small (Alikhan and Cohen 2001, Brookenthal et al. 2001, Geerts et al. 2001).

Nearly all Dutch orthopedic departments (97%) use some form of extended pharmacological thromboprophylaxis. A meta-analysis has shown a favorable effect of LMWH, with a reduction of total thrombosis after hip and knee arthroplasties from 19% to 9.4% when compared to placebo or no prophylaxis after 30–42 days (Eikelboom et al. 2001). There are considerably less data concerning VKAs in prolonged prophylaxis. One recent study has shown a reduction in VTEs of 5.1–0.5% with four weeks of VKAs as compared to no treatment after discharge (Prandoni et al. 2002). Another study found comparable results with either LMWHs or

VKAs (Samama et al. 2002). When using VKAs, the majority of the respondents in our study continue prophylaxis for a period of 3 months (64%). There is, however, no conclusive evidence in the literature regarding the optimal postoperative treatment period. Some studies, however, have shown that the increased risk of thrombosis is prolonged for at least 2 months after surgery (Pellegrini Jr. et al. 1996, White et al. 1998).

Our study shows that LMWH is generally started preoperatively in the Netherlands. This is in accordance with the standard regime in Europe, and contrasts with the situation in North America where the initial dose is generally administered postoperatively (Geerts et al. 2001). The reason for a preoperative start is that it is believed that the surgical procedure itself is the primary initiator of the thrombotic process. Concerns about bleeding and the interference with regional anesthesia are the main reasons for a postoperative initiation. Two meta-analyses have been published recently which address this issue. One study did not find evidence that a preoperative start is more effective than a postoperative initiation, nor did it find evidence for increased major bleeding in either group. A perioperative regimen is more effective, but this is counterbalanced by a marked increase in the risk of major bleeding in comparison with a preoperative or postoperative regimen (Strebel et al. 2002). The results of another meta-analysis have supported these findings in general (Hull et al. 2001).

There is a variation in patterns of practice for the initial administration of VKAs. Studies have shown that even with early initiation of therapy, the INR does not reach the target range until the third postoperative day (Francis et al. 1996, Heit et al. 1997). This, however, is less relevant in the present study since VKAs are generally intended for prolonged out-of-hospital prophylaxis, and are therefore combined with LMWH until an adequate INR is reached, a regimen which to our knowledge has not been evaluated in literature.

Although favorable results have been reported in a number of studies with intermittent pneumatic compression (Bailey et al. 1991, Francis et al. 1992), it is seldom used in the Netherlands. Elastic stockings are used, predominantly after hip replacement surgery, but only as an adjunct to a pharmacological regimen.

There have been a few studies, with only small numbers of patients, evaluating the risk of deep vein thrombosis in the day-care surgery. Without thromboprophylaxis after arthroscopy of the knee, incidences of symptomatic and asymptomatic deep vein thrombosis, confirmed by venography, range from 4.2% to 18% (Hoppener et al. 2003). The respondents in our study mainly used an LMWH once a day following short-stay surgery. The Dutch national guidelines state that there is no evidence to justify a single dose of LMWH in the day-care surgery. This appears to have been followed by 40% of the respondents.

Several studies investigating practice regarding orthopedic thromboprophylaxis have been published from the United States (Mesko et al. 2001), Canada (Gross et al. 1999), the UK (Francis and Brenkel 1997), Sweden (Bergqvist 1985), and Australia and New Zealand (Rodgers et al. 1994). A wide variation in regimens is common in all these studies; unfortunately, it is not known how this reflects on the incidence of VTE. Although the rather recent publication of some of these studies may allow an adequate comparison, practice in our study differ in as far as about 97% appeared to use extended prophylaxis with a relatively long continuation. Moreover, the combination of LMWHs and VKAs during hospitalization is employed only infrequently in other countries. Another difference is the absence of use of aspirin and adjusted-dose unfractionated heparin by Dutch orthopedic departments.

Thromboembolism after hip and knee arthroplasty is standard in the Netherlands during admission, as well as for prolonged out-of-hospital prophylaxis. In general, Dutch orthopedic departments do not, however, comply with national guidelines for thromboprophylaxis as regards hip and knee replacement surgery, which recommends postoperative LMWH for 6 weeks. The popular protocol in the Netherlands of 3 months of VKAs has only recently found some support in the literature. For day-care and short-stay surgery, there is no conclusive evidence in the literature to justify it, but contrary to the national guidelines, administering a single dose of LMWH in the day-care surgery has remained popular. New Dutch guidelines on thromboprophylaxis are currently being developed, and clear and updated recommendations may possibly result in better compliance.

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