The necessity of pharmacological prophylaxis against venous thromboembolism in major joint arthroplasty

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Abstract

Purpose Venous thromboembolism (VTE) is a recognised post-operative complication of major lower limb joint arthroplasty. Current National Institute for Health and Clinical Excellence (NICE) guidelines suggest the use of both mechanical and pharmacological prophylaxis following hip and knee replacement. Since the introduction of enhanced recovery programmes following hip and knee arthroplasty the requirement for routine pharmacological VTE prophylaxis has been questioned. The purpose of this study was to assess the efficacy of pharmacological prophylaxis against symptomatic VTE in patients undergoing hip and knee arthroplasty under an enhanced recovery programme.

Methods Symptomatic VTE incidence was audited in 1,100 patients undergoing primary or revision total hip or knee arthroplasty at the same hospital with only mechanical prophylaxis from 2007 to 2009. Following addition of chemical prophylaxis (enoxaparin) symptomatic VTE incidence in 522 patients undergoing primary or revision total hip or knee arthroplasty from 2011 to 2012 was re-audited.

Results In the mechanical prophylaxis group incidence of DVT was 0.73 % [95 % confidence interval (CI) 0.37–1.43 %] and incidence of pulmonary embolism (PE) 0.91 % (95 % CI 0.49–1.67 %). Following addition of pharmacological prophylaxis incidence of DVT was 0.57 % (95 % CI 0.20–1.68 %) and incidence of PE 1.15 % (95 % CI 0.53–2.48 %).

Conclusions We found no statistically significant difference in symptomatic VTE incidence following the addition of enoxaparin. We question whether routine pharmacological prophylaxis still has a role following total hip and knee arthroplasty. Peri-operative optimisation, including post-operative analgesia and mobility, with current enhanced recovery programmes may be sufficient. As anticoagulants carry increased risk of post-

operative bleeding and wound ooze, in addition to significant cost implications, their role remains controversial.

Keywords Pharmacological prophylaxis · DVT · Enoxaparin · Joint arthroplasty · Mechanical prophylaxis

Introduction

Patients undergoing major lower limb joint arthroplasty are at risk of developing deep venous thrombosis (DVT) and pulmonary emboli (PE) in the post-operative period [1, 2]. Appropriate and effective prophylaxis against venous thromboembolism (VTE) is required following total hip and knee arthroplasty, while minimising adverse risks such as bleeding and infection [3].

Current National Institute for Health and Clinical Excellence (NICE) guidelines suggest the use of both mechanical and pharmacological prophylaxis following hip or knee arthroplasty, provided there are no contraindications. Following elective hip replacement, pharmacological prophylaxis should be offered post-op and continued for 28–35 days. Following elective knee replacement, pharmacological prophylaxis should be offered and continued for ten to 14 days [3].

Today with better pain management, mechanical VTE prophylaxis, early mobilisation in the post-operative period and shorter hospital stays, some have questioned whether routine pharmacological prophylaxis is necessary [4–8]. The aim of this study is to assess the effect of routine low molecular weight heparin (LMWH) following hip or knee arthroplasty on symptomatic VTE incidence.

Method

This retrospective study included 1,100 patients between 2007 and 2009, and 522 patients during 2011, undergoing primary or revision total hip or knee replacements at the same hospital. The

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average ages of the cohorts were 69 and 70 years old, respectively. Between 2007 and 2009, the VTE prophylaxis regime at this hospital included only mechanical prophylaxis with intermittent compression devices, thromboembolic deterrent (TED) stockings and early immobilisation post-operatively. In 2011, a routine course of subcutaneous LMWH post-operatively was added to the VTE regimen in accordance with NICE guidelines. Patients undergoing total hip replacements received LMWH for 28 days post-operatively, and patients undergoing total knee replacements received 14 days of LMWH post-operatively. All patients received the same treatment regardless of VTE risk.

The list of patients was generated by the audit department from discharge coding. All patients except those already receiving warfarin therapy were included. This included patients with classic risk factors for VTE such as malignancy, obesity and ischaemic heart disease. Radiology archiving systems at our hospital, and four other hospitals within the catchment area, were searched for investigations performed in these patients for VTE symptoms. All confirmed PEs and above knee DVTs within six months post-operatively were recorded as positive VTE events. Routine screening for VTE was not used in this study; only symptomatic VTE was investigated.

Results

Between 2007 and 2009, without pharmacological VTE prophylaxis, eight of 1,100 patients [0.73 %; 95 % confidence interval (CI) 0.37–1.43 %] developed symptomatic above knee DVT, and ten of 1,100 patients (0.91 %; 95 % CI 0.49–1.67 %) developed symptomatic PE. During 2011, with the addition of pharmacological VTE prophylaxis, three of 522 patients (0.57 %; 95 % CI 0.20–1.68 %) developed symptomatic above knee DVT, and six of 522 patients (1.15 %; 95 % CI 0.53–2.48 %) developed symptomatic PE.

Mechanical prophylaxis & early immobilisation only				Mechanical prophylaxis, early immobilisation & pharmacological prophylaxis			
2007–2009				2011			
Hips	587			Hips	265		
Knees	513			Knees	257		
Total	1100			Total	522		
95 % CI				95 % CI			
DVT incidence	8	0.73 %	0.37–1.43 %	DVT incidence	3	0.57 %	0.20–1.68 %
PE incidence	10	0.91 %	0.49–1.67 %	PE incidence	6	1.15 %	0.53–2.48 %

Discussion

Whilst the results of our study question the role of enoxaparin following hip and knee arthroplasty, we accept there are several

limitations to our study. Given the low incidence of VTE, our sample size may not be sufficiently large enough to show a statistically significant difference in VTE incidence post introduction of enoxaparin. Routine screening for VTE was not used, and only symptomatic VTE was investigated. We can therefore not be certain of the true VTE incidence, however argue that the majority of clinically significant VTE would have been investigated. Our study did not take into account subjects that may have been investigated for VTE outside the catchment area. Finally, we did not record events of adverse bleeding.

Various other chemical agents have also been recommended by NICE, including dabigatran and rivaroxaban [3]. A recent systematic review and meta-analysis concluded that the risk of symptomatic VTE was lower with rivaroxaban [relative risk (RR) 0.48; 95 % CI 0.31–0.75] and similar with dabigatran, when compared with enoxaparin. However, the RR of clinically relevant bleeding was higher with rivaroxaban (RR 1.25; 95 % CI 1.05–1.49) and similar with dabigatran (RR 1.12; 95 % CI 0.94–1.35) [9]. These figures suggest that chemical agents with a greater efficacy in VTE prophylaxis come at the cost of a higher risk of bleeding [9–11]. Rivaroxaban may also be more cost-effective than enoxaparin, with a 30-day course of 10 mg rivaroxaban costing £63.00, compared with £121.20 for a 30-day course of 40 mg enoxaparin [12].

The perfect chemical agent for VTE prophylaxis does not exist, and the idea of nullifying both VTE risk and risk of bleeding seems implausible. VTE risk will always be present and post-operative VTE should never be classified as a never event. We may be at the point of diminishing returns in the development of chemical VTE prophylaxis agents, and instead we suggest focusing attention on safer prophylaxis methods, such as compliance with mechanical prophylaxis, post-operative exercise regimes and analgesia [13]. Some studies have suggested that the use of regional rather than general anaesthesia may also reduce VTE incidence. A careful balance between benefit and risk needs to be considered when using chemical prophylaxis agents, and our study suggests that mechanical prophylaxis and early immobilisation may be sufficient.

Conclusion

The results of this study suggest that the addition of pharmacological prophylaxis with subcutaneous enoxaparin to a VTE prophylaxis regimen already including mechanical prophylaxis and early post-operative mobilisation has no statistically significant effect on VTE incidence. We suggest that mechanical prophylaxis and early mobilisation may be sufficient following hip and knee arthroplasty, although the constituents of an optimal prophylaxis regimen remain controversial. We believe further multi-centre studies looking at optimisation of

other peri-operative factors, as suggested above, rather than choice of anticoagulant, will lead to safer reductions in VTE incidence.

Conflict of interest The authors declare that they have no conflict of interest.

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