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Venous thromboembolism incidence in upper limb orthopedic surgery: do these procedures increase venous thromboembolism risk?

Graham R. Hastie, BMedSci (Hons), BMBS[a,*], Amanda Pederson[b], Daniel Redfern, MBBS[a]

[a]*Department of Trauma and Orthopaedic Surgery, Lancashire Teaching Hospitals NHS Trust, Royal Preston Hospital, Preston, Lancashire, UK*
[b]*Manchester Medical School, The University of Manchester, Manchester, UK*

Background: In 2005, the House of Commons (HoC) Health Committee stated deaths attributed to preventable, hospital-acquired venous thromboembolism (VTE) numbered upwards of 25,000 per annum. Nationwide prevention of VTE became the topic of a major health campaign. The HoC Health Committee stated there was an unstratified VTE risk of between 45% and 51% associated with orthopedic surgery. VTE research in orthopedic surgery has been concentrated on lower limb procedures. Experience suggests that this kind of relation does not hold true for upper limb orthopedic procedures. This project aimed to estimate the incidence of postoperative VTE in upper limb orthopedic surgery.

Methods: The incidence of postoperative VTE was assessed in 3357 consecutive upper limb orthopedic operations performed by 4 surgeons in Lancashire Teaching Hospitals National Health Service (NHS) Trust (LTHTR) between July 1, 2009, and July 31, 2012.

Results: Four pulmonary embolisms and 2 deep vein thromboses occurred. Incidence of postoperative VTE was 0.0018%, significantly lower than rates reported in the literature. Five of 6 patients who developed a VTE reported a personal or family history of VTE. Three patients would not have been identified as at risk under the current VTE screening guidelines. Three of these patients received appropriate anticoagulation according to present guidelines, yet VTE events still occurred.

Conclusion: These results indicate VTE risk in orthopedic upper limb surgery is much lower than reported in the literature. The necessity for screening for VTE in upper limb surgery is contested. The efficacy of VTE screening and current VTE prophylaxis is discussed, and an alternative and much simplified method of screening is suggested.

Level of evidence: Level IV, Case Series, Treatment Study.

Keywords: DVT; PE; upper limb surgery; prophylaxis

Venous thromboembolism (VTE) is an umbrella term used to conflate 2 pathologies; typically, deep venous thrombosis (DVT) and its more serious and much rarer pathologic relation, pulmonary embolus (PE). The

*Reprint requests: Graham R. Hastie, BMedSci (Hons), BMBS, Department of Trauma and Orthopaedic Surgery, Lancashire Teaching Hospitals NHS Trust, Royal Preston Hospital, Preston, Lancashire, PR2 9HT, UK.

E-mail address: grhastie@doctors.org.uk (G.R. Hastie).

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unhelpful effect of this misnomer is regularly demonstrated throughout the professional literature and perhaps most seriously in the House of Commons (HoC) Health Care Committee report of 2005. The introduction of this document states that PE after DVT in hospitalized patients causes between 25,000 and 32,000 deaths each year in the United Kingdom. This figure defies credence because it exceeds the total of deaths from breast cancer, AIDS, and traffic accidents combined. It is more than 2.5 times greater than the 9554 annual deaths rightly or wrongly attributed to methicillin-resistant *Staphyloncus aureus* and more than 5 times the total of all hospital-acquired infections.[5]

The document goes further and states, "more alarming than the scale of the problem was the fact that VTE in hospitalised patients was largely preventable through the use thromboprophylaxis during the patient's hospital stay and occasionally continuing after discharge."[5] Although it may be true that prophylaxis reduces DVT and, therefore VTE, it is less likely to be true for PE, and there is little evidence to support the extension of this assertion that thromboprophylaxis reduces death rates in trauma and orthopedic surgery.

The overwhelming majority of research into VTE rates and orthopedic surgery is in lower limb surgery, and it has long been known that lower limb surgery significantly increases the risk of DVT. On that basis, patient screening and the use of thromboprophylaxis is generally considered appropriate.[7] Literature shows the rates vary but fall within the range of 25% to 67% after hip and knee surgery.[2,13]

Some authors have shown that the use of thromboprophylaxis reduces the rates of DVT and PE after hip and knee surgery, and several types of thromboprophylaxis have been recommended for patients undergoing total hip or knee replacement,[14,15] including antiplatelet drugs,[8] intermittent pneumatic compression of the leg,[6] oral anticoagulants,[4,8] and low-molecular-weight heparin (LMWH).[1] Because of the high risk of VTE events in this type of surgery and the relatively safe reduction of risk from providing anticoagulation, National Institute of Clinical Excellence (NICE) guidance encourages its use.[11] There is, however, evidence to the contrary suggesting that there is little evidence that thromboprophylaxis prevents death and certainly none to support the HoC Health Committee's implication that thousands of deaths could be prevented annually.[10]

This high level of VTE risk has not yet been demonstrated in upper limb surgery, with most of the research from retrospective studies or case reports. Some authors have suggested that DVT rates after shoulder replacement are comparable to those after hip replacement.[16] Alternatively, a recent comprehensive review of the literature suggested rates were as low as 0.26% to 0.64%, depending on the upper limb procedure performed.[3]

The reason for this possible reduction in VTE rates may be that unlike lower limb operations, upper limb orthopedic surgery tends to be less associated with a significant reduction in mobility, one the features of Virchow's triad. The procedures also tend to be shorter and less traumatic, with no surgical involvement of the lower limb deep veins.

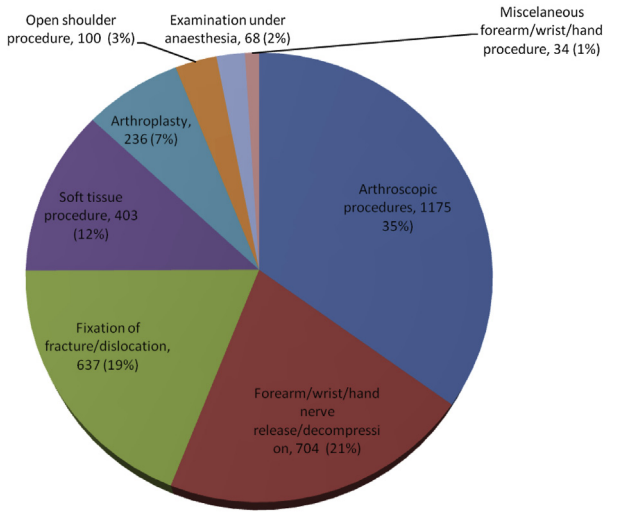

Figure 1 Breakdown of different surgical procedures.

Perhaps due to the lack of plausible evidence, NICE has shown considerable reluctance to give definitive guidance for VTE prophylaxis for upper limb procedures. NICE does not recommend routine thromboprophylaxis for patients undergoing upper limb surgery, but puts the onus back on clinicians, advising that patients considered at high risk of VTE be given mechanical prophylaxis on admission and prescribed chemical prophylaxis postoperatively, after discussion of the risks with the patient.[11]

A proper large-scale analysis of the risk of VTE in elective upper limb surgery is long overdue. This study starts by determining the rate of postoperative VTE (stratified into PE and DVT) within all upper limb procedures performed at a large teaching hospital.

Methods

A complete data set of operations has been retained within the Orthopedic Department at Lancashire Teaching Hospitals NHS Trust using Bluespier (Worcestershire, UK). The period identified for study was between July 1, 2009, and July 31, 2012. For each of the 4 upper limb consultants, a search was performed using the codes for all upper limb procedures performed. Exclusions included operations coded as an emergency procedure, patients younger than 18 years, and procedures such as injections. Emergency procedures were excluded because part of the study design was to look at the utility of current VTE screening and prophylactic measures; moreover, these patients might experience several operations within a very short interval.

Each operation was considered a separate event, because several patients underwent more than 1 operation between July 2009 and July 2012. This generated a list of 3357 events to be included in the study. Patient records where then compared with the radiology database to determine if the patient had been