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Omitting pre-operative coagulation screening tests in hip fracture patients: Stopping the financial cascade?

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ABSTRACT

Background: Coagulation screening continues as a standard of care in many hip fracture pathways despite the 2011 guidelines from the Association of Anaesthetists of Great Britain and Ireland (AAGBI) which recommend that such screening be performed only if clinically indicated. This study aims to evaluate the use of pre-operative coagulation screening and explore its financial impact.
Methods: Prospective data was collected in accordance with the "Standardised Audit of Hip Fractures in Europe" (SAHFE) protocol. All patients admitted to our hospital with hip fractures during a 12-month period from November 2011 to November 2012 were analysed. Data including coagulation results and the use of vitamin K or blood products were collected retrospectively from the hospital computer system. Patient subgroup analysis was performed for intraoperative blood loss, post-operative blood units transfused, haematoma formation and gastrointestinal haemorrhage.
Results: 814 hip fractures were analysed. 91.4% ($n = 744$) had coagulation tests performed and 22.0% ($n = 164$) had an abnormal result. Of these, 55 patients were taking warfarin leaving 109 patients who had abnormal results and were not taking warfarin. When this group ($n = 109$) was compared to those who had normal test results ($n = 580$) and to all other patients ($n = 705$) there was no difference in intraoperative blood loss ($p = 0.79$, 0.78), postoperative transfusion ($p = 0.38$, 0.30), postoperative haematoma formation ($p = 0.79$, 1.00), or gastrointestinal haemorrhage ($p = 0.45$, 1.00), respectively. In those who were not taking warfarin, but had abnormal results, none had treatment to reverse their coagulopathy with either vitamin K or blood products. By omitting pre-operative coagulation tests in patients who are not taking warfarin, we estimate a financial saving of between £66,500 and £432,250 per annum.
Conclusions: This study supports the hypothesis that routine pre-operative coagulation screening is unnecessary in hip fracture patients unless they take warfarin or have a known coagulopathy. Moreover, its omission represents significant cost-saving potential.

Introduction

Comprehensive pre-operative assessment of hip fracture patients is an essential part of care [1]. Intra-operative bleeding impacts upon medical complications and length of hospital stay [2] and is associated with poor functional outcome after hip fracture surgery [3]. It is, therefore, extremely important to attempt to attenuate this risk by identifying those who are most at risk of bleeding at a pre-operative stage.

Coagulation tests continue to be included in 'fast track' pathways [4] for patients with hip fractures in hospitals throughout the United Kingdom despite recommendations from the AAGBI in their 2011 guideline on the management of proximal femoral fractures, that coagulation screening be performed only if clinically indicated [5]. National Institute for Clinical Excellence and British Orthopaedic Association guidelines suggest that all correctable comorbidities, including anticoagulation, should be identified and treated immediately so that surgery is not delayed but both have no specific guidance on coagulation tests [6,7].

Rohrer et al. [8] investigated coagulation tests in general and vascular surgery patients. They found that all of the clinically significant coagulopathies discovered were in the group who had a positive indication for the test after history and examination (including a detailed coagulation questionnaire). They concluded that if coagulopathy is not suspected, pre-operative screening tests for coagulopathy are unnecessary [8]. The importance of a

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comprehensive bleeding history has been further demonstrated in several studies where a positive history was noted to correlate with intra-operative bleeding [9,10].

The question of whether it is possible to predict which patients are likely to bleed intra-operatively has been addressed since in the fields of cardiac surgery, [11] neurosurgery, [12] ophthalmology, [13] obstetrics and gynaecology [14] and general surgery, [15] with all fields concluding that pre-operative coagulation tests are not useful to this end. This has also been found to be true for newer tests such as platelet function analyser 100 (PFA-100) [11] but there has been better documented predictability from thromboelastography [16]. Despite this, review papers continue to conclude that only selective use of pre-operative coagulation tests is appropriate [17,18].

The purpose of this study was to identify whether pre-operative coagulation screening predicts bleeding risk in hip fracture patients undergoing operative intervention. In addition, we investigated the financial implications of these tests.

Patients & methods

The study was an approved hospital audit conducted in a single Major Trauma Centre. All patients who had sustained a fractured neck of femur between November 2011 and November 2012, were identified from a prospectively collected database. An audit pro forma was used in accordance with the "Standardised Audit of Hip Fractures in Europe" (SAHFE) (Table 1).

A total of 815 hip fractures were admitted during the study period. 1 patient had their operation elsewhere and was excluded leaving 814 patients in the study. 561 patients were female and 254 were male. The mean age was 80.5 years and the majority (62.7%) sustained an intracapsular fracture requiring haemiarthroplasty.

Coagulation results and evidence of the use of vitamin K or blood products were retrospectively reviewed using the hospital online reporting system. The tests and their normal ranges are shown in Table 2. Estimated intra-operative blood loss was calculated by theatre staff. The volume drained into the suction system was measured and swabs were weighed and this information was recorded by the anaesthetist. We divided all patients into four groups. Group 1 had no coagulation tests performed, Group 2 had normal coagulation test results, Group 3 had abnormal results but were taking warfarin and Group 4 were not taking warfarin but had abnormal results. Subgroup analysis was performed to establish if there were any difference between the groups for intraoperative blood loss, total units of post-operative red blood cell transfusion, haematoma formation, and gastrointestinal haemorrhage (Table 3).

Potential national financial savings were estimated using local pricing supplied by the clinical coding department and pathology price lists that were available online. A multiplication factor was applied taking into account the average number of hip fractures in the UK per year minus the proportion who are estimated to be taking warfarin. Categorical data was subjected to contingency table analysis using the chi squared and was used for statistical analysis of groups containing more than 5 patients in one category and Fisher's exact test (two-tailed) for those with less than 5. Continuous data was analysed using Student's t test. A P-value of <0.05 was considered significant.

Table 1
Summary components of the Standardised Audit of Hip Fractures in Europe (SAHFE).

Patient demographics	
Fracture	Site
	Type
	Time of injury
Social circumstances	Housing
	Living alone
	Mobility and aids
Operation	ASA grade
	Date
	Type
	Anaesthetic
Rehabilitation	Length of stay
	Re-operation
	Discharge details
	Death

Table 2
Normal ranges for coagulation tests.

Test	Normal range (s)
Prothrombin time (PT)	9–12
Activated partial thromboplastin time	≤25
Thrombin time	≤16

Results

Coagulation screening was not performed in 8.6% ($n = 70$) of patients (Group 1). 91.4% ($n = 744$) had coagulation tests performed. Of these 78.0% ($n = 580$) of patients had normal test results (Group 2) and 22.0%, ($n = 164$) had abnormal test results. 33.5% ($n = 55$) were patients admitted on warfarin (Group 3). The remaining 66.5% ($n = 109$) had abnormal coagulation studies but were not taking warfarin (Group 4).

No patient from Group 4 had treatment to reverse their coagulopathy with either vitamin K or blood products. When Group 4 ($n = 109$) was statistically compared to Group 2 ($n = 580$) and all other patients ($n = 705$) there was no difference in intraoperative blood loss ($p = 0.79, 0.78$), postoperative transfusion ($p = 0.38,\ 0.30$), postoperative haematoma formation ($p = 0.79, 1.00$), or gastrointestinal haemorrhage ($p = 0.45, 1.00$), respectively (Table 4).

There was no statistical difference between those with normal coagulation tests and those with abnormal tests when sub-group analysis was performed to compare those that had spinal anaesthesia and those that had general anaesthesia (Table 5). We also found no statistical difference in intra-operative blood loss, the requirement for post-operative transfusion or the

Table 3
Demographics of patients included in the study.

Total patients in study	814
Age	80.5 years (22–102 yrs)
Male	254 (31.2%)
Female	561 (68.8%)
Residence in own home	592 (72.7%)
Residence in residential home	73 (9.0%)
Residence in nursing home	70 (8.6%)
Previous cerebrovascular accident	148 (18.2%)
Chronic obstructive pulmonary disease	138 (17.0%)
Renal disease	82 (10.1%)
Diabetes mellitus	130 (16.0%)
Liver disease	0
Malignancy	112 (13.8%)
Smoker	98 (12.0)
Warfarin	55 (6.8%)
Intracapsular fracture	510 (62.7%)
Extracapsular fracture	305 (37.5%)
General anaesthetic	430 (52.8%)
Spinal anaesthetic	364 (44.7%)
Nerve block	585 (71.9%)