Thrombo-prophylaxis in pelvic and acetabular trauma patients: a UK consensus?

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Abstract

Aims The incidence of deep vein thrombosis, non-fatal pulmonary embolism and fatal pulmonary embolism may be as high as 61%, 10% and 2%, respectively, in patients with pelvic and acetabular injuries. A survey of the pelvic and acetabular units across the United Kingdom was performed to ascertain the thrombo-prophylaxis policy for these patients. In particular, questions were asked about different regimes on post-operative patients, conservatively managed patients and those simply discussed over the telephone. We enquired about their known rates of DVT and PE and their methods of data collection.

Methods Postal questionnaires were sent to 22 pelvic and acetabular trauma centres around the United Kingdom.

Results Replies from 18 units were received in which a total of 837 operations are performed per year. Forty-five percent of pelvic and acetabular units do not routinely prescribe chemical prophylaxis for post-operative patients and 56% do not prescribe prophylaxis for conservatively managed patients. The policy of the remaining units showed no consistency in duration or agent. Fifty-three percent of units use a database to collect information related to the numbers of patients operated up on. Forty-seven percent have no defined method for collecting DVT and PE numbers. For this reason, reported rates of proximal DVT,

non-fatal PE and fatal PE were below that expected at 2.5%, 0.8% and 0.1%, respectively.

Conclusions Despite high rates of thrombo-embolic complications in patients with pelvic and acetabular injuries there is no UK consensus on prescribing prophylaxis.

Introduction

The severely injured patient with pelvic and acetabular injuries presents a number of difficulties for the trauma surgeon including surgical and non-surgical issues. Unlike elective orthopaedic patients or those with simple trauma injuries this group of patients have significantly higher rates of thrombo-embolic complications. Following pelvic trauma the incidence of deep vein thrombosis (DVT) varies between 35% and 61% [1, 2], with the incidence of proximal DVT between 25% and 35% [1–4]. More importantly the risk of symptomatic pulmonary embolism (PE) is between 2% and 10% with the risk of fatal PE as high as 2% [1–4]. Most tertiary referral centres in the United Kingdom would therefore experience about ten symptomatic PE's and up to two fatal PE's per year.

However, little is known about the thrombo-embolic outcome of pelvic and acetabular patients treated conservatively. In addition, many patients referred for an opinion by a tertiary referral centre may not require surgery and are managed by the local hospital. This paper sets out to analyse the thrombo-prophylaxis procedures adopted by the major pelvic and acetabular trauma centres in the United Kingdom for patients treated surgically and conservatively. With the advent of level one trauma centres in the United Kingdom, and a hub and spoke system of referring such patients, the management of pelvic and acetabular injuries will require concise communication between hospitals.

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Table 1 Percentage of reported cases of thrombo-embolic episodes across the United Kingdom

Type of thrombotic event	Reported percentage of total
Proximal DVT	2.5
Non-fatal PE	0.8
Fatal PE	0.1

DVT deep vein thrombosis, *PE* pulmonary embolism

Patients and methods

Questionnaires were sent to 22 pelvic and acetabular trauma centres around the UK. Questions about the number of patients treated in their unit, patients excluded from receiving thrombo-prophylaxis and their specific prophylaxis regimes were asked. Additionally, we wanted to know whether there was any difference between patients admitted for surgery, those not requiring surgery and those for which only telephone advice was given. Subsequently, a further questionnaire was sent asking details about the rates of DVT and PE's in their units, the method used to collect this data and on their prophylactic use of indomethacin to prevent heterotrophic ossification. If a reply had not been received in the post then a telephone call was made to prompt a response and a further questionnaire sent by post.

Results

In total, replies from the first questionnaire were received from 18 institutions across the United Kingdom. This represents a response rate of 82% (18/22) and accounts for 837 pelvic and acetabular operations performed per year. Fifteen units (68%) responded to the second questionnaire.

Number of pelvic and acetabular operations performed and thrombo-embolic events reported:

Each unit was asked about the number of pelvic and acetabular operations performed per year and how this data

is derived. Fifty-three percent of units use a database to collate information, 33% use their own logbook and 13% use data collected at audit meetings.

The same question was asked about the number of thrombotic events (Table 1). Forty-seven percent of units have no defined method for collecting this data, 27% use a database to record events, 20% collect this data formally during outpatient follow-up and 6% use data from audit meetings.

Patients admitted for surgery:

Pre-operative screening

Three out of the 18 institutions routinely screen all of their pelvic and acetabular patients pre-operatively. Two perform a duplex ultrasound $\pm$ venogram and insert an inferior vena cava filter if positive. One institution performs a duplex ultrasound scan pre-operatively and also at seven to ten days post-operatively on all their patients prior to discharge. If there is no evidence of thrombosis then no prophylaxis is given after discharge.

Inpatient prophylaxis

Seventy-eight percent of units give some form of mechanical prophylaxis and 100% give a chemical agent. Most units excluded pre-operative prophylaxis for patients with head injuries, bleeding or coagulopathy issues and spinal injuries. However, four units identified no exclusion criteria for prophylaxis.

Discharge

Nearly half of the units do not routinely prescribe any chemical prophylaxis after the discharge of surgically treated pelvic and acetabular patients (Table 2).

Patients treated conservatively

For patients admitted to a pelvic and acetabular unit and treated conservatively, 11 units prescribe chemical prophylaxis alone

Table 2 Routine chemical prophylaxis for surgically treated patients on discharge

Prophylaxis	Type of prophylaxis and number of units prescribing			Total number of units	Percentage of units
	Aspirin	LMWH	Warfarin		
None				8	45%
3/52	1	1		2	11%
6/52	2	1	1	4	22%
3/12			4	4	22%

Table 3 Routine chemical prophylaxis for conservatively treated patients once discharged

Prophylaxis	Type of prophylaxis and number of units prescribing			Total number of units	Percentage of units
	Aspirin	LMWH	Warfarin		
None				10	56%
3/52	1	1		2	11%
6/52	2	1	1	4	22%
3/12			2	2	11%

and seven units use a combination of mechanical and chemical prophylaxis whilst an inpatient. Eight units vary their prophylaxis depending on the mobility of the patient, one unit differentiates those that are on traction and one unit looks at the energy of the injury. When these patients are discharged more than half do not prescribe any chemical prophylaxis (Table 3).

Patients discussed over the telephone but not requiring transfer or surgery

One unit recommends the referring hospital to their own local policy for prophylaxis and one unit does not give any advice. Of the 16 that offer advice, eight recommend prophylaxis on all patients. Whereas six units ask about the patient's level of mobility, one will look at the energy of the injury and one whether the patient is on traction. More than half of the sixteen units do not recommend any chemical prophylaxis for these patients once discharged (Table 4).

Use of Indomethacin

Sixty percent of units prescribe indomethacin for patients that have undergone pelvic and acetabular surgery. One of these units would not prescribe aspirin for prophylaxis if the patient has received indomethacin.

Discussion

The exact number of pelvic and acetabular operations performed in the United Kingdom is largely unknown. Geoghegan et al. [5] in 2007 identified that the information

held by the Department of Health was three times less than that reported by the 33 units they identified as performing such operations. This is largely due to an inaccuracy in coding but has huge financial implications to the treating units. We found that the 18 units we surveyed perform a total of 837 operations per year, which lends further support of the numbers treated across the United Kingdom. Bircher and Giannoudis [6] clearly outlined the financial difficulties faced by units treating such injuries and emphasised the importance of knowing the true incidence. Part of their recommendation was to improve data collection methods [7]; however, only 53% of the units we surveyed keep a database of their pelvic and acetabular patients.

Thrombo-embolic rates for patients with pelvic and acetabular injuries vary enormously. Montgomery et al. [8] have reported proximal DVT rates as high as 35% when using magnetic resonance venography to screen their patients. In the literature, symptomatic PE and fatal PE rates vary from 2 to 10% and 0.5 to 2%, respectively [1–4]. Forty-seven percent of the units we surveyed had no defined mechanism in place to collect the rates of thrombotic events. For this reason, our findings of proximal DVT rates of 2.5%, symptomatic PE of 0.8% and fatal PE of 0.1% are most certainly massively underestimated.

A recent systematic review of the literature by Slobogean et al. [9] commented on the different prophylactic measures available specifically for patients with pelvic and acetabular injuries. They found that mechanical compression devices lower DVT rates but have no effect on PE. The use of LMWH within 24 hours of the injury produced a significant reduction in DVT and PE rates. They found no evidence for the prophylactic use of inferior vena cava filters, although a

Table 4 Routine chemical prophylaxis for conservatively treated patients discussed on the telephone

Prophylaxis	Type of prophylaxis and number of units prescribing			Total number of units	Percentage of units
	Aspirin	LMWH	Warfarin		
None				9	56%
3/52	1	1		2	12.5%
6/52	2	1		3	19%
3/12			2	2	12.5%

review by Giannoudis et al. [10] found that newer filters might be a safe and reliable method of reducing PE rates. Currently, the use of filters is reserved for the proven proximal DVT pre-operatively, or if a contraindication exists for the use of a chemical agent post-operatively. The use of routine radiological screening does not reduce the risk of fatal PE [11–13]; however, there may be a role for its use in the patient in which there has been a delay to surgery of more than three days from the time of injury [14].

Slobogean et al. [9] concluded that there was actually no strong evidence-based recommendation for the use of thrombo-prophylaxis in patients with pelvic and acetabular injuries. This was due to the lack of publications with high enough patient numbers to sufficiently power any study to compare the effectiveness of different regimes.

Geoghegan et al. [15] in 2007 surveyed units across the United Kingdom and found that 67% of units use a mechanical device, 100% use chemical prophylaxis and 10% perform routine USS Doppler surveillance. This is similar to our findings of 78%, 100% and 17%, respectively. However, not much is written about the extended prophylaxis of patients with pelvic and acetabular injuries after discharge. Fishmann et al. [16] used warfarin for three weeks in their protocol and reported an incidence of postoperative venous thrombosis of 3% and pulmonary embolism of 1%. Letournel and Judet used warfarin for a total of 75 days and Tile writes of his use of warfarin post-operatively in his patients [17]. Our survey revealed that 45% of units do not prescribe any chemical prophylaxis for patients post-operatively once discharged. The policy of the remaining 65% showed no consistency in duration or agent.

To our knowledge there are no papers discussing the role of prophylaxis in patients with pelvic and acetabular injuries managed conservatively. Often these patients are immobile and are at higher risk of thrombo-embolic episodes. However, 56% of the units surveyed do not prescribe any prophylaxis after discharge for these patients.

There has been a drive towards the development of specialist pelvic and acetabular units for the management of these patients. Along with recent efforts to have level one trauma centres in the UK, a hub and spoke system will need to exist for the referral from smaller surrounding hospitals. To enable the optimum management of these patients there will need to be concise communication between hospitals. Steele et al. [18] clearly demonstrated a reduction in their DVT and PE rates when LMWH was given within 24 hours of the injury. However, only 49% of patients transferred from elsewhere had been given LMWH within 24 hours compared with 94% of patients admitted directly to their hospital. Our survey only enquired about telephone advice given to hospitals for patients not requiring transfer or surgery. However, we found that 11% of tertiary units did not make any recommendations for prophylaxis for these

patients, and 56% of those that did offer advice did not recommend any prophylaxis after discharge.

Conclusions

There are no evidence-based recommendations for the thrombo-prophylaxis of patients with pelvic and acetabular injuries. However, there is a higher incidence of thrombotic episodes in these patients and the literature therefore supports the use of some form of prophylaxis. There is no consensus amongst the pelvic and acetabular units in the United Kingdom about prophylaxis.

Conflict of interest statement The authors declare that in preparing, designing or carrying out this study there was no conflict of interest and no study sponsor.

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