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Research Article

Venous Thromboembolism Prophylaxis in Renal Trauma- What are the Guidelines?

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Abstract

Venous thromboembolic events are a common complication in trauma patients. Timing of initiation of chemical Venous Thromboembolism (VTE) prophylaxis is controversial as patients may have established or perceived contraindications to its implementation. Blunt solid organ injuries are often managed non-operatively, and frequently caution is applied with respect to VTE prophylaxis due to concerns it could contribute to failure of non-operative management. Major trauma guidelines suggest VTE prophylaxis should be initiated early (within 24 - 48 hours), providing there are no concerns for ongoing bleeding. The majority of the literature with respect to VTE prophylaxis in blunt abdominal trauma is based on splenic and hepatic trauma, with a paucity of literature on renal trauma. Whilst there is evidence to support VTE prophylaxis in renal trauma, major urological guidelines do not reflect this. This article provides a review on chemical VTE prophylaxis use in blunt abdominal trauma, particularly in respect to current urological guidelines in renal trauma. Ultimately, uniformity in practice with respect to all blunt abdominal trauma will require a uniformity in guidelines.

Keywords: Abdominal injuries; Heparin; Kidney; Venous thromboembolism; Trauma

Introduction

Venous Thromboembolic Events (VTE) are not uncommon in the hospitalized trauma patient. Virchow's triad of stasis, hypercoagulation and endothelial injury is more prevalent due to various factors such as immobility, prescribed bed rest, periods of hypoperfusion and ongoing bleeding. The estimated prevalence of VTE events in trauma patients is variable, ranging from approximately 12 to 65 percent [1], and the risk of events appear to be higher in the more severely injured patient [2,3]. A 2013 Cochrane review found chemical VTE prophylaxis compared with no prophylaxis reduces the relative risk of a Deep Vein Thrombosis (DVT) by 48 percent [1]. Surgical practice in trauma has shifted towards earlier mobilization and earlier commencement of chemical VTE prophylaxis, and major trauma guidelines have been updated to reflect current practice.

Evidence for DVT Prophylaxis in Trauma

Guidelines published by the American Association for the Surgery of Trauma (AAST) in 2021 recommend early (within 24-48 hours) initiation of chemical VTE prophylaxis for blunt abdominal injuries [2]. They also recommend that in high grade (AAST 4-5) injuries, early VTE prophylaxis should be balanced against the risk of ongoing bleeding, however, once bleeding has been stabilized, it should be initiated [2]. A systematic review and meta-analysis by Anteby et al queried whether initiation of VTE prophylaxis within 48 hours of blunt abdominal solid organ injury was associated with increased failure of Non-Operative Management (NOM). They concluded that early VTE prophylaxis decreased the risk of VTE events without increasing the risk of

failure of non-operative management, however this was not found to be statistically significant [4]. The limitation of that study and ones similar preceding it, has been the risk of bias. Overall, this may be influenced by the heterogeneity of the identified retrospective studies with regards to VTE prophylaxis protocols and outcomes, as well as including adjusted and unadjusted studies in an analysis.

A meta-analysis and systematic review by Lamb et al on the timing of initiation of VTE prophylaxis in blunt abdominal injury concluded that initiation of VTE prophylaxis earlier than 48 hours is associated with an increased risk of failure of non-operative management, and a decreased risk of DVT (OR 0.36, p <0.0001) [5]. Ten studies totaling 4642 patients were identified for analysis. A meta-analysis of the three studies with unadjusted data showed a statistically significant increase risk in failure of NOM (OR 1.76) with VTE prophylaxis initiation at less than 48 hours. Overall, the rate of failure of NOM in all studies was low, with many studies reporting no failure. Gaitanidis et al was the largest study included in Lamb et al. A total 3223 patients with blunt abdominal trauma were analysed with respect to the timing of initiation of VTE prophylaxis, failure of NOM, bleeding post initiation of VTE prophylaxis, VTE events and factors associated with bleeding post VTE prophylaxis. Early VTE prophylaxis, defined as <48hrs was associated with more bleeding events, whilst late VTE prophylaxis (>72hrs) was associated with more VTE events. Late VTE prophylaxis was associated with a higher rate of overall VTE (OR 3.17, p <0.001) as well as higher rates of pulmonary embolism (OR 4.29 p <0.001). DVT events were statistically higher in late compared to early VTE prophylaxis (OR 3.15), and intermediate (initiation 48-72 hrs) compared to early (OR 2.38) prophylaxis. Splenic injuries, high grade liver injuries and early VTE prophylaxis were identified as having a higher incidence of bleeding events [6]. An earlier meta-analysis of VTE prophylaxis in blunt solid organ injury by Murphy et al identified ten studies for inclusion and found no difference in the failure of NOM between early and late VTE prophylaxis (OR 1.09) [7]. It also concluded that the rates of VTE were lower in the early VTE prophylaxis group.

Evidence in Renal Trauma

Literature on VTE prophylaxis in isolated renal trauma or in multi-trauma with renal injury is sparse. The paucity of such literature begs the question whether the shift in paradigm with respect to VTE prophylaxis in splenic and liver trauma is being applied to isolated renal trauma in current practice. Whilst the literature does contain articles on the management of renal trauma – the vast majority of those focus on management with respect to AAST grading, commenting on the indication for operative intervention and imaging guidelines to re-assess the injury.

Werner et al performed a 10 year review of renal trauma at West Virginia University. The study identified 295 cases of renal trauma from 2009 - 2019, the majority of which (220 cases) were AAST grading 1-3. A renal trauma protocol was implemented in 2012, which specified timing of VTE prophylaxis. VTE prophylaxis was commenced at 24 hours in Grade 1 renal trauma, 48 hours in Grade 2, and at 72 hours in Grade 3 or higher [8]. The total number of isolated renal injuries was 62, and 18 of those received VTE prophylaxis. The reason given for the low rate of prophylaxis was that many patients discharged prior to or on the day of scheduled VTE prophylaxis as per the standard protocol. There were no adverse events following initiation of chemical prophylaxis. Because of this, West Virginia University updated their renal trauma protocol in 2020, with VTE prophylaxis being initiated at 24 hours in Grade 1-3 renal trauma and at 48 hours in Grade 4-5 renal trauma, if there is evidence of haemodynamic stability.

Eberle et al, analysed 312 patients from 2008 - 2011 who underwent non-operative management following blunt abdominal trauma. Of those, 65 patients had renal injuries and 52.3% of those had an AAST grading of 3-5. VTE prophylaxis was administered in 23 patients, with the majority (17 patients) receiving prophylaxis at some point between 3 days and discharge, the remainder received prophylaxis within three days [9]. No renal trauma patient failed non-operative management following initiation of VTE prophylaxis, appreciating that the majority of patients received no VTE prophylaxis, and of those that did, the majority received late VTE prophylaxis.

Urological Association Guidelines

The 2023 European Association of Urology (EAU) guideline on urogenital trauma includes a short paragraph on the role of thromboprophylaxis. It highlights that VTE prophylaxis is recommended as a general management principle following the 2013 Cochrane review, however, mentions that the evidence is not high. No guidance is given with respect to when to initiate VTE prophylaxis or in whom. The EUA guidelines, when specifically discussing renal trauma, do not mention VTE prophylaxis in their treatment algorithm or final recommendations [10]. The American Urological Association Urotrauma guidelines were most recently amended in 2020. No mention is made of VTE prophylaxis in renal trauma [11,12]. McCombie et al published a review and guideline from Australia and New Zealand in 2014. The guidelines acknowledges that trauma patients are at an increased risk of VTE events, however does not provide recommendations due to a lack of specific evidence in the setting of renal trauma [13].

Conclusion

Trauma guidelines are unequivocal with respect to VTE prophylaxis and the prevention of thromboembolic events. All

trauma patients, once concerns regarding bleeding are addressed, should have VTE prophylaxis initiated as soon as safe to do so. However, the application of guidelines with respect to VTE prophylaxis is variable, as not all trauma patients are managed by trauma surgeons. The decision as to who the treating team is in an isolated renal injury, or multi trauma with renal injury, is dependent on expertise, interventional capability, local protocols and the need for transfer to a larger centre. Therefore the treating specialty could range from a urological unit, to an acute surgical or trauma unit or a general surgical unit. Given such a variation, ideally guidelines across the varying sub-specialties would be uniform, as would the practices of the individual surgeon.

None of the major urological societies have guidelines with respect to the time interval at which to commence VTE prophylaxis. Potentially, this will result in a discrepancy between the management of an isolated renal injury compared to the multi trauma patient with a renal injury, compared to the multi trauma patient without a renal injury. Whilst the literature on VTE prophylaxis with respect to renal trauma is sparse, it is not discordant with the literature on VTE prophylaxis in blunt abdominal trauma and it would be reasonable to extrapolate those findings in the management of renal injuries. A uniform approach to VTE prophylaxis in blunt abdominal trauma would suggest the need for uniformity in guidelines.

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