Chemical anticoagulant administration within 48hours of injury significantly lowers the odds of VTEs without increasing bleeding or mortality among patients with spine trauma.

Michael Akodu[1], Diana Yeritsyan[1], Kaveh Momenzadeh[1], Jason Pittman[1], Andrew White[1], Sapan Gandhi[1]
[1]Beth Israel Deaconess Medical Center, Boston, MA
makodu@bidmc.harvard.edu

Disclosures: No author disclosures relevant to this study

INTRODUCTION: The incidence of venous thromboembolic (VTE) events is significant among spine trauma patients, with those requiring surgical intervention at elevated risk. Chemical anticoagulation with unfractionated heparin, low molecular weight heparin and recently, direct oral anticoagulants have been used in acute settings to prevent the occurrence of VTE, however, this presents a therapeutic challenge to spine surgeons as bleeding complications in this subset of patients can have devastating consequences, highlighting the need to establish a balance.
While clear guidelines exist for anticoagulation in elective spine surgery, recommendations regarding optimal timing of anticoagulation use in spine trauma is relatively scarce. A few individual studies exist, but results are mixed. We conducted this meta-analysis to answer existing questions about optimal timing of anticoagulant administration, and provide recommendations for the spine surgeon

METHODS: We carried out a systematic search of Medline, EMBASE, Web of Science Core Collection, and Cochrane Central Register of Controlled Trials from the inception of the journals/databases to February, 2023. Controlled vocabulary terms were identified as well as key terms and synonyms; and search results were limited to only English language papers. We developed a search for human studies examining optimal timing for acute spinal trauma in adults. Terms included were spinal injuries, fractures, trauma, heparin etc.
We identified articles from our literature search that did a comparison between different timings of anticoagulant initiation in patients who had acute spine trauma as methods to prevent thromboembolic complications following operative and non-operative acute spinal trauma with or without spinal cord injury. Three reviewers performed abstract screenings, full text review and data extraction; and all conflicts were resolved by consensus. Outcomes of interest were defined as deep venous thrombosis (DVT), pulmonary embolism (PE), major bleeding and mortality.

RESULTS SECTION: Five studies, making up a total of 13,110 patients, did a comparison between anticoagulant administration within 48hours of trauma and after 48hours; and reported DVT and PE as outcomes. The results show a significantly-lower odds of having a DVT or PE with early (within 48hours) administration of chemical anticoagulants (odds ratios 0.20 (0.17 – 0.25) p-value 0.0001 and 0.46 (0.34 – 0.62) p-value 0.0001 respectively).
Four studies had major bleeding as an outcome and reported slightly lower odds with early initiation but this association was not significant (0.85 (0.66 – 1.09) p-value 0.1964). Similarly, four studies reported mortality as an outcome measure with non-significant results.

DISCUSSION: The current available evidence suggests that early initiation of chemical anticoagulation within 48hours of injury in spine trauma patients boasts favorable outcomes with regards to prevention of thromboembolic complications, without putting these patients at risk of bleeding or mortality.

SIGNIFICANCE/CLINICAL RELEVANCE: Bleeding and its complications in the acute spine trauma setting is feared, and this may be a barrier to early anticoagulant administration. This study shows that these fears are unfounded, and the surgeon would be doing more good than harm by administering chemical anticoagulation early

REFERENCES:
Zeeshan M, Khan M, O'Keeffe T, Pollack N, Hamidi M, Kulvatunyou N, et al. Optimal timing of initiation of thromboprophylaxis in spine trauma managed operatively: A nationwide propensity-matched analysis of trauma quality improvement program. J Trauma Acute Care Surg. 2018 Aug;85(2):387–92.
Dornbush C, Maly C, Bartschat N, Lilienthal M, Galet C, Skeete DA, et al. Chemoprophylaxis Timing Is Not Associated With Postoperative Bleeding After Spinal Trauma Surgery. Clin Neurol Neurosurg. 2023 Feb;225:107590.
Khan M, Jehan F, O'Keeffe T, Hamidi M, Truitt M, Zeeshan M, et al. Optimal Timing of Initiation of Thromboprophylaxis after Nonoperative Blunt Spinal Trauma: A Propensity-Matched Analysis. J Am Coll Surg. 2018 May;226(5):760–8.
Hamidi M, Asmar S, Bible L, Hanna K, Castanon L, Avila M, et al. Early Thromboprophylaxis in Operative Spinal Trauma Does Not Increase Risk of Bleeding Complications. J Surg Res. 2021 Feb;258:119–24.
Kim DY, Kobayashi L, Chang D, Fortlage D, Coimbra R. Early pharmacological venous thromboembolism prophylaxis is safe after operative fixation of traumatic spine fractures. Spine. 2015 Mar 1;40(5):299–304.
Godat LN, Haut ER, Moore EE, Knudson MM, Costantini TW. Venous thromboembolism risk after spinal cord injury: A secondary analysis of the CLOTT study. J Trauma Acute Care Surg. 2023 Jan 1;94(1):23–9.