

VTE PROPHYLAXIS

General Trauma

Byrne, J. P., Geerts, W., Mason, S. A., Gomez, D., Hoefft, C., Murphy, R., . . . Nathens, A. B. (2017). Effectiveness of low-molecular-weight heparin versus unfractionated heparin to prevent pulmonary embolism following major trauma: A propensity-matched analysis. *J Trauma Acute Care Surg*, 82(2), 252-262. doi:10.1097/TA.000000000000132. This TQIP propensity matched analysis of 153,474 patients compared LMWH with unfractionated heparin (UF) on preventing PE. LMWH was associated with significantly lower risk of PE. LMWH should be the anticoagulant agent of choice for the prevention of PE in trauma.

Jacobs, B. N., Cain-Nielsen, A. H., Jakubus, J. L., Mikhail, J. N., Fath, J. J., Regenbogen, S. E., & Hemmila, M. R. (2017). Unfractionated heparin versus low-molecular-weight heparin for venous thromboembolism prophylaxis in trauma. *J Trauma Acute Care Surg*, 83(1), 151-158. doi:10.1097/TA.0000000000001494. This MTQIP study of 18,010 patients compared unfractionated heparin (UFH) vs low molecular weight heparin (LMWH) on trauma patient outcomes. LMWH was superior in reducing the incidence of mortality and VTE events. LMWH should be the preferred VTE prophylaxis agent for use in hospitalized trauma patients.

Pelvic Fractures

Hamidi, M., Zeeshan, M., Sakran, J. V., Kulvatunyou, N., O'Keeffe, T., Northcutt, A., . . . Joseph, B. (2019). Direct Oral Anticoagulants vs Low-Molecular-Weight Heparin for Thromboprophylaxis in Nonoperative Pelvic Fractures. *Journal of the American College of Surgeons*, 228(1), 89-97. doi:10.1016/j.jamcollsurg.2018.09.023. This TQIP propensity matched analysis (n=852) of isolated blunt nonoperative pelvic fracture patients compared LMWH vs DOACs (FXa inhibitor or direct thrombin inhibitor) on DVT/PE outcomes. DOACs were associated with a reduced rate of DVT compared with LMWH, without increasing the risk of bleeding complications.

Jehan, F., O'Keeffe, T., Khan, M., Chi, A., Tang, A., Kulvatunyou, N., . . . Joseph, B. (2017). Early thromboprophylaxis with low-molecular-weight heparin is safe in patients with pelvic fracture managed nonoperatively. *Journal of Surgical Research*, 219, 360-365. doi:10.1016/j.jss.2017.06.049. This single center retrospective (2010-2012) study of 255 nonoperative pelvic fracture patients compared (first 24 hr) versus late (after 24 hr) initiation of LMWH prophylaxis. Late LMWH had a higher incidence of symptomatic DVT and longer hospital LOS. Early LMWH in pelvic fractures managed nonoperatively is safe and decreases the risk of symptomatic deep venous thrombosis.

Spinal Trauma

Khan, M., Jehan, F., O'Keeffe, T., Hamidi, M., Truitt, M., Zeeshan, M., . . . Joseph, B. (2018). Optimal Timing of Initiation of Thromboprophylaxis after Nonoperative Blunt Spinal Trauma: A Propensity-Matched Analysis. *Journal of the American College of Surgeons*, 226(5), 760-768. This TQIP propensity-matched analysis of 8552 nonoperative, isolated spine trauma patients compared early (<48 hrs) vs late (>48 hrs) thromboprophylaxis. Early thromboprophylaxis was associated with lower DVT and PE. There was no difference in PRBC requirement and mortality.

Zeeshan, M., Khan, M., O'Keeffe, T., Pollack, N., Hamidi, M., Kulvatunyou, N., . . . Joseph, B. (2018). 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*, 85(2), 387-392. This

TQIP propensity-matched analysis of 3554 operative adult spine injury patients (spine AIS score >3) compared early (< 48 hrs) to late (>48 hrs) thromboprophylaxis. Early VTE prophylaxis was associated with decreased rates of DVT without increasing the risk of bleeding and mortality. VTE prophylaxis should be started within 48 hrs of surgery to reduce risk of DVT.

Khan, M., Jehan, F., O'Keeffe, T., Hamidi, M., Kulvatunyou, N., Tang, A., . . . Joseph, B. (2018). Oral Xa Inhibitors Versus Low Molecular Weight Heparin for Thromboprophylaxis After Nonoperative Spine Trauma. *Journal of Surgical Research*, 232, 82-87. This 4-yr (2013-2016) TQIP propensity-matched analysis of 1056 isolated nonoperative spine trauma (Spine-AIS >3 and other-AIS <3) compared LMWH versus oral Xa inhibitors (Xa-Inh) thromboprophylaxis. Oral Xa-Inh seems to be more effective than LMWH for VTE prevention in nonoperative spine trauma. The two drugs had similar safety profile. Further prospective trials should be performed to change current guidelines.

Chang, R., Scerbo, M. H., Schmitt, K. M., Adams, S. D., Choi, T. J., Wade, C. E., & Holcomb, J. B. (2017). Early chemoprophylaxis is associated with decreased venous thromboembolism risk without concomitant increase in intraspinal hematoma expansion after traumatic spinal cord injury. *J Trauma Acute Care Surg*, 83(6), 1088-1094. This single-center retrospective study (2012-2015) of 501 patients with spinal cord injury comparing those receiving (<48 hr) heparin vs aspirin chemoprophylaxis on intraspinal hematoma expansion diagnosed intraoperatively or by follow up radiology. Early aspirin was not associated with reduced VTE or PE. Early heparinoid therapy was associated with decreased VTE and PE risk in SCI patients without concomitant increase in ISH expansion.

DiGiorgio, A. M., Tsolinas, R., Alazeh, M., Haefeli, J., Talbott, J. F., Ferguson, A. R., . . . Dhall, S. S. (2017). Safety and effectiveness of early chemical deep venous thrombosis prophylaxis after spinal cord injury: pilot prospective data. *Neurosurgical Focus*, 43(5), E21. This is a single center prospective observational study of 49 adult spinal cord injury patients treated at a single Level I trauma center. Standardized VTE prophylaxis was initiated: LMWH (40 mg SQ daily) within 24 hours of injury. Patients undergo surgery within 24 hours of injury and LMWH is withheld for 24 hours after surgery. The standardized protocol was effective in keeping VTE at the lower end of the reported range, and is safe, with a zero rate of adverse bleeding events.

Traumatic Brain Injury

Benjamin, E., Recinos, G., Aiolfi, A., Inaba, K., & Demetriades, D. (2017). Pharmacological thromboembolic prophylaxis in traumatic brain injuries: Low molecular weight heparin is superior to unfractionated heparin. *Annals of Surgery*, 266(3), 463-469. This TQIP study of 20,417 severe blunt TBI patients (AIS>3), compared patients receiving LMWH versus unfractionated heparin (UH) on thrombotic complications. LMWH prophylaxis in severe TBI is associated with better survival and lower thromboembolic complications than UH.

Byrne, J. P., Mason, S. A., Gomez, D., Hoeft, C., Subacius, H., Xiong, W., . . . Nathens, A. B. (2016). Timing of pharmacologic venous thromboembolism prophylaxis in severe traumatic brain injury: A propensity-matched cohort study. *Journal of the American College of Surgeons*, 223(4), 621-631.e625. This TQIP propensity matched analysis 3,634 isolated TBI patients (Head AIS >3 and GCS score <8) compared early prophylaxis (<72 hours) versus late prophylaxis (>72 hours) using either LMWH or UFH. Early prophylaxis was associated with decreased risk of PE and DVT with no increase in risk of late neurosurgical intervention or death. Early prophylaxis may be safe and should be the goal for each patient in the context of appropriate risk stratification.