Thromboprophylaxis in Spinal Surgery

Published institutional practices for Venous thromboembolic prophylaxis are highly variable and there are no universally accepted guidelines.

While the incidence of deep vein thrombosis (DVT) and pulmonary embolism (PE) was relatively low regardless of prophylaxis type, the true incidence is difficult to determine given the heterogeneous nature of the small number of studies available in the literature.

Findings suggest there may be a role for chemoprophylaxis given the relatively high rate of fatal PE. Future studies are needed to determine which patient population would benefit most from chemoprophylaxis [1)]. [2)].

Case series

A paucity of randomized trials have compared prophylactic dose of unfractionated heparin (UFH) versus Low molecular weight heparin (LMWH) for the prevention of venous thromboembolism in spinal surgery.

The objective of Macki et al. was to determine the most prevalent chemoprophylactic techniques in spine surgery.

The ACGME was queried for all neurosurgical residency programs, which were subsequently sent an electronic survey about prophylactic UFH vs LMWH in spine surgery for 1) degenerative/deformity, 2) traumatic, and 3) neoplastic pathologies

Of 69 unique responding residencies, the first dose of chemoprophylaxis for degenerative/deformity spinal disease started most commonly on postoperative day (POD) 1 in 75.3% of neurosurgery programs followed by POD 2 in 10.1% of programs, POD 0 - same day of surgery in 8.7% of programs, POD 3 in 1.4% of programs, and morning of surgery in 1.4% of programs. Choice of postoperative chemoprophylaxis did not statistically significantly differ between UFH versus LMWH: 56.5% versus 36.2% in degenerative/ deformity pathologies (P=0.080) and 50.7% versus 43.4% in traumatic pathologies (P =0.535). Three programs (4.3%) in both the degenerative/deformity and trauma groups documented no chemoprophylaxis. Neoplastic pathologies saw a statistically significantly higher proportion of prophylactic UFH (60.8%) compared to prophylactic LMWH (36.2%) (P =0.037). One program (1.4%) in the neoplastic group did not utilize chemoprophylaxis. Two institutions (2.8%) in the degenerative/deformity cohort and one institution (1.4%) in the trauma and cancer cohorts reported “other.”

Prophylactic UFH was statistically more common than LMWH in neoplastic spinal surgery, but not in the degenerative/deformity and trauma groups (cohorts). Further trials are warranted [3)].

2014

An institutional review board-approved retrospective review of outcomes in patients undergoing spine surgery 2 years before protocol implementation (representing the preprotocol group) and of outcomes in patients treated 2 years thereafter (the postprotocol group) was conducted. Inclusion criteria were

that patients were 18 years or older and had been admitted for 1 or more days. Before 2008 (preprotocol), VTE prophylaxis was variable and provider dependent without any uniform protocol. Since 2008 (postprotocol), a new VTE-prophylaxis protocol was administered, starting either preoperatively or on the same day of surgery and continuing throughout hospitalization. The new protocol consisted of 5000 U heparin administered subcutaneously 3 times daily, except in patients older than 75 years or weighing less than 50 kg, who received this dose twice daily. All patients also received sequential compression device. The incidence of VTE in the 2 protocol phases was identified by codes of the International Classification of Diseases, Ninth Revision (ICD-9) codes for deep vein thrombosis (DVT) and pulmonary embolus (PE). Bleeding complications arising from anticoagulation treatments were evaluated by the Current Procedural Terminology (CPT) code for postoperative spinal epidural hematoma (EDH) requiring evacuation.

In total, 941 patients in the preprotocol group met the inclusion criteria: 25 had DVT (2.7%), 6 had PE (0.6%), and 6 had postoperative EDH (0.6%). In the postprotocol group, 992 patients met the criteria: 10 had DVT (1.0%), 5 had PE (0.5%), and 4 had postoperative EDH (0.4%). This reduction in DVT after the protocol's implementation was statistically significant ($p = 0.009$). Despite early aggressive prophylaxis, the incidence of postoperative EDH did not increase and compared favorably to the published literature.

At a high-volume tertiary center, an aggressive protocol for early VTE prophylaxis after spine surgery decreases VTE incidence without increasing morbidity [4].

Between December 2006 and January 2011, 209 patients undergoing spinal surgery (121 males, 88 females; average age: 64 yr), who also had ultrasonographic assessments of both legs before and after surgery, were prospectively assessed. A pneumatic sequential compression device and standard compression stockings were used for primary VTE prophylaxis. In Mie University Hospital protocol, pharmacological agents were not used for VTE prophylaxis after surgery. However, when a distal type DVT was found preoperatively, an anticoagulant medication was administered until 6 hours prior to surgery. After detection of DVTs, weekly ultrasonography assessed the DVT.

Twenty-three patients (11.0%) showed VTE in the spinal surgery perioperative period. Nine patients (4.3%) had VTE (PE with proximal DVT, 1 [0.5%]; distal DVT, 8 [3.8%]) before surgery. In the one case of asymptomatic PE with proximal DVT, an inferior vena cava filter was placed before surgery. Fourteen patients (6.7%) developed new-onset VTE (PE with proximal DVT, 2 [1.0%]; distal DVT, 12 [5.9%]) after spinal surgery. New-onset PE with proximal DVT occurred in 2 patients after surgery. Follow-up ultrasonographic assessment showed that the DVT disappeared completely in 85% (17/20) of patients with a distal type DVT during the perioperative period.

DVT assessment using ultrasonography is important for proper management of VTE during the perioperative period of spinal surgery, especially for high-risk patients, such as those with advanced age or neurological deficit. The institutional protocol for VTE using pneumatic sequential compression device and compression stockings is effective, although the administration of chemoprophylaxis should be considered for high-risk patients, such as those with spinal tumors and spinal trauma [5].

2011

Yu et al., separated 298 spinal patients who had different VTE risk factors into low-, medium- and

high-risk groups for 22 cases, 48 cases and 228 cases respectively. Physical prevention measures such as thigh-length thromboembolic deterrent stockings (TEDS) and pneumatic sequential compression device (PSCD) were used in low- and medium-risk groups. In high-risk groups, low molecular weight heparin(LMWH) was applied in addition to physical prevention measures. Lower limb vascular doppler ultrasonography was used to monitor thrombosis pre- and postoperatively. Simultaneously the occurrences of epidural or wound hematoma, mucosal bleeding, thrombocytopenia caused by low molecular heparin and nerve damage caused by extradural hemorrhage were monitored.

Among the 298 cases of patients with spinal surgery, DVT occurred in 23 cases, the incidence of DVT was 7.7%. There were 0, 2 and 21 patients with positive findings of deep vein thrombosis on duplex ultrasonograph respectively in low-, medium- and high-risk groups. There was no case of PE. All DVT was thrombosis in calf which was distal to the knee. There was no clinical symptom of VTE. The DVT needed no therapy. The vein with thrombosis was recanalized 3 months after operation. No case caught epidural or wound hematoma, mucosal bleeding, thrombocytopenia caused by low molecular heparin or nerve damage caused by extradural hemorrhage.

Individual VTE prophylaxis was taken according to risk stratifications. No VTE of clinical value or no complications from prophylaxis happened. So our prophylaxis is effective and safe. But more prospective, case-control studies are needed to assess the efficacy and safety of VTE prophylaxis [6].

References

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