Deep-Vein Thrombosis Prophylaxis

- Comparative efficacy of certoparin, enoxaparin, and combined thromboprophylaxis on thromboembolic events after glioblastoma resection: a prospective observational study
- Postoperative Initiation of Thromboprophylaxis in patients with Cushing's Disease (PIT-CD): a randomized controlled trial
- Predictors of pulmonary embolism in adult patients following neurosurgery: a Chinese single-center, retrospective study
- Symptomatic venous thromboembolism after transsphenoidal surgery in Cushing's disease: incidence and risk factors
- Does Perioperative Subcutaneous Heparin or Intravenous Tranexamic Acid Affect the Rate of Vascular Complications in Anterior Lumbar Interbody Fusion Procedures?
- Intermittent compression devices as antithrombotic strategy in neurosurgical interventions: a prospective randomized controlled trial (Trial In Prevention of Post-Operative ThromboEmbolic Events)
- Assessing the impact of perioperative allogenic blood transfusion in spinal surgery: a comprehensive systematic review, meta-analysis, and meta-regression analysis
- Deep Venous Thromboembolism Following Ambulatory General Surgery

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Deep-vein thrombosis (DVT) prophylaxis involves measures and interventions aimed at preventing the formation of blood clots (thrombosis) in the deep veins of the body, typically in the legs. DVT is a serious condition that can lead to complications such as pulmonary embolism, where a clot breaks off and travels to the lungs. DVT prophylaxis is particularly important in individuals who are at an increased risk of developing blood clots. Here are some common methods and strategies for DVT prophylaxis:

Early Mobilization: Encouraging patients to move and ambulate as soon as possible after surgery or prolonged periods of immobilization can help prevent blood clots.

Compression Stockings: Graduated compression stockings are tight-fitting stockings that provide pressure to the legs, promoting blood flow and reducing the risk of clot formation.

Pharmacological Prophylaxis: In some cases, healthcare providers may prescribe anticoagulant medications, such as low molecular weight heparin or fondaparinux, to prevent clot formation. These medications help prevent the formation of new clots and the growth of existing ones.

Mechanical Prophylaxis: Devices like intermittent pneumatic compression (IPC) and graduated compression devices (GCDs) are used to help improve blood flow in the legs by intermittently applying pressure to the limbs.

Hydration: Staying well-hydrated can help prevent the blood from becoming too thick and sluggish, reducing the risk of clot formation.

Elevation of Legs: Elevating the legs can help improve blood flow, especially when patients are bedridden.

Smoking Cessation: Smoking increases the risk of blood clot formation, so quitting smoking can be an

important preventive measure.

Maintaining a Healthy Weight: Obesity is a risk factor for DVT, so maintaining a healthy weight through diet and exercise can help reduce the risk.

Avoiding Prolonged Sitting or Standing: When possible, individuals at risk of DVT should avoid prolonged periods of sitting or standing without breaks.

Risk Assessment: Healthcare providers typically assess a patient's risk factors for DVT, such as age, surgery type, and medical history, to determine the most appropriate prophylactic measures.

It's important to note that DVT prophylaxis strategies may vary depending on the specific clinical situation, and healthcare providers will tailor their recommendations to the individual patient's needs. Moreover, some individuals may have contraindications to certain prophylactic measures, such as anticoagulant medications, due to underlying medical conditions or allergies, so a thorough assessment is crucial.

Options

1. general measures

a) passive range of motion

b) ambulate appropriate patients as early as possible

2. mechanical techniques (minimal risk of complications):

a) pneumatic compression boots [1] (PCBs) or sequential compression devices (SCDs): reduces the incidence of DVTs and probably PEs. Do not use DVTs already present. Continue use until the patient is able to walk 3–4 hrs per day.

b) TED Stockings®:(TEDS) applies graduated pressure, higher distally. As effective as PCB. No evidence that the benefit is additive [2]

Care should be taken to avoid a tourniquet effect at the proximal end (note: TEDS® is a registered trademark. “TED” stands for thromboembolic disease)

c) Electrostimulation of calf muscles.(Neuromuscular electrostimulation)

d) rotating beds

3. anticoagulation; see also contraindications and considerations of anticoagulation in neurosurgery

a) full anticoagulation is associated with perioperative complications

“low-dose”anticoagulation(low-dose heparin):5000 IUSQq8or12hrs,starting 2hrs pre-op or on admission to hospital. Potential for hazardous hemorrhage within brain or spinal canal has limited its use low molecular weight heparins and heparinoids: not a homogeneous group. Efficacy in neurosurgical prophylaxis has not been determined aspirin:role in DVT prophylaxis is limited because ASA inhibits platelet aggregation, and platelets play only a minor role in DVT

4. combination of PCBs and “mini-dose” heparin starting on the morning of post-op day 1 (with no evidence of significant complications)65

Risk group	Estimated risk of calf DVT	Typical neurosurgical patients	Treatment recommendation
low risk	< 10%	age < 40 yrs, minimal general risk factors, surgery with < 30 minutes general anesthesia	no prophylaxis, or PCB/TEDS
moderate risk	10–40%	age ≥ 40 yrs, malignancy, prolonged bed rest, extensive surgery, varicose veins, obesity, surgery > 30 minutes duration (except simple lumbar discectomy), SAH, head injury	PCB/TEDs; or for patients without ICH or SAH, mini-dose heparin
high risk	40–80%	history of DVT or PE, paralysis[b] (para- or quadriplegia or hemiparesis), brain tumor (especially meningioma or malignant glioma)	PCB/TEDS + (in patients without ICH or SAH) mini-dose heparin

VT = deep venous thrombosis, PCB = pneumatic compression device, TEDS = TED (thromboembolic disease) Stockings®, ICH = intracerebral hemorrhage, SAH = subarachnoid hemorrhage

b: see specifics regarding Deep vein thrombosis prophylaxis in cervical spinal cord injury.

Thromboprophylaxis in Spinal Surgery

see Thromboprophylaxis in Spinal Surgery

Thromboprophylaxis in Traumatic brain injury

see Thromboprophylaxis in Traumatic brain injury.

Thromboprophylaxis after Intracerebral Hemorrhage

see Thromboprophylaxis after Intracerebral Hemorrhage.

Prophylaxis for VTE includes sequential compression devices (nonpharmacological) and low-dose anticoagulant medications (pharmacological). Although there are numerous publications addressing venous thromboembolism and its prevention in neurosurgery, there are relatively few high-quality studies to guide decisions regarding thromboprophylaxis [3].

Studies of pneumatic compression in cardiac surgery and neurosurgical patients have shown a distinct improvement in the incidence of deep venous thrombosis (DVT) without the added risk of bleeding.

However, the effect is less impressive in higher-risk patients, and compliance can be difficult. Timing and duration of prophylactic agents has also been determined to have a significant effect the development of DVT. Early prophylaxis in surgical patients with low molecular weight heparin (LMWH) has been associated with significant reductions in postoperative venous thrombosis. A study by Hull

et al found that initiation of therapy within 8 hours of surgery had the greatest effect.

The ninth edition of the clinical practice guidelines for prevention of venous thromboembolism (VTE) from the American College of Chest Physicians (ACCP) recommended that LMWH be given to patients undergoing major orthopedic procedures at least 12 hours preoperatively or postoperatively.

Venous thromboembolism is the most common preventable cause of death in surgical patients. Thromboprophylaxis, using mechanical methods to promote venous outflow from the legs and antithrombotic drugs, provides the most effective means of reducing morbidity and mortality in these patients. Despite the evidence supporting thromboprophylaxis, it remains underused because surgeons perceive that the risk of venous thromboembolism is not high enough to justify the potential hemorrhagic complications of anticoagulant use. The risk of venous thromboembolism is determined by patient characteristics and by the type of surgery that is performed. In this paper we identify the risk factors for venous thromboembolism and provide a scheme for stratifying surgical patients according to their risk. We describe the mechanism of action of the various forms of thromboprophylaxis and outline the evidence supporting thromboprophylaxis in different surgical settings. Finally, we recommend optimal forms of thromboprophylaxis in patients who undergo various types of surgery. Intermittent pneumatic compression, with or without elastic stockings, can be used for thromboprophylaxis in patients who undergo neurosurgical procedures; for patients who undergo vascular or cardiovascular procedures, long-term acetylsalicylic acid should be used for thromboprophylaxis. Low-molecular-weight heparin (LMWH) or warfarin is the choice for patients with spinal cord operations and all patients with major trauma who do not have contraindications to anticoagulation should receive thromboprophylaxis with LMWH [4)].

Unfractionated heparin (UFH), low molecular weight heparin or fondaparinux are recommended for venous thromboembolism (VTE) prophylaxis in acutely ill medical patients.

Systematic Reviews

Deep-Vein Thrombosis Prophylaxis Systematic Reviews.

References

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