

Trombose preventie in dagchirurgie



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Gebaseerd op

- ⦿ 9 th ACCP guidelines 2012 en update 2014
- ⦿ Sign 2010 guidelines
- ⦿ NICE guidelines 2010
- ⦿ American association orthopedic surgeons guidelines
- ⦿ Consensus vergadering riziv 21/11/2013
- ⦿ Peer reviewed artikels in web of science / pubmed

Risicofactoren DVT en longembolen

- ⦿ **Leeftijd (1- ...)**
 - ⦿ Gedaalde mobiliteit
 - ⦿ Co-morbiditeit (ASA classificatie)
 - ⦿ Verminderde musculaire tonus venen
 - ⦿ Verminderde kleptonus venen
- ⦿ **Heelkunde (x5-50)**
- ⦿ **Actieve maligniteit (X5-20)**
- ⦿ **Immobiliteit > 3d (gips , ziekenhuisopname , ...) (X5-50)**
- ⦿ **Trombofilie (x 1.5-20 afh van stollingstoornis)**
- ⦿ **Zwangerschap en postpartum (X2-5)**
- ⦿ **Varices met flebitis (1-...)**
- ⦿ **Orale anticonceptie , hormonale substitutie , anti-oestrogenen (x2-7)**

Risicofactoren DVT en longembolen

- ⊖ Persoonlijk of familiale voorgeschiedenis van DVT (X5-20)
- ⊖ Obesitas : x2-3 als $BMI > 30 \text{ kg/m}^2$
- ⊖ Langdurige reis (X2-4)
- ⊖ Acute medische aandoening (AMI , metabool syndroom , inflammatoire darmziekte , ...) (X3-10)
- ⊖ Trauma (x5-50)
- ⊖ Centraal veneuze catheter (x2-4)

Tabel 13: Voornaamste types trombofilie (geïnspireerd door Middeldorp 2011, Lijfering 2010)

Biologische trombofilie	Aangeboren	Verworven	Gemengd/ onbekend*	RR**
Gebrek aan antitrombine	X			15-20
Gebrek aan proteïne C	X			15-20
Gebrek aan proteïne S	X			15-20
Factor V Leiden	X			5-7
FIIG20210A [#]	x			2-3
Dysfibrinogenemie	X			
Antifosfolipidesyndroom (APS)		X		
- lupus anticoagulans				3-10
- anticardiolipineantistoffen				2-4
- antiß2 GPI-antistoffen				2-4
Verhoging van Factor VIII			X	3-5
Verhoging van Factor IX			X	2-3
Verhoging van Factor XI			X	1.5-2.5
Verhoging van fibrinogeen			X	
Hyperhomocysteïnemie			X	1.5-2.5
Verhoging van TAFI [#]			X *	1.5-2.5
Vermindering van TFPI [§]			X *	
geactiveerde-proteïne-C-resistentie in afwezigheid van Factor V Leiden			X	3-5

* Mutatie 20210A van het protrombine-gen # trombine activeerbare fibrinolyseremmer § tissue factor pathway inhibitor ** RR= relatief risico voor een 1ste VTE-episode in vergelijking met de algemene bevolking

Tabel 26: Risico afhankelijk van operatie (ACCP richtlijn 2012)

Levels of Thromboembolism Risk and Recommended Thromboprophylaxis in Hospital Patients		
Levels of Risk	Approximate DVT Risk Without Thrombo- prophylaxis, %	Suggested Thromboprophylaxis Options
Low risk		
Minor surgery in mobile patients	<10	No specific thromboprophylaxis
Medical patients who are fully mobile		Early and "aggressive" ambulation
Moderate risk		
Most general, open gynecologic or urologic surgery patients	10-40	LMWH (at recommended doses), LDUH 2 or 3 times daily, fondaparinux
Medical patients (bed rest or sick) Moderate VTE risk plus high bleeding risk		Mechanical thromboprophylaxis
High risk		
Hip or knee arthroplasty, hip fracture surgery	40-80	LMWH (at recommended doses), fondaparinux, oral vitamin K antagonist (INR 2-3)
Major trauma, spinal cord injury High VTE risk plus high bleeding risk		Mechanical thromboprophylaxis

Farmacologische profylaxe

Medicatie (preventief)	merknaam	dosis
Enoxaparine lage dosis	Clexane®	20 mg Sc / België 40 mg Sc
Enoxaparine hoge dosis	Clexane®	40 mg SC / België 1 mg/kg/d
Dalteparine lage dosis	Fragmin®	2500 IE Sc
Dalteparine hoge dosis	Fragmin®	5000 IE Sc in 1 of 2 toedieningen /d
Nadroparine lage dosis	Fraxiparine®	0.3-0.4 ml Sc
Nadroparine hoge dosis	Fraxiparine®	0.6 ml Sc
Tinzaparine lage dosis	Innohep®	50 IE/kg/d (3500 IE)
Tinzaparine hoge dosis	Innohep®	4500 IE Sc
Heparine	Heparine	aptt 40 s
Fondaparinux	Arixtra®	2.5 mg Sc
Apixaban	Eliquis®	2*2.5 mg/d in 2 giften
Dabigatran	Pradaxa®	2*110 mg/d in 1 gift
Rivaroxaban	Xarelto®	10 mg/d
Vitamine K antagonisten	Sintrom®, Marevan®, Marcoumar®	INR 1.5
Acetyl salicylzuur		80-100 mg

Mechanische profylaxe

- ⦿ **Anti-embool kousen (knie of dijhoogte)**
 - ⦿ Enkel druk 14-18 mm Hg
 - ⦿ Kuitdruk 14-15 mm Hg
- ⦿ **Intermittente pneumatische compressie**
- ⦿ **Voet impulse devices**

Do not offer anti-embolism stockings to patients who have:

- ⊖ suspected or proven peripheral arterial disease
- ⊖ peripheral arterial bypass grafting
- ⊖ peripheral neuropathy or other causes of sensory impairment
- ⊖ any local conditions in which stockings may cause damage, for example fragile 'tissue paper' skin, dermatitis, gangrene or recent skin graft
- ⊖ known allergy to material of manufacture
- ⊖ cardiac failure
- ⊖ severe leg oedema or pulmonary oedema from congestive heart failure
- ⊖ unusual leg size or shape
- ⊖ major limb deformity preventing correct fit.

► Table 5 : Stratification du risque hémorragique en fonction du type de procédure.

Haut (Risque de saignement majeur à 2 jours – 2 à 4%)	
Remplacement de valve cardiaque	
Bypass corono-artériel	
Intervention sur un anévrisme aortique abdominal	
Intervention chirurgical en cancérologie - neurochirurgical/ urologique/ tête et cou/abdominal/ sein	
Remplacement de genou bilatéral	
Laminectomie	
Résection prostatique transurétrale	
Biopsie rénale	
Polypectomie traitement des varices, sphinctérotomie biliaire, dilatation pneumatique	
Placement d'une gastrostomie endoscopique percutanée	
Extractions dentaires multiples	
Chirurgie vasculaire et générale	
Toutes opérations majeures (d'une durée de plus de 45 minutes)	
Basse (Risque de saignement majeur à 2 jours – 0 à 2%)	
Cholécystectomie	
Hystérectomie abdominale	
Endoscopie gastrointestinale ± biopsie, entéroscopie, stent bilaire/pancréatique sans sphincterotomie, endoscopie sans « fine-needle aspiration »	
Insertion d'un pacemaker et de défibrillateur cardiaque ou test electrophysiologique	
Extractions dentaires simple	
Intervention au niveau du canal carpien	
Replacement de genou/ hanche et chirurgie au niveau des épaules/pied/main et arthroscopie	
Dilatation et curetage	
Excision d'un cancer de la peau	
Hernie abdominale	
Chirurgie hémorroïdaire	
Dissection de noeud axillaire	
Hydrocèle	
Chirurgie au niveau de la cataracte et intervention au niveau des yeux autres que la cataracte	
Angiographie non-coronarienne	
Bronchoscopie ± biopsie	
Retrait d'un cathéter veineux central	
Biopsies au niveau cutanée/ rate / prostate / thyroïde/ seins/ ganglions lymphatiques	

Caprini score

Tabel IV: Caprini score (11)

Deep Vein Thrombosis (DVT)
Prophylaxis Orders
 (For use in Elective General Surgery Patients)

**Thrombosis Risk Factor Assessment
 (Choose all that apply)**

Each Risk Factor Represents 1 Point		Each Risk Factor Represents 2 Points	
<input type="checkbox"/> Age 41-60 years <input type="checkbox"/> Acute myocardial infarction <input type="checkbox"/> Swollen legs (current) <input type="checkbox"/> Congestive heart failure (<1 month) <input type="checkbox"/> Varicose veins <input type="checkbox"/> Medical patient currently at bed rest <input type="checkbox"/> Obesity (BMI >25) <input type="checkbox"/> History of inflammatory bowel disease <input type="checkbox"/> Minor surgery planned <input type="checkbox"/> History of prior major surgery (<1 month) <input type="checkbox"/> Sepsis (<1 month) <input type="checkbox"/> Abnormal pulmonary function (COPD) <input type="checkbox"/> Serious lung disease including pneumonia (<1 month) <input type="checkbox"/> Oral contraceptives or hormone replacement therapy <input type="checkbox"/> Pregnancy or postpartum (<1 month) <input type="checkbox"/> History of unexplained stillborn infant, recurrent spontaneous abortion (≥ 3), premature birth with toxemia or growth-restricted infant <input type="checkbox"/> Other risk factors: _____		<input type="checkbox"/> Age 61-74 years <input type="checkbox"/> Central venous access <input type="checkbox"/> Arthroscopic surgery <input type="checkbox"/> Major surgery (>45 minutes) <input type="checkbox"/> Malignancy (present or previous) <input type="checkbox"/> Laparoscopic surgery (>45 minutes) <input type="checkbox"/> Patient confined to bed (>72 hours) <input type="checkbox"/> Immobilizing plaster cast (<1 month)	
Subtotal:		Subtotal:	
Each Risk Factor Represents 5 Points		Each Risk Factor Represents 3 Points	
<input type="checkbox"/> Stroke (<1 month) <input type="checkbox"/> Multiple trauma (<1 month) <input type="checkbox"/> Elective major lower extremity arthroplasty <input type="checkbox"/> Hip, pelvis or leg fracture (<1 month) <input type="checkbox"/> Acute spinal cord injury (paralysis) (<1 month)		<input type="checkbox"/> Age 75 years or older <input type="checkbox"/> Family History of thrombosis* <input type="checkbox"/> History of DVT/PE <input type="checkbox"/> Positive Prothrombin 20210A <input type="checkbox"/> Positive Factor V Leiden <input type="checkbox"/> Positive Lupus anticoagulant <input type="checkbox"/> Elevated serum homocysteine <input type="checkbox"/> Heparin-induced thrombocytopenia (HIT) <i>(Do not use heparin or any low molecular weight heparin)</i> <input type="checkbox"/> Elevated anticardiolipin antibodies <input type="checkbox"/> Other congenital or acquired thrombophilia If yes: Type _____ * most frequently missed risk factor	
Subtotal:		Subtotal:	
TOTAL RISK FACTOR SCORE: _____			

Prophylaxis Regimen

Total Risk Factor Score	Incidence of DVT	Risk Level	Prophylaxis Regimen	Legend
0-1	<10%	Low Risk	No specific measures: early ambulation	ES - Elastic Stockings IPC - Intermittent Pneumatic Compression LDUH - Low Dose Unfractionated Heparin LMWH - Low Molecular Weight Heparin Fac Xa - Factor X Inhibitor
2	10-20%	Moderate Risk	ES or IPC or LDUH, or LMWH	
3-4	20-40%	High Risk	IPC or LDUH, or LMWH alone or in combination with ES or IPC	
5 or more	40-80% 1-5% mortality	Highest Risk	Pharmacological: LDUH, LMWH*, Warfarin*, or Fac Xa* alone or in combination with ES or IPC	

Caprini JA.Risk assessment as a guide for the prevention of the many faces of venous thromboembolism.
 American journal of surgery 2010;199(1 Suppl): S3-10.

Prospectieve studie VTE en caprini score in dagkliniek **American College of Surgeons (National Surgical Quality Improvement Program)**

Program) Ann Surg. 2012 Jun;255(6):1093-9. identifying patients at high risk for venous thromboembolism requiring treatment after outpatient surgery. Pannucci CJ, Shanks A, Moote MJ, Bahl V, Cederna PS, Naughton NN, Wakefield TW, Henke PK, Campbell DA, Kheterpal S.

- ⦿ **30 d VTE risico in dagkliniek = 0.15%**

- ⦿ **Hoge Caprini score= 1.18% VTE**
- ⦿ **Lage Caprini score = 0.06% VTE**

- ⦿ **Contra deze studie**
 - ⦿ Geen informatie over LMGH preventie
 - ⦿ Geen informatie over voorgeschiedenis VTE pt of familie



Probleem Caprini score !!!!!!!!

Prospectieve studie VTE en Caprini score in dagkliniek American College of Surgeons (*National Surgical Quality Improvement Program*)

⌚ 9 risicofactoren voor VTE:

- ⌚ BMI > 40 (OR 1,81)
- ⌚ Maligniteit (OR 3,66)
- ⌚ Zwangerschap (OR 7,88)
- ⌚ ≥60j (OR 2,48)
- ⌚ 40-59j (OR 1,72)
- ⌚ Operatieduur > 120 min (OR 1,69)
- ⌚ Artroscopie (OR 1,56)
- ⌚ Heelkunde safenofemorale junctie (OR 13,20)
- ⌚ Veneuze heelkunde maar niet van de VSM (OR 15,61)

Rogers-score:

Risk Factor	Risk Score Points
Operation type other than endocrine:	
Respiratory and hernic	9
Thoracoabdominal aneurysm, embolectomy/ thrombectomy, venous reconstruction, and endovascular repair	7
Aneurysm	4
Mouth, palate	4
Stomach, intestines	4
Integument	3
Hernia	2
ASA physical status classification:	
3, 4, or 5	2
2	1
Female sex	1
Work RVU:	
> 17	3
10-17	2
Two points for each of these conditions:	2
Disseminated cancer	
Chemotherapy for malignancy within 30 d of operation	
Preoperative serum sodium > 145 mmol/L	
Transfusion > 4 units packed RBCs in 72 h before operation	
Ventilator dependant	
One point for each of the conditions:	1
Wound class (clean/contaminated)	
Preoperative hematocrit level ≤ 38%	
Preoperative bilirubin level > 1.0 mg/dL	
Dyspnea	
Albumin level ≤ 3.5 mg/dL	
Emergency	
Zero points for each of these conditions:	0
ASA physical status class 1	
Work RVU < 10	
Male sex	

ASA = American Society of Anesthesiologists; RVU = relative value unit

Rogers score

- ☞ Type operatie
- ☞ Pt kenmerken
- ☞ Labo

MAAR:

- ☞ Niet extern gevalideerd
- ☞ Omslachtig
- ☞ Profylaxe niet vermeld in artikel

Table 3

Risk of Deep Venous Thrombosis and Pulmonary Embolism in Surgical Patients

Risk Category	Examples	Preventive Measures	Risk of DVT/PE (%)			
			Cuff	Proximal	PE	Fatal PE
Low	Nonmajor surgery* in patients < 40 yr with no clinical risk factors	Early and aggressive ambulation	2	0.4	0.2	0.002
Moderate	Nonmajor surgery in patients with risk factors Minor surgery in patients 40–60 yr with no clinical risk factors Major surgery in patients < 40 yr with no other clinical risk factors Immobobilized patients with major medical illnesses	LDUH q 12 h, LMWH, fondaparinux , or IPC, with or without elastic stockings	10 ~20	2–4	1–2 ~0.4	0.1
High	Nonmajor surgery in patients > 60 yr or 40–60 with risk factors Major surgery in patients > 40 yr or with other clinical risk factors	LDUH q 8 h, LMWH, fondaparinux , or IPC	20 ~40	4–8	2–4 ~1.0	0.4
Very high	Major surgery in patients > 40 yr who have had a previous venous thromboembolic, malignant, or hypercoagulability disorder In patients of any age: • Hip or knee arthroplasty • Hip fracture surgery • Elective neurosurgery • Multiple trauma • Spinal cord injury	LMWH, oral anticoagulation, IPC, or elastic stockings plus either LDUH q 8 h or LMWH Fondaparinux if patients have had orthopedic, abdominal, or thoracic surgery or have an acute, severe illness	40 ~60	10–20 ~10	4 ~10	0.2–5

*Nonmajor surgery is defined here as an operation that does not involve general anesthesia or respiratory assistance.

DVT = deep venous thrombosis; PE = pulmonary embolism; LDUH = low-dose unfractionated heparin; LMWH = low molecular weight heparin; IPC = intermittent pneumatic compression.

Adapted with permission from Geerts WH, Heit JA, Clagett GP, et al: Prevention of venous thromboembolism. *Chest* 119:132S–175S, 2001.

- Heel laag risico voor VTE (<0,5%): Rogers-score < 7 en Caprini-score van 0
- Laag risico (ca. 1,5%): Rogers-score van 7 à 10 en Caprini-score van 1 à 2
- Matig risico (3,0%): Rogers-score > 10 en Caprini-score van 3 à 4
- Hoog risico op VTE (ca. 6%): Caprini-score van 5 of meer

Artroscopie

- ⦿ Artroscopie van de knie zonder voorgeschiedenis VTE : geen thromboprophylaxie (Grade 2B).
- ⦿ Liever snelle en frequente mobilisatie bij laag risico ptn (Caprini 0)

Artroscopie

De literatuurstudie toont wel efficiëntie van LMWH versus elastische compressie kousen en versus placebo bij artroscopie van de knie, dit op het vlak van distale DVT gediagnosticeerd door echografie. Het klinisch nut is echter niet zeker. Er is **geen sterke evidentie die aantoont dat tromboprofylaxe effectief en veilig is bij mensen met onbekende risicofactoren, die een artroscopie van de knie ondergaan.**(Ramos 2008)

Bij elke patiënt moet eerst een risico inschatting gebeuren alvorens tromboprofylaxie op te starten, zoals ook alle richtlijnen adviseren (zie tabel 14 (punt 1.3.)).

Enkel bij patiënten met sterk verhoogd risico (zie vraag 1) raadt de jury LMWH aan in een lage preventieve dosis, 12 uren postop op te starten tot volledige mobilisatie. (sterke aanbeveling)

ACCP Orthopedic Prevention vermeldt als risicofactoren voor VTE: eerder VTE, cardiovasculaire aandoening, Charlson comorbiditeitsindex 3 of meer, BMI meer dan 25 kg/m², leeftijd, gevorderde leeftijd 85 jaar of ouder, spataders en rondwandelen voor dag 2 na chirurgie. Echter de auteurs verdui-

Artroscopie

Naargelang dit risico raadt de jury aan, in overeenstemming met de bestaande richtlijnen en ACCP 2012 in het bijzonder, om

- geen tromboprofylaxe op te starten bij heel laag risico (<0,5%),
- enkel mechanische profylaxe bij laag risico (ca 1,5%),
- mechanische of farmacologische profylaxe bij matig risico (3,0%)
- een dubbele tromboprofylaxe bij hoog risico (ca 6%).

De behandelingsduur wordt niet vermeld in de richtlijnen, behalve bij NICE 2010 waar aangeraden wordt om te stoppen met de tromboprofylaxe wanneer de patiënt terug mobiel is wat meestal het geval is na 5 à 7 dagen. (zwakke aanbeveling)

Cholecystectomy

for symptomatic venous thromboembolism following cholecystectomy. Strömberg J , Sadr-Azodi O, Videhult P, Hammarqvist F, Sandblom G.

Conclusion:

The incidence of VTE after cholecystectomy is low and thromboembolism prophylaxis (TP) increases the risk for postoperative bleeding. Patients with previous VTE events should be given TP when undergoing cholecystectomy.

Varices stripping

(Vasc Med. 2015 Jan 19. nt) Postoperative prophylaxis of venous thromboembolism

(VTE) in patients undergoing high ligation and stripping of the great saphenous vein (GSV). Wang H , Sun Z , Jiang W , Zhang Y , Li X , Wu Y .

- **Gerandomiseerd**
- **2196 ptn (A: geen profylaxie , B: Heparine 125U/ kg SC , C: LMGH 6000 IU eenmaal daags , D: LMGH 4000 IE 2 maal daags)**
- **VTE en majeure bloeding na 1m na heelkunde**
- **DVT en longembolen hoger in groep A (DVT 5.17%, PE 1.48%) in vgl met B (0.56%, 0%), C (0.35%, 0%) and D (0.36%, 0%) (p<0.01).**
- **Geen verschil ts 3 heparine groepen voor VTE**
- **Wel meer bloeding in groep B tov LMGH (0.75 % tov group A 0.18%; group C 0.17%; group D 0.18%, p<0.01).**



Patient Safety Toolkit: Ambulatory Surgery and VTE (Venous Thromboembolism)

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Patient Safety Toolkit: Ambulatory Surgery and VTE (Venous Thromboembolism)

PRE-PROCEDURE SCREENING

- Screening for risk of VTE has been shown to have a high positive predictive value.⁹
- There are published recommendations on screening and chemoprophylaxis; however, there are documented gaps in care because of concern with bleeding risk and perceived lack of evidence and lack of awareness of these published recommendations.^{3, 10, 11} National health care organizations have issued several guidelines regarding VTE over the last decade.^{12, 13, 14, 15, 16, 17, 18}

CAPRINI THROMBOSIS RISK FACTOR ASSESSMENT TOOL*

Add 1 point for each of the following statements that apply now or within the past month:

<input type="checkbox"/> Age 41–60 years	<input type="checkbox"/> A history of Inflammatory Bowel Disease (IBD) e.g., Crohn's disease or ulcerative colitis	<input type="checkbox"/> Heart attack	<input type="checkbox"/> On bed rest or restricted mobility, including a removable leg brace for less than 72 hours
<input type="checkbox"/> Minor surgery (less than 45 minutes) is planned	<input type="checkbox"/> Swollen legs (current)	<input type="checkbox"/> Congestive heart failure	<input type="checkbox"/> Other risk factors (1 point each)*
<input type="checkbox"/> Past major surgery (more than 45 minutes) within the last month	<input type="checkbox"/> Overweight or obese (BMI>25)	<input type="checkbox"/> Serious infection e.g., pneumonia	
<input type="checkbox"/> Visible varicose veins		<input type="checkbox"/> Lung disease e.g., emphysema or COPD	
			*Additional risk factors not tested in the validation studies but shown in the literature to be associated with thrombosis include BMI above 40, smoking, diabetes requiring insulin, chemotherapy, blood transfusions, and length of surgery over 2 hours.

*For more information or to download scoring sheets, visit www.IISMS.org

Add 2 points for each of the following statements that apply:

<input type="checkbox"/> Age 61–74 years	<input type="checkbox"/> Tube in blood vessel in neck or chest that delivers blood or medicine directly to heart within the last month (also called central venous access, PICC line, or port)	<input type="checkbox"/> Age 75 or over	<input type="checkbox"/> Personal or family history of positive blood test indicating an increased risk of blood clotting
<input type="checkbox"/> Current or past malignancies (excluding skin cancer, but not melanoma)	<input type="checkbox"/> Confined to a bed for 72 hours or more	<input type="checkbox"/> History of blood clots, either DVT or PE	
<input type="checkbox"/> Planned major surgery lasting longer than 45 minutes (including laparoscopic and arthroscopic)		<input type="checkbox"/> Family history of blood clots (thrombosis)	
<input type="checkbox"/> Non-removable plaster cast or mold that has kept you from moving your leg within the last month			

For women only: Add 1 point for each of the following statements that apply:

<input type="checkbox"/> Current use of birth control or Hormone Replacement Therapy (HRT)	<input type="checkbox"/> History of unexplained stillborn infant, recurrent spontaneous abortion (more than 3), premature birth with toxemia or growth restricted infant	<input type="checkbox"/> Elective hip or knee joint replacement surgery	<input type="checkbox"/> Spinal cord injury resulting in paralysis
<input type="checkbox"/> Pregnant or had a baby within the last month		<input type="checkbox"/> Broken hip, pelvis or leg	<input type="checkbox"/> Experienced a stroke

Score Risk Level
0-2 Low
3-8 Increasing
>8 18.3%⁸

PREVENTION

- Positioning** - Flex the patient's knees to approximately five degrees by placing a pillow underneath them.^{2, 11}
- Compression** - Elastic stockings or intermittent pneumatic compression devices (IPCs). Surgeons should be aware that many offices now have intermittent compression machines, having purchased them new or used, leased them, or rented them on a case-by-case basis.²⁴ IPCs placed and operational before the induction of anesthesia (especially for lengthy procedures or those performed under general anesthesia) may decrease the DVT risk of procedures performed by 28%.²³
- Discontinue supplemental hormones** one week prior to the procedure.²
- Chemoprophylaxis** - Anticoagulants such as low-molecular-weight heparins (LMWH) given two hours before surgery, have been shown to protect patients throughout the peri-operative period. The risks of DVT must always be weighed against the risk of increased bleeding in any given patient. Prophylaxis should be provided for 7-10 days, or at least until resumption of normal ambulation, because the median time-to-event has been reported as 8 days.^{19, 25, 26}
- Anesthesia** - Immobility associated with general anesthesia may be a significant risk factor for VTE. Intravenous sedation including propofol can allow surgeons to perform lengthy surgeries without general anesthesia.
- Stage multiple procedures** - The length of the procedure itself increases the risk for many complications including VTE.
- Early ambulation** - This should occur at the facility and be a part of post-discharge instructions.

SIGNS, SYMPTOMS, AND MANAGEMENT

- DVT signs include warmth, tenderness, and swelling. PE is associated with difficulty breathing and chest pain.²⁷ Physicians should be suspect VTE when patients exhibit these symptoms and have recently had any surgery.
- These can be life threatening situations; rapid diagnosis and treatment is very important.
- Suspicions should lead to immediate testing. The test recommended to confirm DVT is ultrasound with Doppler.²⁸ Chest x-rays are recommended to confirm PE.²⁹
- Treatment: DVT may be treated with thrombolytics in the outpatient; however this requires careful patient selection and there are a number of factors that may lead to inpatient treatment options.³⁰

VTE and Ambulatory Surgery

- Some procedures most commonly performed in the ambulatory setting have relatively high risks for VTE. Examples of estimated risks include:

For aesthetic procedures:

abdominoplasty - 2%²

body contouring - 9.3%³

face lifts - 0.49%⁴

high volume liposuction - 1.1%⁵

For orthopaedic procedures:

spine surgery - 1.15%⁶

knee arthroscopy - 0.42%⁷

For otolaryngology procedures the risk is 1.3%.

- For a Caprini score (see Caprini Thrombosis Risk Assessment Tool) over 8, the incidence increases to 18.3%.⁸

2. Most D, Karlow J, Heller J, Shermak M. Thromboembolism in plastic surgery. *Plast Reconstr Surg*. 2005; 115:20e-30e.

3. Clavijo-Alvarez JA, Pannucci CJ, Oppenheimer AJ, Wilkins EG, Rubin JP. Prevention of venous thromboembolism in body contouring surgery: a national survey of 696 ASPS surgeons. *Ann Plast Surg*. 2011; 66:228-232.

4. Reinsch JF, Basmick SD, Walker JW, Rossi RF. Deep venous thrombosis and pulmonary embolus after face lift. *Plast Reconstr Surg*. 2001; 107:1570-1575.

5. Heu P, Bleau CB, Venturini M, Davison S. Venous thromboembolism prophylaxis. *Semin Plast Surg*. 2006; 20:225-232.

6. Sansone JM, del Rio AM, Anderson PA. The prevalence of and specific risk factors for venous thromboembolic disease following elective spine surgery. *J Bone Joint Surg Am*. 2010; 92:304-313.

7. Mahrer GB, Inacio MC, Reynolds SJ, Finsen PT. Incidence of symptomatic venous thromboembolism after elective knee arthroscopy. *J Bone Joint Surg Am*. 2012; 94:714-720.

8. Shuman AG, Hu HM, Pannucci CJ, Jackson CR, Bradford CR, Bahl V. Stratifying the risk of venous thromboembolism in otolaryngology. *Otolaryngol Head Neck Surg*. 2012; 146:719-724.

ACCP guidelines

3.6.1. For general and abdominal-pelvic surgery patients at very low risk for VTE (< 0.5%; Rogers score, < 7; Caprini score, 0), we recommend that no specific pharmacologic (Grade 1B) or mechanical (Grade 2C) prophylaxis be used other than early ambulation.

3.6.2. For general and abdominal-pelvic surgery patients at low risk for VTE (~1.5%; Rogers score, 7-10; Caprini score, 1-2), we suggest mechanical prophylaxis, preferably with intermittent pneumatic compression (IPC), over no prophylaxis (Grade 2C).

3.6.3. For general and abdominal-pelvic surgery patients at moderate risk for VTE (~3.0%; Rogers score, > 10; Caprini score, 3-4) who are not at high risk for major bleeding complications, we suggest low-molecular-weight heparin(LMWH) (Grade 2B), low-dose unfractionated heparin(LDUH) (Grade 2B),or mechanical prophylaxis, preferably with IPC (Grade 2C),over no prophylaxis.

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Table 23 —Recommendations for Thromboprophylaxis in Various Risk Groups

Risk of Symptomatic VTE	Risk and Consequences of Major Bleeding Complications	
	Average Risk (~1%)	High Risk (~2%) or Severe Consequences
Very low (< 0.5%)		No specific prophylaxis
Low (~1.5%)		Mechanical prophylaxis, preferably with IPC
Moderate (~3.0%)	LDUH, LMWH, or mechanical prophylaxis, preferably with IPC	Mechanical prophylaxis, preferably with IPC
High (~6.0%)	LDUH or LMWH <i>plus</i> mechanical prophylaxis with ES or IPC	Mechanical prophylaxis, preferably with IPC, until risk of bleeding diminishes and pharmacologic prophylaxis can be added
High-risk cancer surgery	LDUH or LMWH <i>plus</i> mechanical prophylaxis with ES or IPC <i>and</i> extended-duration prophylaxis with LMWH postdischarge	Mechanical prophylaxis, preferably with IPC, until risk of bleeding diminishes and pharmacologic prophylaxis can be added
High risk, LDUH and LMWH contraindicated or not available	Fondaparinux or low-dose aspirin (160 mg); mechanical prophylaxis, preferably with IPC; or both	Mechanical prophylaxis, preferably with IPC, until risk of bleeding diminishes and pharmacologic prophylaxis can be added

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