Guidelines

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SURGICAL ENDOSCOPY
and Other Interventional Techniques

Guidelines for deep venous thrombosis prophylaxis during laparoscopic surgery

This Guideline was developed by the Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) Guidelines Committee and approved by the SAGES Board of Governors October 2006

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There is still some controversy over the best practice for prevention of deep vein thrombosis (DVT) during laparoscopic surgery. This guideline is intended to assist surgeons in making decisions regarding DVT prophylaxis when performing laparoscopic procedures. Although there are examples of specific procedures, the basic philosophy is that the prophylactic therapy be tailored to the individual patient needs based on estimated risk of venous thromboembolic (VTE) disease. In this regard, there may be a specific procedure that has a variety of treatment strategies for varying clinical scenarios. Recommendations are based on the current medical evidence and have been graded according to the available evidence. Where data only exist for open surgical procedures, we adapt these data, and note a lower evidence and/or recommendation rating.

Disclaimer

Clinical practice guidelines are intended to indicate the best available approach to medical conditions as established by systematic review of available data and expert opinion. The approach suggested may not necessarily be the only acceptable approach given the complexity of the health care environment. These guidelines are intended to be flexible, as the physician must always choose the approach best suited to the individual patient and variables in existence at the moment of decision. These guidelines are applicable to all physicians who are appropriately credentialed and address the clinical situation in question, regardless of specialty.

Guidelines are developed under the auspices of the Society of Gastrointestinal and Endoscopic Surgeons and its various committees, and approved by the Board of Governors. Each guideline is developed with a systematic approach, and includes review of the available literature and expert opinion when published data alone are insufficient to make recommendations. All guidelines undergo appropriate multidisciplinary review prior to publication, and recommendations are considered valid at the time of publication. Because new developments in medical research and practice can change recommendations, all guidelines undergo scheduled, periodic review to reflect any changes. The systematic development process of clinical practice guidelines began in 2005, and will be applied to all revisions as they come up for scheduled review, as well as all new guidelines.

Risk Stratification (Table 1)

Operative factors

Laparoscopic surgery of all types causes serum hypercoagualability of varying degrees (level I, II evidence) [1, 2]. Shorter (less than one hour) and less complex laparoscopic procedures such as simple laparoscopic cholecystectomy probably have low risk of VTE disease (level III evidence)[2]. Longer/complex laparoscopic procedures such as laparoscopic roux-en-y gastric bypass are higher risk (level II evidence) [3]. Although patient positioning may alter DVT risk, there is not enough significant evidence to suggest that DVT prophylaxis should be changed based on body position alone.

Patient factors

Age, immobility, history of venous thromboembolism (VTE), varicose veins, malignant disease, severe infection, chronic renal failure, more than three pregnancies, peri-pregnancy, CHF, history of MI, inflammatory bowel disease, hormone replacement therapy, oral contraceptive use, and obesity all increase risk (level B evidence) [4, 5]. Inherited or acquired thrombophylias (e.g., protein C or S deficiency, factor V Leiden, antithrombin deficiency) greatly increase risk (level II evidence) [6]. A strong family history of clotting com-

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Table 1. Risk factors for VTE (one point each)

Procedure specific	Patient specific	
Duration >1 hour	**History of VTE**	Congestive heat failure
Pelvic procedures	Age >40	Myocardial infarction
	Immobility	Hormone replacement therapy
	Varicose veins	Oral contraceptive use
	Cancer	Multiparity (3)
	Chronic renal failure	Inflammatory bowel disease
	Obesity	Severe infection
	Peri-partum	

For inherited or acquired thrombophilias hematology consult is recommended where available

plications should be inquired about, and may also influence prophylactic treatment strategy.

Prophylactic Methods

Unfractionated heparin (low dose UH)

The dose is 5000 U given subcutaneously. This should be started within two hours of operation (evidence level II) and then every 8 or 12 hours. Every 8 hours is probably more effective at preventing VTE with similar risk of major bleeding (level II evidence) [7, 8]. Continuous infusion of unfractionated heparin is as effective as the subcutaneous route but has an increased risk of major bleeding and also requires hematologic monitoring (level C evidence) [9].

Low-molecular-weight heparin (LMWH)

The dose and frequency for LMWH depends on the manufacturer, and should be used according to their recommendations, although patient weight may also be a factor. One trial showed a need for increased LMWH in the morbidly obese (level III evidence) [20]. LMWH is at least as effective as low-dose UH with a similar risk of major bleeding (level I evidence) [7, 8]. There is decreased dosing schedule and decreased risk of heparin induced thrombocytopenia with LMWH compared to UH. Most studies start dosing the night before surgery with no other preoperative dosing to decrease the risk of operative bleeding. One trial showed no increase of operative bleeding when given two hours preoperatively versus the night before (level I evidence) [10]. Special consideration needs to be given when using LMWH with epidural or spinal anesthesia because of the risk of causing hematoma during placement or removal of the catheter (level II evidence) [16].

Pneumatic compression devices (PCD)

Calf-length pneumatic compression devices seem to offer the same protection for VTE as LMWH or low-dose heparin (level II evidence) [11, 12, 13]. Foot pneumatic compression devices increase lower-extremity venous blood flow and cause fibrinolysis to the same extent as calf-length devices and seem to have similar benefit to calf-length devices (level III evidence) [16]. Foot compression devices are often used with obese patients because calf-length devices may not fit properly. With pneumatic compression devices there is no increased risk of bleeding and therefore little risk of use. There are no data to support the use of PCDs on only one extremity or the upper extremities during laparoscopic surgery.

Combination therapy

LMWH or low-dose UH with PCDs may decrease the risk of VTE even more than single line therapy (level II evidence) [12, 13].

IVC filters

These have been used for high-risk patients. Patients with venous stasis disease, BMI > 59, truncal obesity, and hypoventilation syndrome or sleep apnea undergo Roux-en-Y gastric bypass with good results (level III evidence) [14]. There are retrievable filters that can be placed perioperatively and removed up to one year later or left in place. If filters are left in place, low-dose coumadin or equivalent anticoagulation is recommended to prevent IVC thrombosis and pulmonary embolism caused by the filter (level III evidence) [19].

Compression stockings, Coumadin

These are inferior methods for the prevention of VTE (level III evidence) [12,15]. Presumably, compression stockings do not create enough pressure to prevent stasis in deep leg veins or alter lower-extremity blood flow and fibrinolysis. The anticoagulative effect of coumadin alone starts too late to prevent DVT if given immediately prior to the surgical procedure.

Length of treatment

This remains controversial. We recommend treatment until patients are fully mobile or until discharge from the hospital, unless the patient has an acquired hypercoagulable state, in which case treatment for two weeks or more may be prudent (level III evidence). Consultation with a hematologist may be helpful in determining an appropriate treatment strategy in these instances.

Contraindications

Contraindications to anticoagulation therapy for VTE prophylaxis will vary depending on the clinician's assessment of the risk–benefit ratio. The clinician should refer to individual manufacturer recommendations for specific therapy, and utilize sound clinical judgment regarding the decision to withhold prophylactic therapy.

Appendix A: Levels of evidence

Level Ievidence from properly conducted randomized, controlled trials

Table 2. Suggested VTE Prophylaxis

Procedure	Risk factors	Recommendation	Level of recommendation/level of evidence
Lap chole	0 or 1	None, PCDs, UH or LMWH	C; II,III
Lap chole	2 or more	PCDs, UH or LMWH	C; II,III
Lap appy	0 or 1	None, PCDs, UH or LMWH	C; II,III
Lap appy	2 or more	PCDs, UH or LMWH	C; II,III
Diagnostic lap	2 or more	PCDs, UH or LMWH	C; II,III
Lap Inguinal H	2 or more	PCDs, UH or LMWH	C; II,III
Lap nissen	0 or 1	PCDs, UH or LMWH	B/II
Lap nissen	2 or more	PCDs and UH or LMWH	B/I, II
Splenectomy	0 or 1	PCDs, UH or LMWH	B/II
Splenectomy	2 or more	PCDs and UH or LMWH	B/II
Other major lap Procedures: Roux-Y, etc	0 or more	PCDs and UH or LMWH	B/III

Level IIevidence from controlled trials without randomization

Or

Cohort or case-control studies

Or

Multiple time series, dramatic uncontrolled experiments

Level III evidence from descriptive case series, opinions of expert panels

Appendix B: Scale used for recommendation grading

Grade ABased on high-level (level I or II), well-performed studies with uniform interpretation and conclusions by the expert panel

Grade BBased on high-level, well-performed studies with varying interpretation and conclusions by the expert panel

Grade CBased on lower-level evidence (level II or less) with inconsistent findings and/or varying interpretations or conclusions by the expert panel

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