Risk of deep venous thrombosis and pulmonary embolism in urogynecologic surgical patients

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OBJECTIVE: We sought to determine the incidence of symptomatic deep venous thrombosis and pulmonary embolism, collectively referred to as venous thromboembolic events (VTE), in patients undergoing urogynecologic surgery to guide development of a VTE prophylaxis policy for this patient population.

STUDY DESIGN: We conducted a retrospective analysis of VTE incidence among women undergoing urogynecologic surgery over a 3-year period. All patients wore sequential compression devices intraoperatively through hospital discharge.

RESULTS: Forty of 1104 patients (3.6%) undergoing urogynecologic surgery were evaluated with chest computed tomography, lower extremity ultrasound, or both for suspicion of VTE postoperatively. The overall rate of venous thromboembolism in this population was 0.3% (95% confidence interval, 0.1–0.8).

CONCLUSION: Most women undergoing incontinence and reconstructive pelvic surgery are at a low risk for VTE. Sequential compression devices appear to provide adequate VTE prophylaxis in this patient population.

Key words: deep venous thrombosis, incontinence, pelvic organ prolapse, pulmonary embolism, urogynecology, venous thromboembolism

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Deep vein thrombosis (DVT) and pulmonary embolism (PE), collectively referred to as venous thromboembolic events (VTE), are potentially preventable postoperative complications that are associated with significant morbidity and health care expenditures. During surgery, hemodynamic changes, endothelial damage, and hypercoagulability, collectively referred to as Virchow triad, contribute to patients' increased risk of VTE.[1] One study of 7 million hospitalizations found postoperative VTE is the second most common medical complication and is associated with mean excess charges of >$21,000 per case.[2] Current thromboprophylaxis guidelines (Table 1) issued by the American College of Chest Physicians (ACCP) and advocated by the American College of Obstetricians and Gynecologists (ACOG) are based primarily on data from general surgery and gynecologic oncology patients and reference only 1 study of benign gynecology surgical patients undergoing laparoscopic procedures.[3]

Based on ACCP guidelines, patients undergoing incontinence and reconstructive pelvic surgery can fall within any of the 3 VTE risk categories: low, moderate, and high. Given this widely variable degree of VTE risk, it is difficult to develop a general thromboprophylaxis policy for urogynecologic surgical patients. We hypothesized that women undergoing incontinence and reconstructive pelvic surgery would be at high risk for VTE, given their exposure to prolonged surgery, advanced age, medical comorbidities, and rates of hormone replacement use. Thus, the purpose of this study was to estimate the risk of VTE in women undergoing incontinence and reconstructive pelvic surgery to inform the development of an effective DVT prophylaxis policy for this patient population.

Materials and Methods

After obtaining institutional review board approval, all pelvic reconstructive and incontinence procedures performed by members of the Center of Urogynecology and Reconstructive Pelvic Surgery at Cleveland Clinic from 2006 through 2008 were identified using *International Classification of Diseases, Ninth Revision* codes and then were reviewed via the electronic medical record. Women receiving planned perioperative anticoagulation with heparin or low-molecular-weight heparin were excluded from the analysis. Patient demographics and medical history data were collected from preoperative clinic notes. Operative notes, imaging reports, discharge summaries, and postoperative clinic notes were reviewed for information on the surgical procedure performed and the patient's postoperative course, including whether the patient experienced a DVT, PE, or both. All patients included in the study had a follow-up visit approximately 6 weeks after surgery. Charts were abstracted through the date of that visit. Additional visits beyond the 6-week postoperative visit were not reviewed for the purposes of this study.

VTE risk factors abstracted from patient records included operating room time, length of hospitalization, decreased mobility prior to surgery, known malignancy at the time of surgery, hor-

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TABLE 1
American College of Chest Physicians risk classification for venous thromboembolism in patients undergoing surgery

Level of risk	Definition[a]	Recommended prevention strategy
Low	Minor surgery in mobile patients	Early and frequent mobilization
Moderate	Major surgery, including most general, open gynecologic and urologic cases	LMWH, LDUH bid or tid, fondaparinux, or mechanical thromboprophylaxis
High	Major surgery with additional VTE risk factors[b]	LMWH, fondaparinux, oral vitamin K antagonist, or mechanical prophylaxis; alternatively, one may consider combination of chemical and mechanical prophylaxis

Bid, twice daily; *LDUH*, low-dose unfractionated heparin; *LMWH*, low-molecular-weight heparin; *tid*, 3 times daily; *VTE*, venous thromboembolic events.
Modified, with permission, from Geerts et al.[3]

[a] Descriptive terms are purposely left undefined to allow individual clinician interpretation; [b] Additional risk factors include major trauma or lower extremity injury, immobility, cancer, cancer therapy, venous compression (from tumor, hematoma, arterial anomaly), previous VTE, increasing age, pregnancy and postpartum period, estrogen-containing oral contraceptive or hormone replacement therapy, selective estrogen receptor modulators, erythropoiesis-stimulating agents, acute medical illness, inflammatory bowel disease, nephritic syndrome, myeloproliferative disorders, paroxysmal nocturnal hemoglobinuria, obesity, central venous catheterization, and inherited or acquired thrombophilia.

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mone replacement therapy use, oral contraceptive use, and perioperative central line insertion. Patients were labeled as having decreased mobility if they required assistance walking, had a recent or chronic lower extremity injury or disability, or had a neurologic impairment affecting mobility at the time of preoperative evaluation. Charlson Comorbidity Index data were also collected to generate an estimate of perioperative risk for each patient using this validated model.[4] Consistent with the current practice in our division, all patients had sequential compression devices (SCDs) applied prior to induction of anesthesia. If admitted to the hospital following surgery, patients wore SCDs while in bed until the time of discharge.

Using software (JMP, version 7.0; SAS Institute, Cary, NC), we calculated the frequency and 95% confidence interval (CI) of VTE incidence. Student *t* test was performed to evaluate the relationship between VTE and continuous variables, while the χ^2 test was used to evaluate the relationship between VTE and dichotomous variables.

TABLE 2
Procedures performed

Procedure	n	% (n = 1104)
Hysterectomy		
Vaginal	353	32.0
Abdominal	36	3.3
Laparoscopic or robotic	49	4.4
Anterior and/or posterior colporrhaphy	639	55.6
Vaginal vault suspension		
Sacral colpopexy (open, laparoscopic, or robotic)	156	14.1
Uterosacral, sacrospinous, or iliococcygeus vault suspension	430	38.9
McCall culdoplasty	53	4.8
Incontinence procedures		
Burch colposuspension	70	6.3
Midurethral sling	583	52.8
Sacral neuromodulation	9	0.8

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Results

A total of 1286 operative procedures were performed by the members of the Center of Urogynecology and Reconstructive Pelvic Surgery at Cleveland Clinic from 2006 through 2008. A total of 1130 involved at least 1 prolapse or incontinence procedure. Of these, 26 were excluded due to receipt of planned perioperative anticoagulation, leaving 1104 patients included in the analysis. The study population had a mean age of 57.2 ± 13.3 years and a mean body mass index of 28.3 ± 5.6. The racial distribution in the study cohort was 88.6% Caucasian, 7.7% African American, 0.5% Latino, 0.6% Asian, and 2.6% other/unknown. The mean length of stay was 1.6 ± 2.9 days. The mean operating room time was 183 ± 88 minutes. Table 2 lists the procedures performed. In all, 257 patients (23.3%) underwent outpatient procedures, while 847 (76.7%) required overnight hospitalization. In all, 757 subjects (68.6%) had a Charlson Comorbidity Index score of 0, 18.8% had a score of 1, and 12.6% had a score of >1, indicating, on average, a low proportion of medical comorbidities. A total of 10 patients (0.89%) had a previously diagnosed clotting disorder. Risk factors of the population are described in Table 3.

A total of 40 patients (3.6%) were evaluated for suspicion of DVT or PE postoperatively with radiographic imaging, including chest computed tomography (CT), lower extremity Doppler ultra-