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VENOUS THROMBOEMBOLISM IN RECONSTRUCTIVE PELVIC SURGERY

Hypothesis / aims of study

To determine the incidence and risk factors for Venous Thromboembolism (VTE) in women undergoing reconstructive pelvic surgery for urinary incontinence (UI) and/or pelvic organ prolapse (POP).

Study design, materials and methods

Using the American College of Surgeon's National Surgical Quality Improvement Program (ASC-NSQIP) registry, we identified patients who underwent surgery for UI and/or POP from 2006-2010. Identification was based on *Current Procedural Terminology* (CPT) codes specific to urogynecologic surgery. We defined two cohorts: women with any reconstructive pelvic surgery performed, with concomitant surgery from other specialties allowed (*RPS+other*), and women whose only procedure was reconstructive pelvic surgery (*RPS*). VTE cases were defined as deep vein thrombosis (DVT) or pulmonary embolism (PE) diagnosed by venous duplex scan, venogram, or CT scan requiring anticoagulation within 30 days of surgery. Demographic characteristics (age, body mass index (BMI), race), co-morbidities (diabetes, hypertension, chronic obstructive pulmonary disease, congestive heart failure, smoking status, functional status) and operative characteristics (operative time, length of stay (LOS), in-patient status, and ASA class (American Society of Anesthesiology Physical Status classification) were extracted from the database. We assumed that surgeons adhered to the American College of Chest Physicians risk classification for VTE in surgical patients prevention strategy guidelines. Peri-operative variables were analyzed using chi-squared tests and student's t-tests for categorical and continuous variables. We performed a multiple logistic regression to control for confounding variables.

Results

20,687 women underwent surgery within the *RPS + other* cohort, with 69 cases of VTE for a rate of 0.3%. Risk factors associated with VTE are shown in Table 1. Multivariate analysis demonstrated predictors for postoperative VTE including inpatient hospital status (OR 7.69, p<0.001), higher American Society of Anesthesiologists Physical Classification System (ASA) (OR 2.70, p<0.001), and emergency intervention (OR 3.65, p=0.008). When women in the *RPS* cohort were analyzed, there were 14 cases of VTE, with an incidence of 0.1%, however on multivariate analysis the only specific predictor for postoperative VTE was length of stay (OR1.02, p<0.037) (Table 1). The majority of VTE cases were among primary general surgey procedures, followed by gynecologic and urogynecologic procedures (Table 2).

Interpretation of results

Fortunately, our study includes data from a large, geographically diverse national sample of hospitals and suggests that VTE is a rare occurrence in reconstructive pelvic surgery. The incidence of VTE which we observed is significantly lower than previously published incidence rates, such as those cited in the American College of Chest Physicians prevention guidelines [1]. However, many of the studies that estimated incidence of VTE included patients undergoing surgery for gynecologic cancers limiting their generalizability to women undergoing reconstructive pelvic surgery. According to Virchow's triad, malignancy almost certainly inflates the estimation of VTE in the gynecologic population. Few studies estimate VTE incidence in benign gynecologic surgery. When patients with malignancy are excluded, our results are consistent with several studies. A recent prospective study from Finland estimated the incidence of VTE as 0.1% in 5297 women undergoing hysterectomy for benign disease [2]. Similarly, a recent retrospective analysis estimated an incidence of VTE in women undergoing urogynecologic surgery of 0.3% [3].

Concluding message

The incidence of VTE following reconstructive pelvic surgery is very low, but it is increased in women undergoing concomitant surgeries. Patients undergoing inpatient surgery with higher ASA classifications and requiring emergency intervention were at highest risk for VTE.

Table 1.Perioperative variables in women in *RPS + other* cohort and *RPS cohort*

	RPS + Other			***RPS***		
	VTE	*No VTE*		*VTE*	*No VTE*	
	69	20618	p-value	14	13	p-value
Age	62.5	57.8	**0.003**	68.07	58.9	**0.01**
BMI	30.45	29.21	0.133	27.53	29.32	0.312
LOS	10.23	1.85	**<0.001***	6.64	3.22	**<0.001**
OPTIME	219.9	111.9	**<0.001***	141	77.84	**<0.001**
Age >50	54	14354	0.119	13	94.98	0.094
Obesity	30	7730	0.331	2	4971	**0.050**
Caucasian	56	16984	0.791	12	10757	0.765
Inpatient / Outpatient	66	11495	**<0.001***	12	5429	**<0.001**
Clinical characteristics (%)						
Smokers	4	2696	0.074	1	1616	0.466
Steroid Use	1	336	1.000	0	209	0.797
Comorbidities (%)						
Diabetes	9	2129	0.459	2	1396	0.453
Dyspnea	10	1251	**0.003**	0	817	0.404
Hypertension	35	8224	0.066	5	5439	0.431

	"Heart Disease"	4	648	0.173	1	454	0.392
	COPD	2	517	0.692	1	353	0.320
	Congestive Heart Failure	1	18	0.062	0	6	0.994
	Bleeding Disorders	2	209	0.156	0	105	0.893
	Previous PCI or Cardiac Surgery	3	553	0.439	1	390	0.382
	Stroke or TIA	1	560	1.000	0	395	0.650
	Functional Status Prior to Op	6	198	**<0.001***	0	95	0.930
	Open Wound Infection	1	108	**0.003**	0	48	0.950
	ASA Level 1-2 / 3-5	42	5190	0.133	7	3218	**0.029**

Table 2. Venous Thromboembolism cases by primary procedure

	N	***%***
Breast surgery	1	1%
Plastic surgery	3	4%
General surgery	33	48%
Gynecologic surgery	17	25%
Reconstructive Pelvic Surgery	14	20%
Vascular surgery	1	1%

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