

Symptomatic Venous Thromboembolism Following Extensor Mechanism Disruption About the Knee

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BACKGROUND

- Extensor mechanism disruptions include tears of either the quadriceps tendon, the patellar tendon or patellar fracture¹
- Operative management is frequently required², but comes with the added risk of post-op surgical complications such as venous thromboembolism (VTE)
- There are few studies measuring the incidence of VTE in this patient population and very little evidence to guide VTE prophylaxis^{3,4}

OBJECTIVES

- Determine incidence of VTE in patients following acute, traumatic extensor mechanism injuries about the knee
- Identify any risk factors associated with VTE in this patient population
- Evaluate the utilization and type of thromboprophylaxis at our institution

METHODS

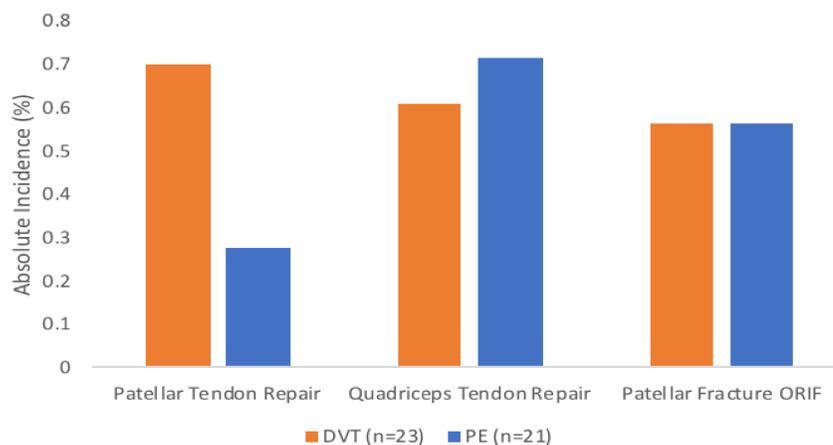
- **Institutional data:** we identified patients treated for primary isolated extensor mechanism injury between 2009-2017 via retrospective chart review.
- **National Database:** The 2005-2015 National Surgical Quality Improvement Program (NSQIP) database was used to identify patients with operatively managed extensor mechanism injuries
- **Exclusions:** concomitant musculoskeletal injuries, follow-up less than 8 weeks for institutional data.
- **Predictors measured:** obesity (BMI>30), diabetes mellitus, prior VTE, oral contraceptive use, cancer, cardiac history, smoking within 1 year of injury
- **Data Analysis:** Chi square or Fisher's Exact Test were performed, as appropriate, for each demographic and comorbidity risk factor. T-tests were performed to compare the mean time until diagnosis of DVT or PE.

RESULTS

Table 2: NSQIP Patient Demographics

	No Complication		DVT		p-value	PE		p-value
	N=3770	%	N=23	%		N=21	%	
Overall		99.3%		0.61%			0.55%	
Gender								
Male	2045	54.3%	11	48%	0.535	10	47.6%	0.541
Female	1722	45.7%	12	52%		11	52.4%	
Age								
<40	708	18.8%	3	13.0%	0.032	710	18.8%	0.194
40-54	833	22.1%	11	47.8%		836	22.2%	
55-69	1379	36.6%	6	26.1%		1377	36.5%	
≥70	850	22.5%	3	13.0%		849	22.5%	
Obesity classification ^b								
Nonobese (BMI < 30 kg/m ²)	2078	58.3%	7	31.8%	0.012*	12	57.1%	0.929
Obese (BMI ≥ 30 kg/m ²)	1489	41.7%	15	58.2%		9	42.9%	

- The incidence of VTE following surgical repair of an acute extensor mechanism injury about the knee is **1.2%**.
- There was a significant association between **obesity** and the development of **DVT** (OR= 2.99, p=0.012) but not PE (OR=1.05, p=0.929)



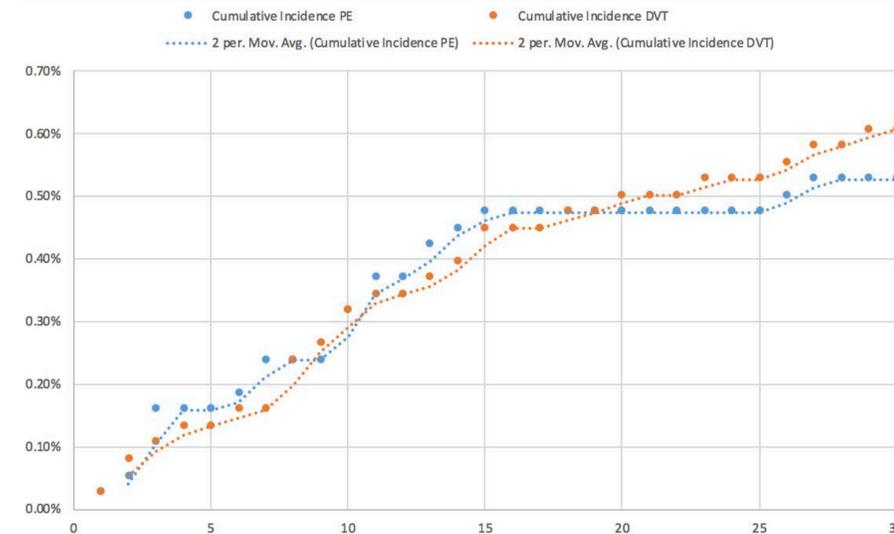
- There is **no** difference between VTE rates and the nature of the surgical procedure for extensor mechanism repair (p>0.05)

Table: Institutional patient demographic characteristics and comorbidity burden

	No Complication		VTE		χ ² p-value
	N=108	%	N=3	%	
Overall		97.3		2.70	
Gender					0.605
Male	57	52.8	1	33.3	0.311
Female	51	47.2	2	66.7	
Age ^a					
<40	37	33.3	1	33.3	0.063
40-54	27	24.3	2	66.7	
55-69	23	20.7	0	0.0	
≥70	24	21.6	0	0.0	
VTE Prophylaxis					0.081
Operative Treatment	98				0.063
Aspirin	22	22.4	0	0.0	
Enoxaparin	33	33.7	2	66.7	
Warfarin	5	5.1	1	33.3	
None	38	38.8	0	0.0	

- 61.2% of operatively managed patients at our institution received post-operative VTE prophylaxis.

RESULTS



- Time to Diagnosis of VTE, NSQIP Dataset

DISCUSSION

- Obesity confers an increased risk for VTE
- 38.8% of patients at our institution received post-injury and post-operative VTE prophylaxis.
- All patients with VTE underwent surgery, and all occurred in the setting of VTE prophylaxis

CONCLUSION

- VTEs are rare among patients with isolated extensor mechanism injuries
- Obese patients are at increased risk of VTE, similar to what is seen in other lower-extremity surgeries
- Post-operative VTE prophylaxis following these injuries is *not* considered "standard of care", but is a matter of clinical judgment and should be administered on a case by case basis, with special consideration for obese patients.

References

- Garner MR, Gausden E, Berkes MB, et al. Extensor Mechanism Injuries of the Knee: Demographic Characteristics and Comorbidities from a Review of 726 Patient Records. The Journal of bone and joint surgery American volume. 2015;97:1592-1596.
- O'Malley M, Reardon P, Pareek A, et al. Extensor Mechanism Disruption in Knee Dislocation. The journal of knee surgery. 2016;29:293-299.
- Falck-Ytter Y, Francis CW, Johanson NA, et al. Prevention of VTE in orthopedic surgery patients: Antithrombotic Therapy and Prevention of Thrombosis, 9th ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines. Chest. 2012;141:e278S-e325S.
- Mont MA, Jacobs JJ. AAOS clinical practice guideline: preventing venous thromboembolic disease in patients undergoing elective hip and knee arthroplasty. The Journal of the American Academy of Orthopaedic Surgeons. 2011;19:777-778.