

Venous Thromboembolism Chemoprophylaxis in Burn Patients: A Single Institution Experience and Literature Review

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Background

Hospitalized burn patients meet the criteria for Virchow's Triad, predisposing them to venous thromboembolism (VTE).¹

Hypercoagulability
Enhanced fibrinogenesis,
increased factor V and VIII,
decreased antithrombin

Endothelial damage
Direct thermal injury,
venous catheterization

Virchow's Triad

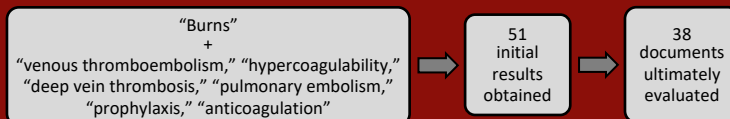
Venous stasis
Sedation, splinting of
skin grafts, limited
mobility due to pain

As VTE is one of the most costly and common causes of preventable hospital death,² prevention in critical care patients is a growing priority.

Despite this, unreliable reported VTE rates, expensive and complicated anticoagulation regimens, and associated risks have prevented the establishment of a universal chemoprophylaxis protocol. This study reviews VTE incidence and prevention in burn patients using data from the literature and our own institution.

Methods

A systematic review was conducted according to PRISMA guidelines in PubMed/Medline, Web of Science, and Embase.



Patients age 18 and over admitted to an ABA-verified burn center from June 1, 2015 to June 30, 2019 were identified for a retrospective review.

Results

Study type	Reference (Author, Year)	Number of patients	Incidence (%)
Autopsy	Sevitt et al., 1961	196	14.8
	Coleman et al., 1975	17	47.1
Retrospective	McDowall, 1973	2,250	0.93
	Rue et al., 1992	2,103	0.9
	Harrington et al., 2001	1,300	1.77
	Wahl et al., 2001	327	2.4
	Fecher et al., 2004	4,102	0.25
	Bushwitz et al., 2011	1,111	0.27
	*Pannucci et al., 2011	33,637	0.61
	Mullins et al., 2013	1,452	5.92
*Satahoo et al., 2015	36,638	0.8	
Prospective	Wahl et al., 2002	30	23.3

12 studies reported a wide range of VTE incidences. The two largest retrospective studies (*) were performed in populations with unknown or inconsistently recorded chemoprophylaxis.

Throughout the literature, prevention protocols were mixed. The most common anticoagulation agents were unfractionated heparin (UFH) and low molecular weight heparin (LMWH). With the latter, a trend toward patient-specific dose adjustments based on serum anti-factor Xa level was noted.

Retrospective Review: 1,068 patients met study criteria. At-risk patients received a uniform chemoprophylactic regimen of 5000U of subcutaneous UFH every 8 hours. No routine monitoring tests were performed to limit cost.

9 patients (0.84%) had DVT and 2 (0.19%) had PE, resulting in a VTE incidence of 1.03%. None of the patients developed heparin-induced thrombocytopenia (HIT) or any other heparin-associated complications.

Results

	All Burn Patients (n=1,068)	Patients with VTE (n=11)	p-value
Age (years)	47.3 ± 14.2	48.5 ± 21.2	0.423
Burn size (% TBSA)	11.4 ± 9.8	36.8 ± 34.9	0.018*
Length of stay (days)	13.3 ± 22.3	95.7 ± 34.4	0.003*

Conclusions

VTE incidence rates reported in the literature are wide-ranging and poorly capture the effect of any one prophylactic regimen in the burn population. Based on the largest and more recent retrospective national studies, the VTE rate appears close to 1%.

Our center uses a single, safe, and cost-effective regimen without monitoring tests, individual calculations, or dose adjustments. It effected a low VTE rate comparable to that of large national retrospective studies without anticoagulant-associated complications.

As the need for and role of VTE prevention in burn patients remains contested, this data suggests that a simple, universal chemoprophylactic protocol may be implemented efficaciously and safely.

References

Kumar DR, Hanlin ER, Glurich I, Mazza JJ, Yale SH. Virchow's contribution to the understanding of thrombosis and cellular biology. *Clin Med Res.* 2010;8(3-4):168-172.

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