

Clinical Application of Circular Pneumatic Dermatomes in Burn Wound Management

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INTRODUCTION

- Burn wound excision is fundamental to surgical burn care
- Sharp excision offers precision, but traditional dermatomes and blades may be limited by surgeon fatigue
- Circular pneumatic dermatomes are designed to improve excision and graft harvesting efficiency
- This retrospective cohort study compares operative time and transfusion rates using a circular pneumatic dermatome



Figure 1. Circular Pneumatic Dermatome Device

METHODS

- **Population:** All patients undergoing burn wound excision at TGH (Jan 2023 – Jun 2024)
- **Data Collected:** excision tools used, total surface area excised, number of Lund & Browder–defined anatomical sites
- **Primary Outcomes:** Operative time and intraoperative transfusion requirement
- **Statistical Analysis:** Mann-Whitney U and Fisher’s Exact tests ($p < 0.05$ significance)

	Circular Pneumatic Dermatome Used				p-value
	No (N=121)		Yes (N=89)		
	<i>Median (Q1, Q3)</i>	<i>Mean ± SD</i>	<i>Median (Q1, Q3)</i>	<i>Mean ± SD</i>	
<i>Number of Sites Excised</i>	2 (1, 4)	3.1 ± 2.6	3 (2, 5)	3.9 ± 3.1	0.009
<i>Total Area Excised (cm²)</i>	894 (344, 2703)	1740.6 ± 2044.1	1694 (678, 3106)	2522.8 ± 2551.4	0.002

Table 1. Number of sites and total area excised using the circular pneumatic dermatome versus other excision tool.

	Circular Pneumatic Dermatome Used					
	Total Area Excised (cm ²)			No (N=121)		
				Yes (N=89)		
Operation Time						
				N	Minutes (Mean + SD)	
				N	Minutes (Mean + SD)	p-value
	<100	13	63.54 $\pm$ 32.69	2	53.50 $\pm$ 36.06	0.800
	100-1000	50	57.62 $\pm$ 26.44	31	62.84 $\pm$ 22.77	0.185
	1000-5000	47	111.11 $\pm$ 72.60	44	100.57 $\pm$ 78.14	0.327
	>5000	11	142.18 $\pm$ 56.18	12	130.58 $\pm$ 62.18	0.379
Transfusions Required						
				N	% Transfused	
				N	% Transfused	p-value
	<100	13	0.0%	2	0.0%	n/a
	100-1000	50	6.0%	31	12.9%	0.419
	1000-5000	47	68.1%	44	56.8%	0.287
	>5000	11	100.0%	12	83.3%	0.478

Table 2. Operation time and transfusions for procedures with/without the circular pneumatic dermatome stratified by total area excised.

RESULTS

- **Cohort:** 136 patients & 210 excision procedures
 - Circular pneumatic dermatome: 89 cases
 - Traditional excision $\pm$ hydrosurgery: 121 cases
- **Sites and area excised:**
 - Circular dermatome more anatomical sites excised (median 3 vs. 2, **p=0.009**)
 - Larger total area excised (median 1694 vs. 894 cm², **p=0.002**)
- **Operative times:** No significant difference across wound-size strata
- **Transfusions:** No significant difference across wound-size strata

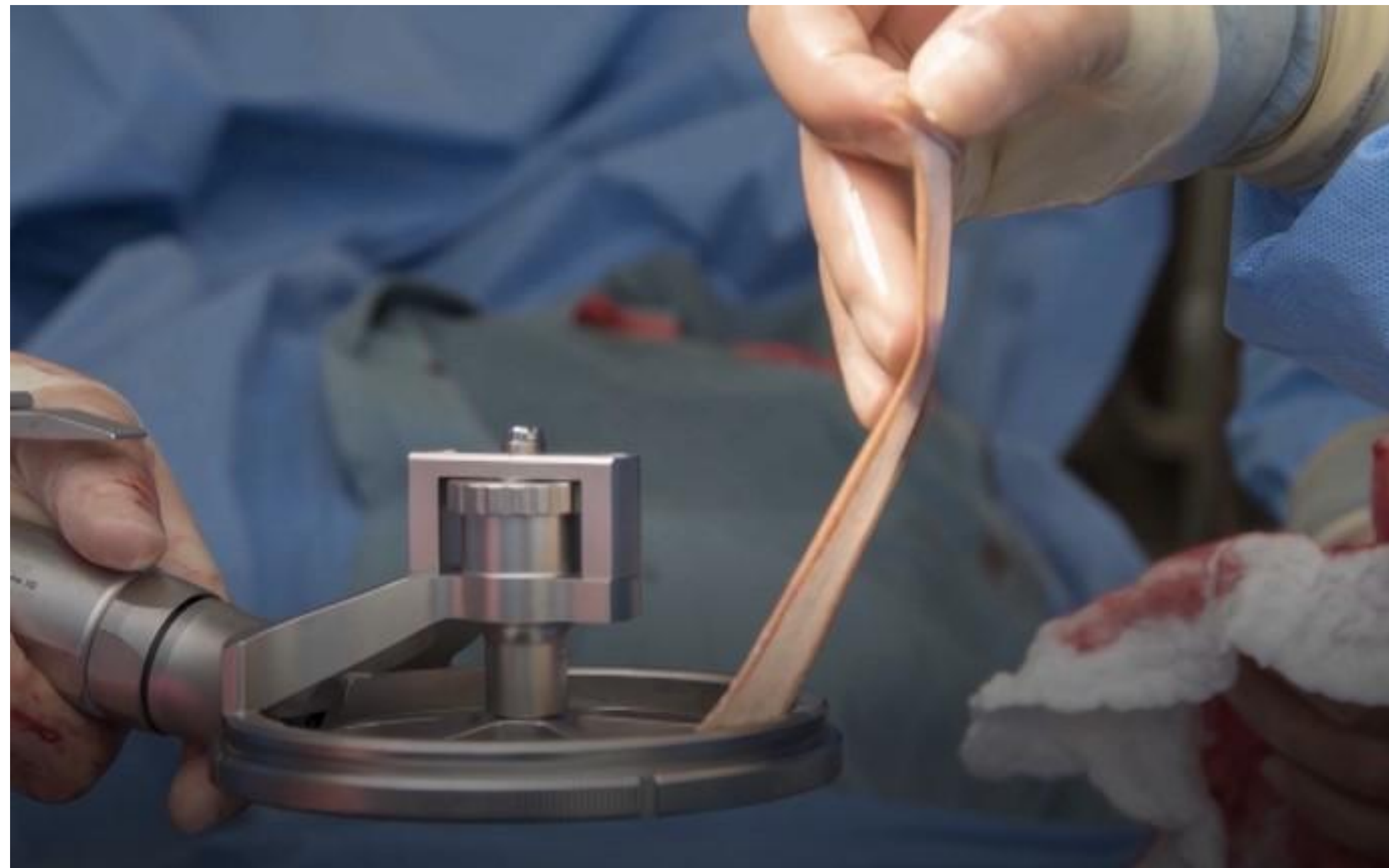


Figure 2. Graft Harvest with Circular Dermatome

DISCUSSION

- Circular pneumatic dermatome use was associated with significantly larger wound surface area excised per procedure
- Findings suggest improved surgical efficiency, potentially reflecting reduced surgeon fatigue
- Operative time and transfusion rates were not significantly different between groups
- The circular dermatome enabled more extensive excision within a single operation
- Future studies should assess objective blood loss and long-term clinical outcomes

Incorporation of a circular pneumatic dermatome into burn wound excision protocols may improve procedural efficiency and reduce surgeon fatigue.