

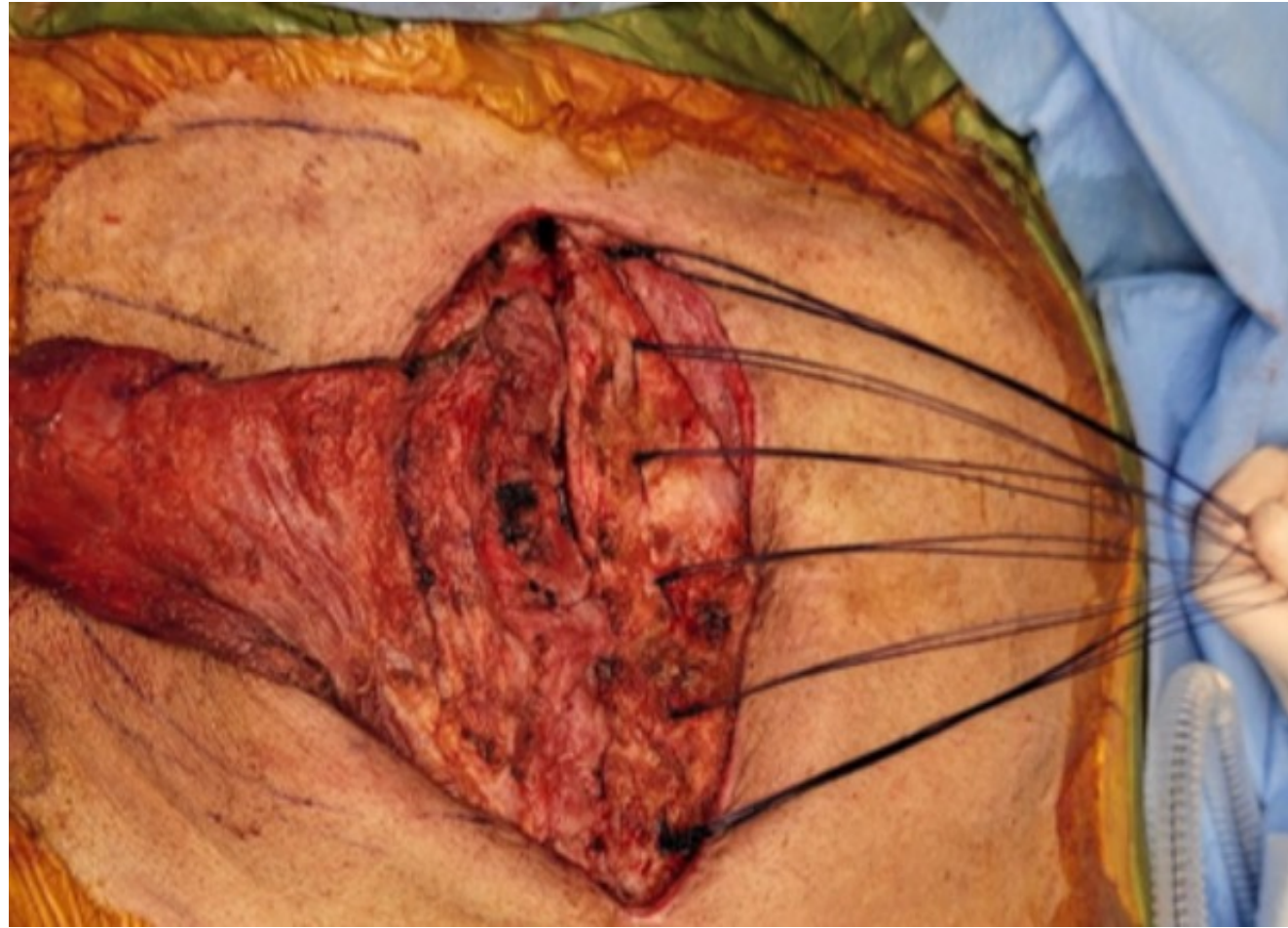
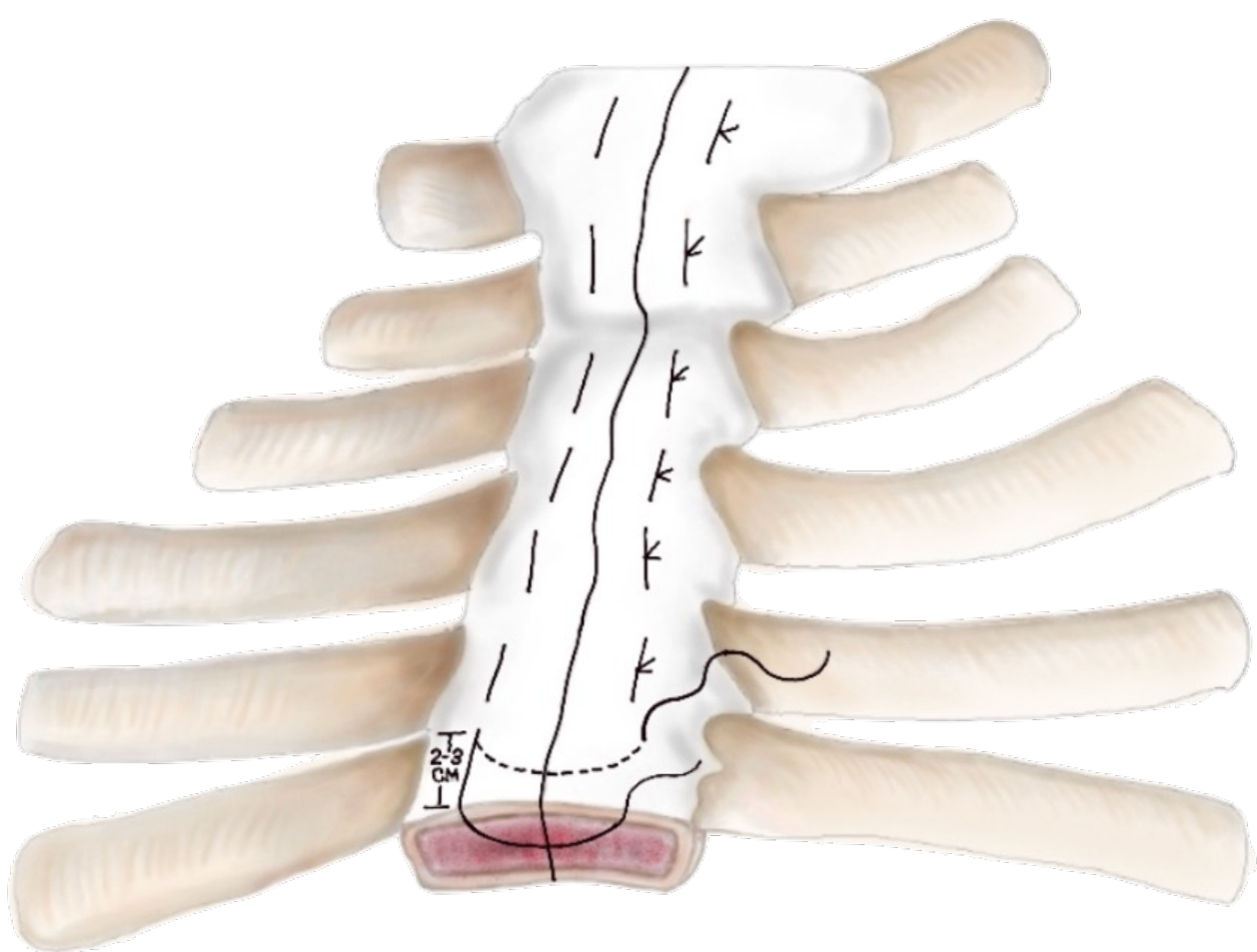
A Novel Sternal Suturing Technique: Comparison with Traditional Post Sternotomy Plastic and Reconstructive Surgery Closure Methods

John B. Park, PharmD¹, Benjamin Rahmani MS, BS¹, Oluwaseun D. Adebagbo, BS¹, Shannon R. Garvey, MS, BS¹, Amy Chen, BS¹, Bernard T. Lee, MD, Ryan P. Cauley, MD, MPH¹
¹*Division of Plastic and Reconstructive Surgery, Department of Surgery, Beth Israel Deaconess Medical Center, Harvard Medical School, Boston, MA, USA.*

INTRODUCTION

- **Complications** following sternotomy such as deep sternal wound infection (DSWI) and deep sternal dehiscence (DSD) are devastating and are associated with **significant morbidity, mortality, and healthcare costs**.
- Although rigid sternal fixation is frequently used for enhanced mechanical stability and sternal bone union, there is hesitancy over use of **hardware in cases of infection and microbial colonization**.
- For an alternative, **a novel sternal closure technique** with absorbable interosseous monocortical horizontal mattress sutures was developed.

SURGICAL TECHNIQUE



- Suture should be placed at least **1.5-2 cm lateral** to sternotomy edges and the **width** of the horizontal mattress sutures should be **≥2 cm**.
- We recommend either **using 1 PDS and/or 1 Vicryl sutures**.
- Unlike hardware, these are **removable** in clinic setting in case of infection or dehiscence.

METHODS

- A total of **120 patients** between December 2007 and August 2023 with **extensive sternal wounds** requiring closure by plastic surgery were included in the analysis.
- Patients were divided into those who received closure without plating, closure with plating, and those who received novel suture method.
- Univariate analysis was performed utilizing JMP Pro.

RESULTS

TABLE 1. Demographics and Preoperative Variables				
	No Plate	Plate	Novel Suture	
N	56	56	8	
Age, mean (SD)	67.59 (9.64)	65.25 (10.3)	59.13 (10.8)	
BMI, mean (SD)	33.54 (7.26)	34.48 (9.17)	24.49 (3.62)	
Sex, n (%)				
Male	20 (35.71)	31 (55.36)	5 (62.50)	
Female	36 (64.29)	25 (44.64)	3 (37.50)	
Race/Ethnicity, n (%)				
African American	3 (5.36)	3 (5.36)	0 (0)	
Asian	1 (1.79)	0 (0)	1 (12.50)	
Hispanic	1 (1.79)	0 (0)	0 (0)	
Unknown	2 (3.57)	2 (3.57)	0 (0)	
Smoking Status, n (%)				
Never	4 (7.14)	15 (26.79)	2 (25.00)	
Former	38 (67.86)	28 (50.00)	2 (25.00)	
Current	14 (25.00)	13 (23.21)	4 (50.00)	
Past Medical History, n (%)				
Diabetes, n (%)	21 (37.50)	23 (41.07)	2 (25.00)	
Peripheral Vascular Disease, n (%)	16 (28.57)	12 (21.43)	1 (25.00)	
Chronic Renal Insufficiency, n (%)	18 (32.14)	16 (28.57)	0 (0)	
Lab Values, mean (SD)				
Hb A1c	7.03±1.38	7.06±1.78	8.04±2.59	
Creatinine	1.31 ±1.11	1.52 ±1.59	0.76 ±0.29	

TABLE 2. Operative and Postoperative Variables				
	No Plate	Plate	Novel Suture	P
N	56	56	8	-
Number of Debridements After Initial Surgery, n (%)				
1	23 (41.07)	34 (60.71)	2 (25.00)	0.018
2	24 (42.86)	16 (28.57)	2 (5.00)	
3+	9 (16.07)	6 (10.71)	4 (50.00)	
Post Operative Complications, n (%)				
Nonunion	0	4 (7.14)	0	0.09
Delayed wound healing	0	1 (1.82)	0	0.56
Dehiscence	6 (10.7)	6 (10.7)	1 (12.5)	0.98
Seroma	0	1 (1.79)	0	0.79
SSWI	1 (1.79)	0	0	0.56
DSWI	5 (8.9)	8 (14.3)	1 (12.5)	0.67
Other Complication	0	3 (5.36)	0	0.17
Return to OR	11 (19.64)	19 (33.93)	0 (0)	0.19
Death	3 (5.36)	1 (1.79)	0	0.49

- **50% of patients** who ultimately underwent closure with interosseous sternal sutures required 3 or more debridements after their initial sternotomy (**p=0.018**).
- After closure with interosseous sternal sutures, **1 patient** developed dehiscence and DSWI.
- All 8 patients receiving the novel technique achieved functional sternal union within their follow-up period.

CONCLUSION

- This is a **proof-of-concept study** introducing our novel sternal closure technique.
- Our study suggests that this is a **safe alternative** to rigid sternal fixation in patients who are contraindicated to have permanent hardware.