Improving Sternal Closure Outcomes in Cardiac Surgery: Polyethylene Suture Tapes vs. Steel Wires

Khalpey Z, Kumar UA, Aslam U, Phillips T, Khalpey Z, Cooper A, Riley R

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Objective

The purpose of this study was to compare the outcomes and complication rates of patients receiving either suture tape (Arthrex FiberTape® sternal closure system) or conventional steel wires for sternal closure.

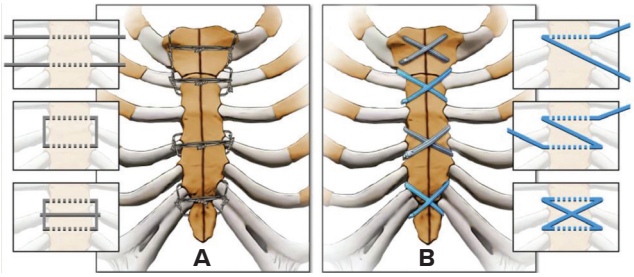
Methods

Treatment Groups—A retrospective review was performed on 300 consecutive patients undergoing cardiac surgery via median sternotomy from a single surgeon.

- **Wire Closure Group—**150 consecutive patients underwent steel wire sternal closure (July 2022-April 2023).
- **Suture Tape Closure Group—**150 consecutive patients underwent suture tape sternal closure (April 2023-January 2024).

Sternal Closure Operative Technique—In the wire closure group, the sternum was closed using surgical steel wires in a semi-Robicsek figure-8 pattern. Eight individual wires were passed under the sternum, twisted together to the adjacent wire, and tied to the corresponding twisted pair on the opposite side of the sternum (Figure 1A). In the suture tape group, the sutures were presoaked in a vancomycin solution 5 minutes before use. In figure-8 patterns, 4 sutures were placed around the manubrium and through the sternal interspaces around the sternum. A tensioner was used to tighten each complex to apply 60 to 80 lb of pressure to the sternum, followed by a half-hitch knot to secure the sutures (Figure 1B).

Figure 1. Sternal closure approaches used in the study. (A) Semi-Robicsek figure-8 sternal wire cerclage. (B) Suture tape sternal cerclage.



Data Collection—Demographic data (Table 1), operative characteristics, and postoperative outcomes were collected. Patients underwent follow-up evaluations at 14 and 30 days postsurgery. Specific outcomes collected included the incidence of sternal wound infection, incidence of sternal dehiscence, incisional pain levels, hospital mortality rate, and sternal closure operative time.

Table 1. Preoperative Patient Demographics

Variable	Total	Wire closure	Suture tape closure	*P* value
Number of patients	300	150	150	N/A
Age **(y)**	67 ± 11	67 ± 11	66 ± 11	.2333
Sex: male	211 (70%)	109 (73%)	102 (68%)	.8261
BMI	32.70 8.79	33.31 ± 8.96	32.09 ± 8.61	.2302
COPD	14 (5%)	6 (4%)	8 (5%)	.7855
Prior sternotomy	6 (2%)	4 (3%)	2 (1%)	.6843

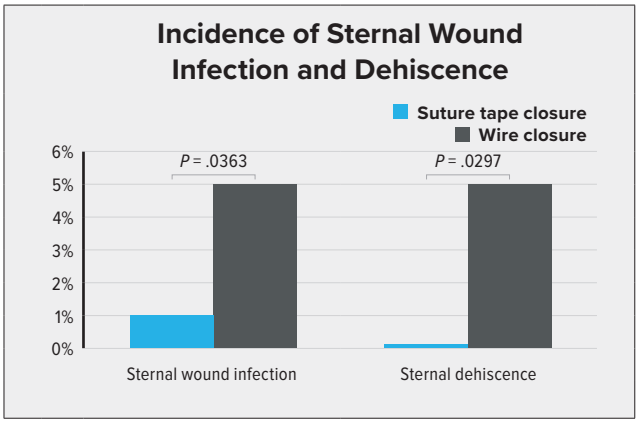
Results

Patient Demographics—A comparison of preoperative characteristics revealed no significant demographic differences between groups (Table 1).

Sternal Closure Time—Closure time was significantly shorter in the suture tape closure group compared with the wire closure group (11 vs 19 min, $P < .0001$).

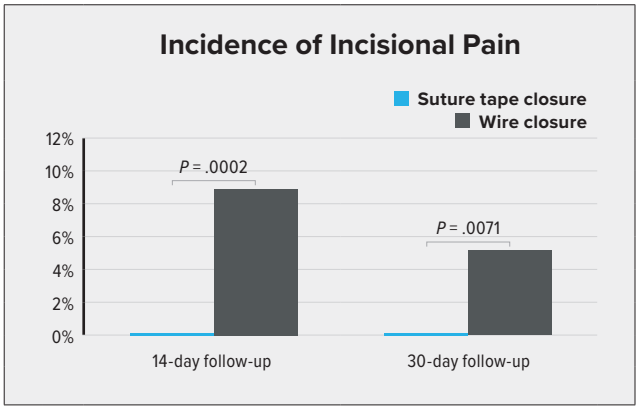
Sternal Wound Infection and Dehiscence—Rates of sternal wound infections (1% vs 5%, $P = .0363$) and sternal dehiscence (0% vs 5%, $P = .0297$) were lower in the suture tape group (Figure 2).

Figure 2. Incidence of sternal wound infection (left) and dehiscence (right) in suture tape and wire closure groups.



Incisional Pain—Significantly fewer patients in the suture tape group vs the wire closure group had incisional pain at the 14-day (0% vs 9%, $P = .0002$) and 30-day (0% vs 5%, $P = .0071$) follow-up evaluations (Figure 3).

Figure 3. Incidence of incisional pain at 14-day (left) and 30-day (right) follow-up appointments in the suture tape and wire closure groups.



Hospital Mortality—Hospital mortality was significantly lower in the suture tape closure group compared with the wire closure group (1% vs 7%, $P = .0349$).

Conclusions

Suture tape demonstrated significant advantages for over conventional steel wires for sternal closure, such as reduced rates of sternal wound infections, dehiscence, incisional pain, and hospital mortality, as well as shorter closure times.

Reference

1. Khalpey Z, Kumar UA, Aslam U, et al. Improving sternal closure outcomes in cardiac surgery: polyethylene suture tapes vs. steel wires. *J Clin Med.* 2025;14(1):277. doi:10.3390/jcm14010277