



Incisional Negative Pressure Wound Therapy is Protective of Postoperative Cardiothoracic Wound Infection

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Background

- Deep sternal wound infection (DSWI) is a rare but life-threatening complication of cardiothoracic surgery, with most reported rates between 0.5-2%.¹
- DSWI has a reported mortality rate as high as 30%, with an associated two-fold increase in cost of treatment.²
- While previously utilized only for the management of open wounds, negative pressure therapy has been expanded to include application over closed surgical incisions.
- Closed incision negative pressure therapy (ciNPT) including the Prevena™ Incision Management System (3M™, St. Paul, Minnesota) is applied intraoperatively and provides continuous negative pressure at -125mmHg for 5-7 days.³
- ciNPT has been used widely including in the treatment of fractures and abdominal, sternal, and groin incisions, with associated positive outcomes of decreased infection rates and improved postoperative recovery.⁴⁻⁷

Objective

Determine whether closed incision negative pressure therapy reduced wound infection and improved outcomes in cardiothoracic surgery, in the largest population of this type studied to date.

Methods

- A retrospective cohort study was performed including all adult patients who underwent nontraumatic cardiothoracic surgery at a single institution between 2016 and 2018 (n=1199).
- Subject characteristics were summarized by means and standard deviations or frequencies and percentages, as applicable.
- Significance between groups was determined by independent samples t-tests and χ^2 tests ($\alpha = 0.05$).
- Analysis was completed using SPSS Statistics 26.

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Data

Table 1. Operative Characteristics of Patients Undergoing Cardiothoracic Surgery 2016-2018, Stratified by Use of ciNPT.

	Total (n=1,199)	No ciNPT (n=493)	ciNPT (n=706)	p-value
Type of surgery, n (%)				
CABG	431 (35.9)	136 (27.6)	295 (41.8)	<0.01
Valve	266 (22.2)	101 (20.5)	165 (23.4)	
Lung Transplant	314 (26.2)	155 (31.4)	159 (22.5)	
Heart Transplant	53 (4.4)	29 (5.9)	24 (3.4)	
Other	135 (11.3)	72 (14.6)	63 (8.9)	
IMA used if CABG, n (%)	480 (40.0)	153 (31.0)	327 (46.3)	<0.01
Preop IABP, n (%)	66 (5.5)	29 (5.9)	37 (5.2)	0.64
Preop ECMO, n (%)	41 (3.4)	23 (4.7)	18 (2.6)	0.05
Re-do chest surgery, n (%)	116 (9.7)	52 (10.6)	64 (9.1)	0.40
Type of thoracotomy, n (%)				
Median sternotomy	829 (69.3)	286 (58.2)	543 (76.9)	<0.01
LAL thoracotomy	129 (10.8)	74 (15.1)	55 (7.8)	
RAL thoracotomy	124 (10.4)	60 (12.2)	64 (9.1)	
Clamshell	90 (7.5)	52 (10.6)	38 (5.4)	
Other	25 (2.1)	19 (3.9)	6 (0.8)	

Table 2. Operative Outcomes of Patients Undergoing Cardiothoracic Surgery 2016-2018, Stratified by Use of ciNPT.

	Total (n=1,199)	No ciNPT (n=493)	ciNPT (n=706)	p-value
Takeback in 5 days, n (%)	81 (6.8)	35 (7.1)	46 (6.5)	0.68
For bleeding	53 (64.4)	22 (62.9)	31 (67.4)	0.81
Postop IABP	58 (4.8)	27 (5.5)	31 (4.4)	0.40
Postop ECMO	62 (5.2)	39 (7.9)	23 (3.3)	<0.01
Wound infection, n (%)	52 (4.3)	31 (6.3)	21 (3.0)	0.01
Death from SWI	2 (3.8)	0 (0)	2 (9.5)	0.16
OR for debridement	43 (82.7)	28 (90.3)	15 (71.4)	0.13
Readmission for SWI, n (%)	18 (1.5)	13 (2.6)	5 (0.7)	0.01

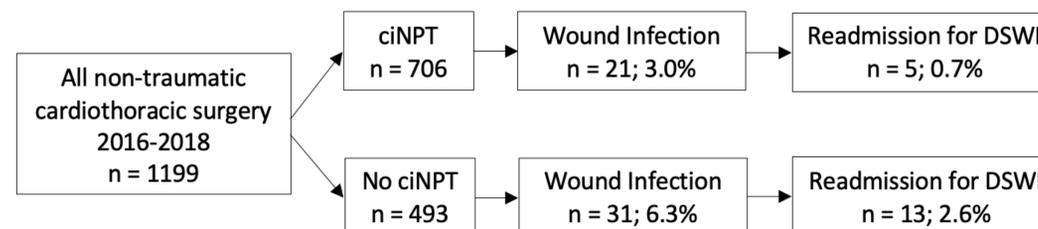


Figure 1. Analytic Flow of Studied Population, Stratified by Use of ciNPT.

Results

- ciNPT was used in 58.9% of patients (n=706).
- Patients who received ciNPT were older, with higher rates of hyperlipidemia, MRSA colonization, statin use, and antihypertensive use.
- Patients who did not receive ciNPT were more likely to have preoperative steroid use and preoperative infections.
- CABG and valve surgeries comprised a larger proportion of the ciNPT group, while heart and lung transplants were more common in the control group.
- ciNPT was found to significantly reduce rates of both wound infection (3.0% vs 6.3%, $p = 0.01$) and readmission for wound infection (0.7% vs 2.6%, $p = 0.01$).
- After controlling for possibly confounding variables, ciNPT was found to be independently protective of surgical wound infection (OR: 0.497, 95% CI: 0.262-0.945).

Conclusions

In the largest population studied to date, this study supported the expanded use of ciNPT in cardiothoracic surgery to decrease postoperative wound infection rates.

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