Closed Incision Negative Pressure Therapy Versus Standard of Care Over Closed Plastic Surgery Incisions in the Reduction of Surgical Site Complications: A Systematic Review and Meta-Analysis of Comparative Studies

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Introduction

- Surgical site complications (SSCs) are common occurrences in plastic surgery, with rates as high as 80% reported for some procedures.[1]
- SSCs are detrimental to patient health and recovery and also result in increased rates of health care utilization and costs.

Purpose

- The objective of this systematic review and meta-analysis was to examine the impact of closed incision negative pressure therapy (ciNPT*) on risk of SSCs including SSIs, wound dehiscence, seroma, excessive drainage, skin necrosis, and scarring as well as related health care utilization and costs following plastic surgery.

Methods

- A systematic literature search using PubMed, EMBASE, and QUOSA was performed for publications written in English, comparing ciNPT to standard of care (SOC) dressings for patients undergoing plastic surgery procedures between January 2005 and August 2021.
- Characteristics of study participants, surgical procedure, dressing used, duration of treatment, post-surgical outcomes, and follow up data were extracted.
- Meta-analyses were performed using random-effects models.
- Dichotomous outcomes were summarized using risk ratios and mean differences were used to assess continuous variables.
- A cost analysis was conducted using inputs from the meta-analysis and cost estimates from a national database.

Results

- 16 studies were identified for inclusion in the analysis, including 1 randomized controlled trial (RCT), 4 prospective studies, and 11 retrospective studies (**Figure 1**).
- Study surgical procedures included abdominoplasty, body contouring, breast reconstruction with donor site repair, breast reduction, panniculectomy with hernia repair, pilonidal cyst removal, pressure ulcer reconstruction, groin incision for inguinal lymph node dissection, and pectoralis flap for sternotomy wound infections.

Figure 1. Included Studies

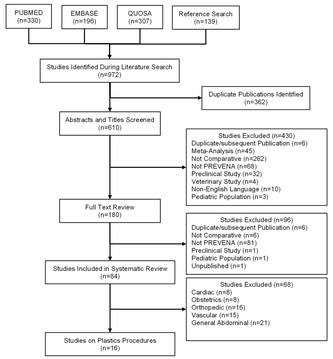


Table 1. Summary of Outcomes from Included Studies

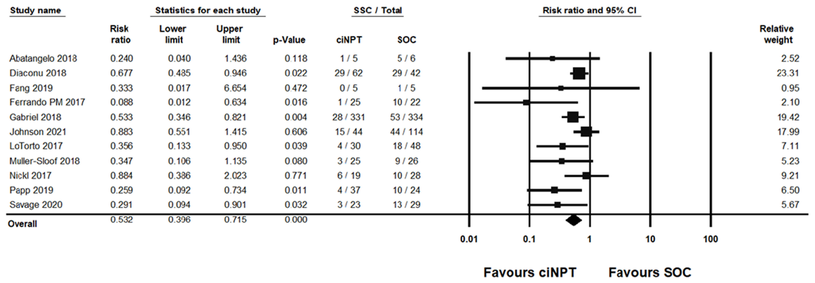
Outcome	Statistic	# of Studies	Value	Lower Limit	Upper Limit	I^2	P-value
SSC	Risk Ratio	11	0.532	0.396	0.715	33.219	0.000
SSI	Risk Ratio	8	0.760	0.540	1.068	0.000	0.113
Seroma	Risk Ratio	8	0.693	0.318	1.54	54.261	0.358
Dehiscence	Risk Ratio	9	0.475	0.309	0.73	0	0.001
Skin Necrosis	Risk Ratio	5	0.460	0.284	0.746	0	0.002
ROR	Risk Ratio	8	0.647	0.401	1.044	8.761	0.074
LOS	Diff in Means	5	-0.610	-0.882	-0.338	43.726	0.000
Drainage (mL)	Diff in Means	4	-157.500	-327.156	12.157	89.795	0.069
Drain Days	Diff in Means	5	-1.966	-4.259	0.327	98.849	0.093
Scarring 90 days (VSS)	Diff in Means	2	-5.111	-5.935	-4.287	45.172	0.000
Scarring 12 months	Std Diff in Means	2	-1.728	-3.44	-0.017	72.1	0.048
Scarring overall	Std Diff in Means	3	-2.543	-4.564	-0.521	82.075	0.014

SSC = surgical site complication, SSI = surgical site infection, ROR = return to operating room, LOS = length of stay, VSS = Vancouver Scar Scale

- Patients who received ciNPT had significantly reduced risk of SSC, dehiscence, and skin necrosis as well as shorter length of stay (LOS) and reduced scarring compared to patients who received SOC dressings (**Table 1**).

Results (cont'd)

Table 2. Forest Plot of the Effect of ciNPT on Risk of SSC



- The relative risk of developing an SSC for patients who received ciNPT was 0.532 (95% CI, 0.396-0.715; p<0.001), indicating that ciNPT reduced the risk of an SSC by approximately 47% compared to SOC dressings (**Table 2**).
- The estimated cost savings associated with ciNPT use in plastic surgery procedures was $904 per patient.

Conclusions

- Study findings indicate that ciNPT may be effective in reducing the risk of SSCs and be associated with improvements in scar quality in patients undergoing plastic surgery procedures.
- Use of ciNPT may also result in decreased LOS and costs of care.
- Additional research in the form of larger studies and RCTs is needed to determine how to optimize use of ciNPT across patient populations and procedures.

References

Abatangelo S, Saporiti E, Giatsidis G. Closed Incision Negative-Pressure Therapy (ciNPT) Reduces Minor Local Complications in Post-bariatric Abdominoplasty Body Contouring: a Retrospective Case-Control Series. *Obes Surg*. 2018;28(7):2096-2104. doi:10.1007/s11695-018-3279-8

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NOTE: Specific information, contraindications, warnings, precautions and safety information exist for these products and therapies. Please consult a clinician and product labeling prior to use.

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