Evaluating Closed Incision Negative Pressure Therapy Use Following High-Risk Caesarean Section in a Middle East Population

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Introduction

- Over the past decade, rates of caesarean section have been increasing globally.[1,2]
- If surgical site complications (SSCs) develop following caesarean section, maternal morbidity and mortality may be greatly impacted.
- Postoperative incision management strategies such as closed incision negative pressure (ciNPT*), have been used to mitigate post-surgical complications.
- However, limited evidence exists on the use of ciNPT over caesarean section incisions in the United Arab Emirates (UAE).

Purpose

- The effect of ciNPT in the management of closed incisions following caesarean section was examined.

Methods

- Patients received a caesarean section between 2022 to 2024 at a single acute care hospital in the UAE.
- Patients who were considered high risk were included in the data analysis, which identified 82 patients.
  - High risk was defined as:
    - A body mass index (BMI) <18 kg/m^2 or >30 kg/m^2
    - Type 2 diabetes
    - Previous caesarean section
    - A history of wound infections
    - A prolonged or emergency caesarean section

Methods (Cont'd)

- All control patients received a postoperative silver dressing (SOC, n=28) with dressing changes every 3-7 days.
- All ciNPT patients (n=54) received 20 cm ciNPT dressing and received continuous negative pressure at -125 mmHg with dressing changes every 5-7 days.
- At each dressing change, patient and incision outcomes were assessed.
- Welch two sample t-tests compared continuous variables and Fisher Exact tests compared categorical variables.

Results

- There were no significant differences between age, BMI, previous caesarean section, or the number of previous cesarean sections for the ciNPT and SOC groups (**Table 1**).

Table 1. Patient demographics

Characteristic	ciNPT (n=54)	SOC (n=28)	p-Value
Age (years, mean ± SD)	34.5 ± 4.5	32.5 ± 6.2	0.1425
BMI (kg/m², N%)			0.1523
Overweight (25-29.9)	3 (6.0%)	2 (7.0%)	
Obese (30-39.9)	30 (56.0%)	21 (75.0%)	
Severely Obese (>40)	21 (39.0%)	5 (18.0%)	
Previous Caesarean Delivery	41 (76.0%)	21 (75%)	0.9999
Number of Previous Deliveries (N, %)			0.2691
0	13 (24.0%)	7 (25.0%)	
1	12 (22.0%)	10 (36.0%)	
2	15 (28.0%)	3 (11.0%)	
3	8 (15.0%)	6 (21.0%)	
4	5 (9.0%)	1 (4.0%)	
5	0 (0.0%)	1 (4.0%)	
6	1 (2.0%)	0 (0.0%)	

SD= Standard deviation

Results (Cont'd)

- The ciNPT group had increased rates of pre-gestational hypertension (17.0% vs 0.0%; p=0.0245, **Table 2**).
- The ciNPT group had higher rates of elective caesarean section surgery compared to the SOC group (69.0% vs 43.0%; p = 0.0332, **Table 2**).

Table 2. Patient comorbidities

Characteristic	ciNPT (n=54)	SOC (n=28)	p-Value
Patient Comorbidities (N, %)			
Pre-gestational Obesity	51 (94.0%)	24 (86.0%)	0.2228
Pre-gestational Diabetes	10 (19.0%)	4 (14.0%)	0.7623
Pre-gestational Pannus	3 (6.0%)	0 (0.0%)	0.5476
Pre-gestational Hypertension	9 (17.0%)	0 (0.0%)	**0.0245**
Elective Caesarean Section (N, %)	37 (69.0%)	12 (43.0%)	**0.0332**

SD= Standard deviation

- The ciNPT group had a significantly lower rate of SSC compared to the SOC group (0.0% vs 21.0%; p = 0.0011, **Table 3**).
- The ciNPT group had a significantly lower rate of deep surgical site infection (SSI) compared to the SOC group (0.0% vs 11.0%; p = 0.037, **Table 3**).
- A clinical reduction in the rate of dehiscence was observed in the ciNPT group (0.0% vs 7.0%; p=0.1138, **Table 3**), although not statistically significant.
- The ciNPT group had a significantly lower rate of emergency department visits for wound care compared to SOC group (0.0% vs 14.0%; p = 0.0117, **Table 3**).

Table 3. Patient outcomes

Outcome	ciNPT (n=54)	SOC (n=28)	p-Value
SSC (N, %)	0 (0.0%)	6 (21.0%)	**0.0011**
Deep SSI (N, %)	0 (0.0%)	3 (11.0%)	**0.037**
Dehiscence (N, %)	0 (0.0%)	2 (7.0%)	0.1138
Time to discharge (Days, mean ± SD)	4.9 ± 1.4	4.8 ± 1.8	0.7985
Emergency department visit (N, %)	0 (0.0%)	4 (14.0%)	**0.0117**

SD= Standard deviation

Results (Cont'd)

- There was a total potential per patient savings of $1,743 USD with use of ciNPT compared to SOC (**Table 4**).

Table 4. Hypothetical economic model

Model Input	ciNPT	SOC
Number of patients	54	54
Number of deep SSI	0	3
Cost of deep SSI[3] (USD)	$20,522	$20,522
Per patient infection cost (USD)	$0	$2,199
Per patient therapy cost* (USD)	$495	$39
Total cost per patient	$495	$2,238
Potential per patient cost savings	**$1,743**	

USD= United States dollar; *Per patient therapy cost is estimated, individual prices may vary

Conclusions

- The use of ciNPT was associated with reduced rates of SSC, deep SSI, and emergency department visits for wound care.
- These findings support the utilization of ciNPT for incision management in patients at high risk for post-surgical complication development.
- The retrospective study design and the use of non-UAE cost data for the hypothetical economic model limits these findings.

References

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