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Obesity in Pregnancy and Surgical Techniques

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Materials and Methods: Ours is a prospective cohort study done at Fernandez Hospital, Hyderabad, a tertiary care hospital from June 2022 to July 2023. We compared high transverse skin incisions and Pfannenstiel incisions in obese women undergoing caesarean section. There were 436 women in the Pfannenstiel incision group and 145 women in the high transverse incision group. Two groups were compared for the outcomes of wound infection, baby delivery time, blood loss, duration of surgery, APGAR score at 5 minutes, NICU admissions, wound discharge, postoperative hospital stay and postnatal admissions.

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Obesity in Pregnancy and Surgical Techniques

Dr. Priya Deshmukh ^a & Dr. Sreedevi Paineni ^o

Abstract- Background: Obesity has become a modern world pandemic. It causes increased morbidity in the postoperative period. Postoperative wound infection being one of the major contributing factors.

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Results: The baby delivery time, duration of surgery, and blood loss were higher in the High transverse incision group. There were no significant differences between the APGAR score at 5 min and NICU admissions between the two groups. The incidence of wound infection was higher in the Pfannenstiel incision group compared to the high transverse incision group. However, the difference did not reach a statistically significant level.

Conclusion: High transverse incision can be considered to reduce wound infections in obese women with BMI >35, based on the grading of pannus.

Keywords: obesity, caesarean section, pannus, Pfannenstiel incision, high transverse incision, wound infection.

I. INTRODUCTION

Obesity has become a major public health problem. About 16% of adults aged 18 years and older worldwide were obese in 2022. According to NFHS-5, 24% (33% in urban and 19% in rural areas) of adult women were in the overweight and obese category [1]. Once it was thought of as a problem in high-income countries, recently the issue of overweight and obesity are increasing in low-income and middle-income countries, especially in urban areas. [2] Due to advances in technology and knowledge, more and more obese women in the reproductive age group seeking pregnancy are conceiving with the help of ART. [3] Still, the journey through pregnancy is difficult for these women and they face many antenatal, intrapartum, intraoperative and postnatal as well as foetal and neonatal complications. Some of the problems faced by these women are increased risk of miscarriage, GDM, GHTN, preeclampsia, VTE, increased risk of prolonged labour, caesarean section,

intraoperative complications, wound infections, stillbirths, NICU admissions, long-term consequences on neonate like obesity. [4][5] Obese women have an increased rate of caesarean sections. [6] Obesity is associated with reduced chances of successful TOLAC. [5], [7] There is increased risk of post-operative wound infection following caesarean section in obese women. [6][8] Postoperative wound infections cause significant morbidity in these women. Considering the higher risk of wound complications, clinicians need to be aware of the measures that reduce its occurrence. In our study, we compared two skin incisions of caesarean section, the Pfannenstiel incision and the high transverse incision, to find a safer incision that will reduce infection-related morbidity in obese women. There are many studies comparing transverse and vertical skin incisions of caesarean section in the literature. But very few studies compared Pfannenstiel and high transverse skin incision. Also, we could not find any such studies in Indian literature done on the Indian population.

Objectives

a) Primary Objectives

Wound infection

b) Secondary Objectives

- 1) Time from start of surgery to baby delivery time
- 2) Amount of blood loss
- 3) Time from start to end of the procedure
- 4) APGAR score at 5 minutes of birth
- 5) NICU admissions
- 6) Postoperative wound discharge
- 7) Culture-positive wound infections
- 8) Postoperative hospital stays and postnatal admissions

II. MATERIALS AND METHODS

The study was done at Fernandez Hospital, Hyderabad, a tertiary care hospital in South India from June 2022 to July 2023. It is a prospective cohort study comparing high transverse incisions and Pfannenstiel incisions in obese women undergoing caesarean section. The sample size was calculated by taking the incidence of wound complications in Pfannenstiel incision as 27.08% and in high transverse skin incision as 15.63%, as per the study by Walton et al. The other parameters considered for sample size calculation were 80% power of study and 5% two-sided alpha error. The ratio of the two groups (Pfannenstiel incision group to

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the High transverse skin incision group) was taken as 3:1. The sample size was calculated by using the ClinCalc sample size calculator. (Reference: Kane SP. Sample Size Calculator. ClinCalc: <https://clincalc.com/stats/samplesize.aspx>. Updated July 24, 2019. Accessed April 30, 2022.)

As per the calculation in ClinCalc, the required sample size was 414 in the Pfannenstiel incision group and 138 in the High transverse skin incision group. On adding a 5% non-response rate, the required sample size was 436 subjects in the Pfannenstiel incision group

and 145 in the high transverse skin incision group. We recruited the study population after proper consent in the antenatal period and the type of incision was based on the grading of pannus.

III. RESULTS

A total of 581 patients were included in the study among which 145 (25%) underwent a high transverse skin incision and 436 (75%) underwent a pfannenstiel incision.

Table 1: Comparison of Background Characteristics

Variables	Total (n=581)	High transverse (N=145)	Pfannenstiel (N=436)	P-value
Age (years), Median (IQR)	31 (28, 34)	32 (28, 34)	31 (28, 34)	0.733
Age group, n (%)				
<25 years	56 (9.6%)	16 (11%)	40 (9.2%)	0.793
25 to 35 years	441 (75.9%)	109 (75.2%)	332 (76.1%)	
36 to 46 years	84 (14.5%)	20 (13.8%)	64 (14.7%)	
BMI (kg/m ²), Median (IQR)	36.51 (35.26, 40.25)	40.51 (37.73, 44.15)	35.72 (35.17, 38.66)	<0.001
BMI classification, n (%)				
35 to 39.99 kg/m ²	428 (73.7%)	66 (45.5%)	362 (83.0%)	<0.001
40 to 49.99 kg/m ²	144 (24.8%)	70 (48.3%)	74 (17.0%)	
>= 50 kg/m ²	9 (1.5%)	9 (6.2%)	0 (0.0%)	
Parity, n (%)				
Primiparous	297 (51.1%)	73 (50.3%)	224 (51.4%)	0.830
Multiparous	284 (48.9%)	72 (49.7%)	212 (48.6%)	

Age and parity were comparable in the two groups but BMI was higher in the high transverse incision group. The median BMI for the high transverse incision group was 40.51 and for the pfannenstiel incision group 35.72.

Table 2: Comparison of Preeclampsia, Gestational Diabetes/Diabetes Mellitus, Gestational Age and Type of Caesarean Section

Variables	Total (n=581)	High transverse (N=145)	Pfannenstiel (N=436)	P-value
Preeclampsia, n (%)				
Yes	113 (19.4%)	33 (22.8%)	80 (18.3%)	0.245
No	468 (80.6%)	112 (77.2%)	356 (81.7%)	
GDM/DM, n (%)				
None	308 (53%)	60 (41.4%)	248 (56.88%)	0.009
DM Type 1	3 (0.5%)	0 (0%)	3 (0.69%)	
DM Type 2	57 (9.8%)	20 (13.8%)	37 (8.49%)	
GDM on diet	89 (15.3%)	25 (17.2%)	64 (14.68%)	
GDM on OHA	76 (13.1%)	28 (19.3%)	48 (11%)	
GDM on insulin	48 (8.3%)	12 (8.3%)	36 (8.26%)	
Gestation, n (%)				
Preterm	109 (18.8%)	28 (19.3%)	81 (18.6%)	0.845

Term	472 (81.2%)	117 (80.7%)	355 (81.4%)	
Type of caesarean section, n (%)				
Elective	284 (48.9%)	71 (49%)	213 (48.9%)	0.981
Emergency	297 (51.1%)	74 (51%)	223 (51.1%)	

The incidence of preeclampsia, gestational diabetes or diabetes mellitus, gestational age and elective vs emergency caesarean section was comparable in both the study groups. The overall incidence of GDM or DM was more in the high transverse incision group.

Table 3: Comparison of Incision to Delivery Time, Time from Start to End of the Procedure and Amount of Blood Loss

Variables	Total (n=581)	High transverse (N=145)	Pfannenstiel (N=436)	P-value
Incision to delivery time (mins), Median (IQR)	8 (6, 11)	10 (7, 13)	8 (6, 11)	<0.001
Time from start to end of procedure (mins), Median (IQR)	60 (50, 70)	69 (56, 80)	58 (49, 65.5)	<0.001
PPH (Blood loss in ml), Median (IQR)	500 (380, 650)	600 (480, 790)	495 (350, 600)	<0.001

The incision to delivery time (10min vs 8min, p-value-<0.001), time from start to end of the procedure (69min vs 58min, p-value-<0.001) and amount of blood loss (600ml vs 495ml, p-value-<0.001) were found higher in the high transverse skin incision group.

Table 4: Comparison of Postoperative Wound Discharge, Wound Swabs Sent and Positive Wound Cultures and Postnatal Admission

Variables	Total (581)		High transverse incision (145)		Pfannenstiel incision (436)		P Value
	Yes	No	Yes	No	Yes	No	
Wound discharge	103 (17.7%)	478 (82.3%)	49 (33.8%)	96 (66.2%)	54 (12.4%)	382 (87.6%)	<0.001
Wound swabs sent	103 (17.7%)		49 (33.8%)		54 (12.4%)		<0.001
Positive cultures	67 (63.8%)		28 (58.3%)		39 (68.4%)		0.284
Variables	Total (581)		High transverse incision (145)		Pfannenstiel incision (436)		P Value
Admissions	6(1.7%)		2 (1.3%)		4 (0.9%)		0.998

More women with high transverse incisions had wound discharge compared to the pfannenstiel incision group (33.8% vs 12.4%), but the culture-positive wound infection was more in the pfannenstiel incision group (68.4% vs 58.3%). Postnatal admissions for wound infections were comparable between the two groups.

Table 5: Comparison of APGAR Score at 5 min and NICU Admissions

Variables	Total (581)		High transverse (145)		Pfannenstiel (436)		P value
APGAR score at 5 min (IQR)	9 (8,9)		9 (8,9)		8 (8,9)		0.592
NICU admissions	Yes	No	Yes	No	Yes	No	0.798
	47 (8.1%)	534 (91.9%)	11 (7.6%)	134 (92.4%)	36 (8.3%)	400 (91.7%)	

The difference in APGAR score at 5 minutes and NICU admissions was not statistically significant between the two groups.

IV. DISCUSSION

Age: The median age in our study was 31 years and it was comparable in both groups. In Dias et al [9] study, women with a supra-panniculus transverse skin incision were older (32.9 vs. 30.6, $p = 0.002$). Walton et al [10] included parturients aged 18-45 years in their study. The average age of participants in the S S Allah study [11] was 31.4 years, the two study groups having no difference.

Parity: In our study the number of primipara and multipara in both the groups were comparable. In the study by S S Allah et al [11], there was no difference in the parity between the two groups in line with our study.

Mean BMI: In our study women with high transverse incision had higher median BMI (40.5 vs 35.72). In Walton et al study [10], both the study groups included women with BMI > 40. The mean BMI was 49 for both groups. Dias et al [9] had a higher BMI in the high transverse incision group (49.2 vs. 43.3), similar to our study. The average BMI for both groups in S S Allah et al study was 40.7 [11].

Gestational Age: There was no difference in Gestational age between the two groups in our study. The average Gestational age was 38 weeks in the study by S S Allah [11].

Other Comorbidities: In the Dias et al [9] study, a higher prevalence of gestational diabetes mellitus (42.6% vs. 21.9%, $p = 0.002$) was found in suprapannus incision, similarly in our study, the overall incidence of DM and GDM was higher in high transverse incision group.

Duration: In our study, Incision to delivery time was comparable in both the groups (9 min vs 8 min). Duration of surgery was higher in the high transverse incision group (65 min vs 57 min). However, In the study by S S Allah [11], fetal delivery time was less in the suprapanniculus incision group (7.87 min vs 8.89 min). The average operating time was 76.01 minutes, with no difference between the two groups. El Agwani [12] found infra-umbilical (below pannus) incision to be easier and quicker compared to supraumbilical incision.

Amount of Blood Loss: In our study, blood loss was higher in the high transverse incision group (615 ml vs 495 ml). In the S S Allah et al study [11], the Hb drop was more in the high transverse incision group (0.76 gm vs 0.51 gm). According to El Agwani [12], a supraumbilical incision is associated with more blood loss.

NICU Admission and APGAR at 5min: In the Walton et al [10] study, those having a high transverse skin incision had lower median five-minute Apgars (8 min vs 9 min, p -value=0.0021) but similar umbilical artery pH values. NICU admissions were higher for neonates in the high transverse group (28.13% vs. 5.21%, P -value=0.0011). S S Allah study [11] had no difference in NICU

admissions similar to our study but the Apgar at 5min was lower in the high transverse incision group.

Wound Infection: In the Walton et al [10] study, there was a lower incidence of wound complications in the high transverse group, but this did not reach statistical significance (15.63% vs. 27.08%, p -value=0.2379), in line with our study. In our study, more women with high transverse incisions had wound discharge compared to the Pfannenstiel incision group (33.8% vs 12.4%), but the culture-positive wound infections were more in the Pfannenstiel incision group (68.4% vs 58.3%). S S Allah's study [11] (at 6 weeks postnatal), there was no difference in wound complications between the two incisions. El Agwani, [12] in their article mentioned that the supraumbilical skin incision is associated with more wound infections compared to infra umbilical skin incision. Adrian Salvant Tames, Katherine Romero Viamonte [13], in their case report of a morbidly obese, 43-year-old woman with medical comorbidities used infra umbilical suprapanniculus skin incision for preterm caesarean section, and suggested that the incision can be used as an effective alternative in obese patients to reduce the wound infection. Sagi Y et al [14], in their observational study in women with class 3 obesity, reported that Pfannenstiel incision is preferred by most surgeons for emergency as well as non-emergency caesarean sections in obese women and high transverse skin incision does not reduce wound infections in these women. And suggested that incisions should be individualised similar to the study by Kristina Roloff K et al [15].

V. CONCLUSION

The purpose of the study was to find a safer incision in obese women undergoing caesarean section to reduce wound infection-related morbidity. We found that the incidence of wound infection was lower in the high transverse incision group. The duration of surgery and amount of blood loss were more in the high transverse incision group. However, there was no difference in foetal delivery time or neonatal outcomes in both groups. We can consider high transverse skin incisions in obese women with BMI > 35, depending upon the grading of the pannus.

Strengths and Limitations: This can be the reference study for further research in this area as there are no studies in the Indian population.

The study period is short and being a prospective study, it needs to be continued further.

The sample size is small and by increasing the duration of the study, a larger study population can be included.

Recommendations: The above limitations can be overcome by continuing the study for a longer duration that will have a larger sample size for analysis.

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