

Optimal Skin Incision Techniques and Perioperative Considerations for Cesarean Delivery in Super Obese Patients

Dimitrios S. Mastrogiannis^{1*} and Nicholas Baranco²

¹Department of Maternal Fetal Medicine, Albert Einstein College of Medicine, Montefiore Medical Center, New York, USA

²Department of Obstetrics and Gynecology, SUNY Upstate Medical University, Norton College of Medicine, New York, USA

*Corresponding author: Dimitrios S. Mastrogiannis, Department of Maternal Fetal Medicine, Albert Einstein College of Medicine, Montefiore Medical Center, New York, USA, E-mail: dimitrios.mastrogiannis@outlook.com

Received: 30-Sep-2024, Manuscript No. JOWT-24-149181; Editor assigned: 02-Oct-2024, PreQc No. JOWT-24-149181 (PQ); Reviewed: 16-Oct-2024, QC No. JOWT-24-149181; Revised: 23-Oct-2024, Manuscript No. JOWT-24-149181 (R); Published: 30-Oct-2024, DOI: 10.4172/2165-7904.S8-005

Citation: Mastrogiannis DS, Baranco N (2024) Optimal Skin Incision Techniques and Perioperative Considerations for Cesarean Delivery in Super Obese Patients. J Obes Weight Loss Ther S8:005.

Copyright: © 2024 Mastrogiannis DS, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Abstract

Super obesity (BMI ≥ 50 kg/m²) presents significant challenges in obstetric care, especially during cesarean delivery. This review examines optimal skin incision techniques and perioperative considerations for cesarean delivery in super obese patients, analyzing the advantages and disadvantages of low transverse (Pfannenstiel), high transverse, and vertical incisions. Low transverse incisions are associated with fewer wound complications and better cosmetic outcomes but may be difficult due to the overhanging pannus. High transverse incisions offer improved exposure but have higher wound infection rates. Vertical incisions allow rapid access but carry risks of poor cosmetic results and increased wound dehiscence. Factors influencing incision choice include body habitus, urgency of delivery, prior surgical history, fetal position, and surgeon preference. Perioperative strategies such as anesthesia considerations, antibiotic prophylaxis, use of self-retaining retractors, and meticulous wound care are critical for optimizing outcomes. Individualized surgical planning and multidisciplinary collaboration are essential to manage these high-risk cases effectively.

Keywords: Super obesity; Cesarean delivery; Skin incision; Pfannenstiel incision; High transverse incision; Vertical incision; Perioperative management; Wound complications

Introduction

Super obesity, defined as a Body Mass Index (BMI) ≥ 50 kg/m², presents significant challenges in obstetric care [1]. The prevalence of super obesity among reproductive-age women has doubled in the past decade, mirroring the overall obesity epidemic [2]. This trend has led to an increase in high-risk pregnancies and cesarean deliveries in this population.

Performing cesarean deliveries in super obese patients is associated with unique challenges, including increased operative time, higher blood loss and a higher risk of wound complications [3]. The choice of skin incision plays a key role in navigating these challenges and can significantly impact postoperative outcomes.

Types of skin incisions

Three main types of skin incisions are commonly used for cesarean deliveries in super obese patients:

Low transverse (Pfannenstiel) incision: This traditional approach involves a slightly curved incision placed 2-3 cm above the pubic symphysis [4]. It offers excellent cosmetic results and is associated with less postoperative pain. However, in super obese patients, the overhanging pannus can obstruct access to this area. Retraction of the pannus is essential, using tape or other commercially available products.

High transverse incision (suprapannus): Placed above the pannus, this incision can be either infraumbilical or supraumbilical [5]. It provides better exposure of the lower uterine segment in patients with a large pannus but may be associated with increased wound complications.

Vertical incision: A midline incision from above or around the umbilicus up to the pubic symphysis [6]. This approach offers rapid abdominal entry and can be extended if needed, but it is associated with poorer cosmetic outcomes, higher rates of "classical or vertical" uterine incision (for supraumbilical vertical incisions) and a higher risk of wound dehiscence.

The choice between these incisions depends on various factors, including the size and position of the pannus, urgency of the procedure and surgeon preference [7].

Literature Review

Comparative outcomes of different incision types

Recent studies have shed light on the outcomes associated with different incision types in super obese patients:

Wound complications: Baranco et al., found that high transverse incisions were associated with significantly higher rates of wound infection compared to low transverse incisions (13.8% vs. 4.9%) [8]. This finding is consistent with other studies that have reported increased wound morbidity with high transverse incisions [9].

Operative time: The same study reported longer skin incision to delivery times for high transverse incisions compared to low transverse incisions (14.98 min vs. 11.09 min) [8]. However, total operative time was not significantly different after adjusting for confounding factors.

Blood loss: While some studies suggest increased blood loss with vertical incisions, others have found no significant difference between incision types when controlling for patient characteristics [8,10].

Postoperative pain and recovery: Patient-reported outcomes regarding postoperative pain have been mixed, with some studies suggesting less pain with low transverse incisions [11]. Most studies have not addressed pain, so evidence is limited.

Long-term outcomes: Limited data exist on long-term outcomes such as incisional hernia formation. Some studies suggest a higher risk of hernia formation with vertical incisions, but data specific to super obese patients are lacking [12].

Factors influencing incision choice

Several factors influence the choice of skin incision in super obese patients:

Body habitus and pannus size/position: The size and position of the pannus are critical factors. A large, pendulous pannus may necessitate a high transverse or vertical incision to achieve adequate exposure [13].

Urgency of cesarean delivery: In emergency situations, the need for rapid abdominal entry may favor a vertical incision [14].

Prior surgical history: Previous incisions may influence the current choice, with some surgeons preferring to use the same incision type to avoid crossing scars [15].

Anticipated fetal position/presentation: Certain fetal positions may require more extensive exposure, potentially influencing incision choice [16].

Surgeon experience and preference: Variation in practice patterns exists, with some surgeons more comfortable with certain incision types [17].

Perioperative Considerations

Preoperative planning and patient positioning: Proper positioning is important. Techniques such as pannus retraction or elevation can improve surgical field visibility [18].

Anesthesia challenges: Super obesity complicates both regional and general anesthesia. Difficulties with spinal placement and potential airway management issues must be anticipated [19].

Antibiotic prophylaxis: Weight-based dosing of antibiotics is essential. For super obese patients undergoing cesarean delivery, the recommended dose of cefazolin is 3 grams administered within 60 mins before skin incision [20]. This dose should be repeated if the surgery is prolonged (>3 h) or if there is significant blood loss (>1,500 ml) [21].

In addition to cefazolin, a single dose of azithromycin (500 mg intravenously) is recommended for all women undergoing cesarean delivery during labor or after membrane rupture [22]. This adjunctive therapy has been shown to significantly reduce the rate of

postoperative infections, including endometritis and wound infections, in both non-obese and obese populations [23].

Venous thromboembolism prophylaxis: Super obese patients are at high risk for VTE. Early mobilization, mechanical prophylaxis and weight-based pharmacological prophylaxis are recommended [24].

Discussion

Use of plastic self-retaining surgical retractors

The Alexis O Wound Protector-Retractor and the Mobius® Retractor are self-retaining, disposable wound retractors that have gained popularity in cesarean deliveries, particularly for patients with obesity [25]. Benefits include improved surgical field visualization, potential reduction in wound infection rates, easier fetal extraction and protection of wound edges [26].

A randomized controlled trial by Hardy-Fairbanks et al., compared two types of retractors at cesarean delivery and found that the Alexis retractor reduced operative time and improved surgeon satisfaction [27]. While the Alexis retractor shows promise, high-quality evidence specifically for super obese populations is limited. A randomized controlled trial by Hinkson et al., in obese women (BMI ≥ 30 kg/m²) found no significant difference in surgical site infections between those who had the Alexis retractor and those who did not, although the study was not powered to detect differences in the super obese subgroup [28].

Challenges in delivering the fetus

Delivering the fetus during cesarean section in super obese patients can be particularly challenging due to several factors:

Limited visualization: The thick abdominal wall and large pannus can obscure the surgical field, making it difficult to visualize the lower uterine segment and fetal parts [29-31].

Increased distance to the uterus: The distance from the skin incision to the uterus is often increased, making manual extraction more difficult [32].

Reduced maneuverability: The confined space within the surgical field can limit the obstetrician's ability to maneuver and apply necessary pressure for delivery [33].

Increased risk of fetal macrosomia: Super obese women are at higher risk of having macrosomic infants, which can further complicate delivery [34].

To address these challenges, several techniques can be used:

Vacuum-assisted fetal extraction: In cases where manual extraction is difficult, vacuum-assisted delivery can be considered. This technique involves applying a soft vacuum cup to the fetal head to aid in extraction. However, it should be used judiciously and with caution to avoid fetal injury [35].

Breech extraction of a cephalic fetus: The fetus can be delivered feet-first in cases of high floating fetal head or failed attempts at cephalic delivery by performing internal podalic version or, with low fetal station, by reverse breech extraction [36].

Fundal pressure: Carefully applied fundal pressure by an assistant can help guide the fetus towards the incision. However, excessive

force should be avoided to prevent uterine rupture or other complications [37].

Extended uterine incision: In some cases, extending the uterine incision (e.g. J or T incision) may be necessary to facilitate delivery. This decision should be made carefully, considering the implications for future pregnancies [38].

These techniques should be used judiciously and tailored to each individual case, balancing the need for successful delivery with the potential risks involved.

Postoperative wound suction devices

Negative Pressure Wound Therapy (NPWT) is a potential tool for reducing wound complications in high-risk surgical patients [39]. Meta-analyses have suggested a decrease in wound infections but have been limited by heterogeneity [40,41]. Recent large randomized controlled trials have not demonstrated improvement in wound outcomes [42].

Routine NPWT does not seem justified based on current evidence, and any use should be individualized, acknowledging that no studies are likely to focus on patients with the highest BMI and other comorbid risk factors.

Wound care and postoperative management

Closure techniques: A meta-analysis by Mackeen et al., found that suture closure was associated with a lower risk of wound complications compared to staples in obese patients undergoing cesarean delivery [43].

This finding was based on a subset of the included trials that had stratified results by BMI. More recent randomized trials in patients with morbid obesity have not shown any benefit to suture compared with staple closure and this was reaffirmed by a subsequent meta-analysis [44-47].

Postoperative monitoring: Frequent wound checks are essential for early detection of complications. Some institutions have implemented standardized protocols for wound monitoring in high-risk patients [48].

Patient education: Clear instructions on wound care, hygiene and the importance of early mobilization are essential. Patients should be educated on signs of wound complications and when to seek medical attention [49].

Future directions

While large prospective randomized trials are typically considered the gold standard for guiding surgical decisions, such studies may be particularly challenging to conduct in the context of cesarean delivery techniques for super obese patients. This difficulty is exemplified by the experience of Marrs et al., who conducted a randomized trial comparing Pfannenstiel *versus* vertical skin incisions in women with a BMI ≥ 40 kg/m² [15].

Given these difficulties, future research efforts may need to consider alternative approaches such as large-scale observational studies, quality improvement initiatives, novel study designs, focus on specific subgroups and patient-centered outcomes research (Table 1).

Characteristic	Low transverse (Pfannenstiel)	High transverse	Vertical
Location	2-3 cm above pubic symphysis	Above pannus (infraumbilical or supraumbilical)	Midline, from above/around umbilicus to pubic symphysis if needed
Exposure	May be limited by overhanging pannus	Better exposure of lower uterine segment	Excellent exposure, can be extended
Cosmetic outcome	Excellent	Good	Less optimal
Postoperative pain	Less	Moderate	More
Risk of wound infection	Lower	Higher	Variable
Risk of wound dehiscence	Lower	Moderate	Higher
Operative time	May be longer due to pannus retraction	Moderate	Shorter, especially in emergencies
Risk of vertical (classical) uterine incision	Lower	Moderate	Higher (especially if above umbilicus)
Suitability for emergency CS	Less suitable	Less suitable	Most suitable
Need for special retraction	Often requires pannus retraction	May require less retraction	Minimal retraction needed
Long-term complications (e.g., hernia)	Lower risk	Moderate risk	Higher risk
Ease of extension if needed	Limited	Moderate	Easily extended
Effects on future obstetric risks	Preferred	Acceptable	Less preferred due to higher risk of complications/classical c/s

Table 1: Comparison of skin incision types.

Conclusion

The choice of skin incision for cesarean delivery in super obese patients remains a challenging clinical decision. While current evidence suggests that low transverse incisions may be associated with fewer wound complications when feasible, the decision must be individualized based on patient characteristics, surgical urgency and operator experience.

The existing evidence should be interpreted with caution. BMI is a practical inclusion criterion for research, but it does not consistently reflect the body habitus of an individual patient. Studies have also used a variety of definitions and BMI cutoffs, so it is difficult to determine which evidence is most applicable in each case.

As the prevalence of super obesity continues to rise, obstetricians must be prepared to manage these complex cases. In the absence of clear evidence from large, randomized trials, clinicians should rely on a combination of the best available evidence, clinical experience and careful consideration of individual patient factors. A multidisciplinary approach, meticulous preoperative planning and vigilant postoperative care remain essential to optimizing outcomes in this high-risk population.

Ongoing research, quality improvement initiatives and innovative study designs are essential to enhancing our understanding and improving care for super obese women undergoing cesarean delivery. While the path to definitive evidence may be challenging, continued efforts to refine our approach to these complex cases are vital for improving maternal and neonatal outcomes.

Reference

1. World Health Organization (2000) Obesity: Preventing and managing the global epidemic: Report of a WHO consultation.
2. Flegal KM, Kruszon-Moran D, Carroll MD, Fryar CD, Ogden CL (2016) Trends in obesity among adults in the United States, 2005 to 2014. *Jama* 315:2284-2291.
3. Alanis MC, Villers MS, Law TL, Steadman EM, Robinson CJ (2010) Complications of cesarean delivery in the massively obese parturient. *Am J Obstet Gynecol* 203:271.
4. Pfannenstiel J (1897) On the advantages of a transverse cut of the fascia above the symphysis for gynecological laparotomies, and advice on surgical methods and indications. *Samml Klin Vortr Gynakol* 68:1-22.
5. Tixier H, Thouvenot S, Coulange L, Peyronel C, Filipuzzi L, et al. (2009) Cesarean section in morbidly obese women: Supra or subumbilical transverse incision?. *Acta Obstet Gynecol Scand* 88:1049-1052.
6. Wall PD, Deucy EE, Glantz JC, Pressman EK (2003) Vertical skin incisions and wound complications in the obese parturient. *Obstet Gynecol* 102:952-956.
7. Smid MC, Smiley SG, Schulkin J, Stamilio DM, Edwards RK, et al. (2016) The problem of the pannus: Physician preference survey and a review of the literature on cesarean skin incision in morbidly obese women. *Am J Perinatol* 33:463-472.
8. Baranco N, Zhang J, Khan S, Mastrogiannis D (2024) Comparison between high transverse and low transverse Pfannenstiel skin incisions during cesarean delivery for morbidly obese patients. *J Matern Fetal Neonatal Med* 37:2375021.
9. Stamilio DM, Scifres CM (2014) Extreme obesity and postcesarean maternal complications. *Obstet Gynecol* 124:227-232.
10. Smid MC, Vladutiu CJ, Dotters-Katz SK, Boggess KA, Manuck TA, et al. (2017) Maternal obesity and major intraoperative complications during cesarean delivery. *Am J Obstet Gynecol* 216:614.e1-614.e7.
11. Dias M, Dick A, Reynolds RM, Lahti-Pulkkinen M, Denison FC (2019) Predictors of surgical site skin infection and clinical outcome at caesarean section in the very severely obese: A retrospective cohort study. *Plos one* 14:216157.
12. Thornburg LL, Linder MA, Durie DE, Walker B, Pressman EK, et al. (2012) Risk factors for wound complications in morbidly obese women undergoing primary cesarean delivery. *J Matern Fetal Neonatal Med* 25:1544-1548.
13. Turan OM, Rosenbloom J, Galey JL, Kahntroff SL, Bharadwaj S, et al. (2016) The relationship between rostral retraction of the pannus and outcomes at cesarean section. *Am J Perinatol* 33:951-956.
14. Smid MC, Edwards RK, Biggio JR, Dorman K, Leduke RC, et al. (2017) Class III obese women's preferences and concerns for cesarean skin incision: A multicenter survey. *Am J Perinatol* 7:289-294.
15. Marrs CC, Moussa HN, Sibai BM, Blackwell SC (2014) The relationship between primary cesarean delivery skin incision type and wound complications in women with morbid obesity. *Am J Obstet Gynecol* 210:319.
16. Brocato BE, Thorpe Jr EM, Gomez LM, Wan JY, Mari G (2013) The effect of cesarean delivery skin incision approach in morbidly obese women on the rate of classical hysterotomy. *J pregnancy* 2013:890296.
17. Plymel K, Mariona FG (2015) Skin incision for cesarean delivery in morbidly obese women. *Am J Obstet Gynecol* 213:440.
18. Benevides ML, Brandão VC, Lovera JI (2016) Perioperative management of a morbidly obese pregnant patient undergoing cesarean section under general anesthesia-case report. *Braz J Anesthesiol* 66:418-422.
19. Machado LS (2012) Cesarean section in morbidly obese parturients: Practical implications and complications. *N Am J Med Sci* 4:13-18.
20. Coleman J, Murtha A, Silverman NS (2018) Use of prophylactic antibiotics in labor and delivery. *Obstet Gynecol* 132:103-119.
21. Pevzner L, Swank M, Krepel C, Wing DA, Chan K, et al. (2011) Effects of maternal obesity on tissue concentrations of prophylactic cefazolin during cesarean delivery. *Obstet Gynecol* 117:877-882.

22. Tita AT, Szychowski JM, Boggess K, Saade G, Longo S, et al. (2016) Adjunctive azithromycin prophylaxis for cesarean delivery. *N Engl J Med* 375:1231-1241.
23. Kawakita T, Landy HJ (2017) Surgical site infections after cesarean delivery: Epidemiology, prevention and treatment. *Matern Health Neonatol Perinatol* 3:12.
24. American College of Obstetricians and Gynecologists (2018) ACOG practice bulletin No. 196: Thromboembolism in pregnancy. *Obstet Gynecol* 132:1-7.
25. Childress KM, Gavard JA, Ward DG, Berger K, Gross GA (2016) A barrier retractor to reduce surgical site infections and wound disruptions in obese patients undergoing cesarean delivery: A randomized controlled trial. *Am J Obstet Gynecol* 214:285.e1-285.e10.
26. Mothiba MS, Tshepuwane TC, Adefolalu AO, Monokoane TS (2023) Alexis O-ring wound retractor *versus* traditional metal retractors for the prevention of postcaesarean surgical site infections. *S Afr Fam Pract* 65(1):1-6x.
27. Hardy-Fairbanks AJ, Mackenzie T, McCarthy M Jr, Goldman MB, Lauria MR (2017) A randomized controlled trial comparing two types of retractors at cesarean delivery. *J Obstet Gynaecol* 37:1009-1014.
28. Hinkson L, Siedentopf JP, Weichert A, Henrich W (2016) Surgical site infection in cesarean sections with the use of a plastic sheath wound retractor compared to the traditional self-retaining metal retractor. *Eur J Obstet Gynecol Reprod Biol* 203:232-238.
29. Mission JF, Marshall NE, Caughey AB (2013) Obesity in pregnancy: A big problem and getting bigger. *Obstet Gynecol Surv* 68:389-399.
30. Sutton AL, Sanders LB, Subramaniam A, Jauk VC, Edwards RK (2016) Abdominal incision selection for cesarean delivery of women with class III obesity. *Am J Perinatol* 33:547-551.
31. Smid MC, Vladutiu CJ, Dotters-Katz SK, Boggess KA, Manuck TA, et al. (2017) Maternal obesity and major intraoperative complications during cesarean delivery. *Am J Obstet Gynecol* 216:614.e1-619.e7.
32. Conner SN, Tuuli MG, Longman RE, Odibo AO, Macones GA, et al. (2013) Impact of obesity on incision-to-delivery interval and neonatal outcomes at cesarean delivery. *Am J Obstet Gynecol* 209:386.
33. Solomons E (1962) Delivery of the head with the Malmstrom vacuum extractor during cesarean section. *Obstet Gynecol* 19:202-203.
34. Berhan Y, Berhan A (2014) A meta-analysis of reverse breech extraction to deliver a deeply impacted head during cesarean delivery. *Int J Gynaecol Obstet* 124:99-105.
35. Kim TY, Ryu DH (2006) The effect of fundal pressure at cesarean section on maternal hemodynamics. *Obstet Gynecol Surv* 61:625-626.
36. Patterson LS, O'Connell CM, Baskett TF (2002) Maternal and perinatal morbidity associated with classic and inverted T cesarean incisions. *Obstet Gynecol* 100:633-637.
37. Hyldig N, Vinter CA, Kruse M, Mogensen O, Bille C, et al. (2019) Prophylactic incisional negative pressure wound therapy reduces the risk of surgical site infection after cesarean section in obese women: A pragmatic randomised clinical trial. *Obstet Gynecol* 126:628-635.
38. Yu L, Kronen RJ, Simon LE, Stoll CR, Colditz GA, et al. (2018) Prophylactic negative-pressure wound therapy after cesarean is associated with reduced risk of surgical site infection: A systematic review and meta-analysis. *Am J Obstet Gynecol* 218:200-210.
39. Angarita AM, Jayakumaran J, Di Mascio D, Berghella V (2022) Prophylactic negative pressure wound therapy on wound complications after cesarean delivery in women with obesity: A meta-analysis of randomized controlled trials. *Am J Obstet Gynecol MFM* 4:100617.
40. Tuuli MG, Liu J, Tita AT, Longo S, Trudell A, et al. (2020) Effect of prophylactic negative pressure wound therapy *vs.* standard wound dressing on surgical-site infection in obese women after cesarean delivery: A randomized clinical trial. *JAMA* 324:1180-1189.
41. Gunatilake RP, Swamy GK, Brancazio LR, Smrtka MP, Thompson JL, et al. (2017) Closed-incision negative-pressure therapy in obese patients undergoing cesarean delivery: A randomized controlled trial. *AJP Rep* 7:151-157.
42. Han D, Feng L, Xu L, Li C, Zhang Q (2022) Staples *versus* subcuticular suture for cesarean skin closure in obese women: A systematic review and meta-analysis. *J Gynecol Obstet Hum Reprod* 51:102420.
43. Mackeen AD, Schuster M, Berghella V (2015) Suture *versus* staples for skin closure after cesarean: A metaanalysis. *Am J Obstet Gynecol* 212:621.e1-621.e10.
44. Rodel RL, Gray KM, Quiner TE, Braescu AB, Gerkin R, et al. (2021) Cesarean wound closure in body mass index 40 or greater comparing suture to staples: A randomized clinical trial. *Am J Obstet Gynecol MFM* 3:100271.
45. Han D, Feng L, Xu L, Li C, Zhang Q (2022) Staples *versus* subcuticular suture for cesarean skin closure in obese women: A systematic review and meta-analysis. *J Gynecol Obstet Hum Reprod* 51:102420.
46. Yamasato K, Yoshino K, Chang AL, Caughey AB, Tsai PJ (2016) Cesarean delivery complications in women with morbid obesity. *J Matern Fetal Neonatal Med* 29:3885-3888.
47. Smid MC, Dotters-Katz SK, Silver RM, Kuller JA (2017) Body mass index 50 kg/m² and beyond: Perioperative care of pregnant women with superobesity undergoing cesarean delivery. *Obstet Gynecol Surv* 72:500-510.
48. (2021) Obesity in Pregnancy: ACOG Practice Bulletin, Number 230. *Obstet Gynecol* 137:128-144.
49. Walton RB, Shnaekel KL, Ounpraseuth ST, Napolitano PG, Magann EF (2019) High transverse skin incisions may reduce wound complications in obese women having cesarean sections: A pilot study. *J Matern Fetal Neonatal Med* 32:781-785.