

Delivery by Caesarean Section in Super-Obese Women: Beyond Pfannenstiel

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Pregnancy in women who are super-obese, defined by body mass index over 50 kg/m², has risen relentlessly across North America during the past decade. Currently 2% of deliveries are affected by super-obesity in parts of the southern United States, where young women of African-American and Hispanic descent constitute the fastest growing segments of the population.¹ In Canada, obstetricians are caring for increasing numbers of very overweight women from a variety of backgrounds. All obstetricians providing labour and delivery services to such women need to be prepared for delivery by Caesarean section (CS) because of the surgical challenges, especially since the risk of having to perform CS in labour may exceed 50%.² Elective CS, often performed because of suspected macrosomia, may best serve many women in this BMI category. Increasingly such women are concentrated in focused antenatal clinics where preoperative discussions lead to elective daytime surgery performed by experienced personnel. Nevertheless, super-obese women do begin labour spontaneously or may have labour induced, and thus the on-call labour and delivery obstetrician will face significant delivery challenges. What advice is available to assist on-call staff when performing CS in these women?

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Current editions of two leading textbooks offer no guidance on the approach to CS in super-obese women.^{3,4} By contrast, the online resource tool “UpToDate” devotes a section to this subject⁵ with the following advice: first, while elevation of the pannus may permit access to the abdomen through a traditional Pfannenstiel incision, the risk of wound infection may be reduced by weight-adjusted prophylactic pre-incision administration of intravenous antibiotics, minimal fat layer disturbance on entry, and closure of this layer on exit with skin staples to permit seroma drainage. This resource warns that postoperative wound complications should be anticipated in up to 25% of these patients and that the patients may require extended follow-up after initial discharge because the presentation is often delayed. If technically possible, a Pfannenstiel incision for entry beneath the pannus has important benefits, provided the surgeon can anticipate having easy access to a presenting fetal pole in the lower uterine segment. The skin incision should ideally be placed in healthy skin at least 2 cm above the natural crease. Modest use of the Trendelenberg position helps to keep the plane of surgery horizontal. Insertion of a self-retaining Mobius retractor (CooperSurgical, Inc., Trumbull CT), followed by lateral abdominal wet packs, gives optimal exposure and allows the operation to proceed with only one assistant. Before the surgery, the surgeon should become familiar with interior ring insertion and exterior ring rolling to maximize exposure.⁶ The uterus is closed in situ with this approach.

When the pannus is too large to elevate, or is edematous, erythematous, or ulcerated, consideration should be given to alternative incisions. It is important to be aware of these

alternative choices to avert the risk of fetal injury when Pfannenstiel access is predicted to be very difficult.^{7,8} Given the depth of pannus in super-obese women, a sub-umbilical midline incision is not recommended because the incised fat is extremely deep, placing the woman at high risk of seroma formation and wound infection. Instead, consideration should be given to performing a transverse skin incision above the pannus, as recently described by authors from France.⁹ This incision is ideal for elective or emergency CS in super-obese nulliparas. The best way to appreciate the utility of this incision is to have the patient partially disrobe in the antenatal clinic for examination in the erect position. In such circumstances, it will become apparent that the weight of the large pannus alone will drag the umbilicus downwards to a site just above the level of the upper border of the symphysis pubis. Therefore, once a higher transverse skin incision has been made, the weight of the pannus will draw down the lower edge of the incision, such that when a self-retaining retractor is placed, the lower segment of the uterus is easily visualized. When assessing such women for the first time in the labour and delivery setting (in bed with epidural anaesthesia), a similar conclusion can be reached by pushing the pannus downwards from the mother's right side, using the hypothenar eminence of the left hand. The excellent four-panel figure in the article by Tixier et al. should be reviewed before proceeding.⁹ In the series described by these authors, 13/18 transverse skin incisions were made in an infra-umbilical position; all surgeries were completed in less than 60 minutes, and there were no postoperative complications.

The alternative incision to consider is what we describe as the "epigastric approach" to CS. We have successfully performed this operation in seven super-obese women, principally for a very large and/or potentially infected pannus. In one case, with the fetal head impacted at full cervical dilatation, this incision was also chosen to avoid the dangerous scenario of very difficult access to the lower uterine segment and the risk of uncontrolled bleeding from an angle tear. A supra-umbilical midline incision is made (with a high epidural) through relatively thin (< 3 cm) fat tissues to approach the underlying uterine fundus. Bedside ultrasound can be helpful to illustrate to the patient (and to her partner or family) the much smaller skin-to-uterus distance with use of an epigastric approach and thus the justification for what seems to be an unusual decision. Wet packs are then placed on either side of the uterus. A classical uterine incision is made, leaving the membranes intact to allow time for a firm grip on a fetal lower extremity. After amniotomy a reverse breech extraction is performed. Because the incised uterus will decompress and retract after delivery, care should be taken to limit the lower extent

of the uterine incision; the Doyen (lower blade retractor) used in a Pfannenstiel incision is inserted after delivery and pulled downwards to facilitate access to the lower part of the classical incision for easy repair.

Previously described midline skin incisions in obese women^{10,11} did not specifically distinguish outcomes between infra-umbilical, peri-umbilical, and supra-umbilical approaches. The main drawback of a midline skin incision is the reduced likelihood of performing a lower uterine segment incision. The option of elective tubal ligation should therefore be discussed preoperatively to avoid subsequent pregnancy risks if a midline incision leads to a classical CS. In our view, these decisions need not be linked, since we have chosen the supra-umbilical midline approach only in rare situations: when we anticipated that lower segment access would be very poor via a transverse incision, or when the fetal head was impacted in the pelvis in advanced labour.

An important consideration with midline skin incisions for CS is the risk of wound dehiscence and infection. Since previous investigators did not stratify their data by site of midline skin incision, or by type of skin closure, we believe no useful conclusions can be drawn other than to note the need for extended wound surveillance after discharge.^{1,2,12} Our view is that infra-umbilical midline skin incisions through a deep pannus are unnecessary now that the high-transverse infra-umbilical incision above the pannus has been developed. We have had no wound complications with our seven "epigastric" cases, due in part to the relatively thin subcutaneous fat layer at that level of the abdomen.

Two further practical points are worthy of mention. First, skin closure with an absorbable suture has recently been shown to lower the risk of delayed infection significantly over the use of staples, with a number needed to harm of 16 for using staples at CS.^{13,14} We concur with use of absorbable suture in women having an elective CS, at which there should be no risk of bacterial wound contamination via the uterine cavity. The risk of wound infection with both the high transverse and the epigastric approaches may be less than for a more difficult Pfannenstiel incision into sub-optimal skin beneath a pannus, where it is challenging to maintain a dry and clean incision in the postoperative period. The use of a suction drain at CS in obese women increases the risk of wound infection¹⁵ and therefore should be considered only in specific circumstances. A novel additional consideration for both the high transverse and epigastric approaches is the use of a suction wound dressing unit such as Prevena (KCI Medical Canada Inc., Mississauga ON). This device is placed directly on the wound, can be used with any method of skin closure,

and should remain in place for seven days without being disturbed. Since the device requires sealed edges to create a constant negative pressure, care should be taken not to incise the skin transversely in excess of the device's length. The device is unlikely to be effective in situations where a midline skin incision passes around the umbilicus, because it needs even skin edges to create effective suction. In one of our seven cases, we extended the lower edge of the supra-umbilical midline incision to below the umbilicus, although in hindsight this extension was not necessary and merely resulted in a small seroma forming within deep infra-umbilical fat. We increasingly use the Mobius device in super-obese women delivering via the Pfannenstiel approach. Interestingly, the Mobius device is not necessary with the epigastric approach, because the natural lateral movement of the abdominal incision creates its own exposure of the classical incision for repair. Thus far we have not used the Prevena system, largely for reasons of cost. To date no publications using either device at CS in obese women has been published, although trials have been registered.^{16,17}

How to make progress? Despite recent large trials of CS techniques leading to Cochrane reviews,^{18,19} these data do not offer specific guidance for the small subset of women in the super-obese category requiring CS. We suggest that the accumulation of prospective data, via a secure on-line registry made available to Canadian obstetricians, would provide useful data for debate at regional meetings sponsored by the Society of Obstetricians and Gynaecologists of Canada. By gathering data about the reasoning behind the intraoperative choices, about operating time and short-term complications, and about longer-term outcomes including wound healing, we will be able to facilitate better outcomes at CS in super-obese women.

Summary of Key Technical Issues

1. Ensure adequate dosage of preoperative IV antibiotics.
2. Examine the patient (ideally standing) to choose the appropriate skin incision (Pfannenstiel, transverse umbilical, epigastric), and document this choice.
3. Consider Trendelenberg positioning and a suitable retractor (e.g., Mobius) if using a Pfannenstiel incision.
4. Use absorbable sutures in both the subcutaneous layer and the skin.
5. Ensure minimal disturbance of the fat layer on entry and avoid routine use of a suction drain.
6. Consider use of a negative pressure skin dressing system (e.g., Prevena).
7. Prescribe postoperative heparin for thromboembolism prophylaxis.

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