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Obesity and the challenges of caesarean delivery: Prevention and management of wound complications

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Caesarean section in obese patients is associated with an increased risk of surgical wound complications, including haematoma, seroma, abscess and dehiscence. This review focusses on the available strategies to decrease wound complications in this population, and on the clinical management of these situations. Appropriate dose of prophylactic antibiotics, closure of the subcutaneous tissue, and avoidance of subcutaneous drains reduce the incidence of wound complications associated with caesarean section in obese patients. For treatment of superficial wound infection associated with dehiscence, there are data from general surgery patients to suggest that the use of vacuum-assisted devices leads to faster healing and that surgical reclosure is preferable to healing by secondary intention, when there are no signs of ongoing infection. There is a need for stronger evidence regarding the prevention and management of wound complications for caesarean section in obese women.

Introduction

Maternal obesity, defined as a pre-pregnancy body mass index (BMI) exceeding 30 kg/m^2, has been associated with an increased risk of several pregnancy and labour complications including foetal macrosomia [1], caesarean section (CS) [2] and post-partum haemorrhage [3,4].

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Maternal obesity is also associated with increased anaesthetic [5], surgical and post-operative risks in CS. The latter are mainly related to endometritis, intra-abdominal abscess or haematoma, and surgical wound complications such as superficial and fascial dehiscence, seroma, haematoma and surgical site infection with or without abscess [6–10]. In an Israeli hospital cohort of 19,416 patients, obese women had an odds ratio (OR) for wound infection after CS of 2.2, with a 95% confidence interval (95% CI) of 1.6–3.1, when compared to non-obese controls [9]. The increased risk of wound complications appears to be proportionate to the BMI value [6,8,11,12]. In a retrospective cohort of 969 women delivered by CS in Vietnam, the OR for surgical site infection after CS increased 2.0 (95% CI 1.3–3.0) for every five-unit increment in BMI [12]. Women with a BMI in excess of 50 kg/m^2 appear to be associated with a particularly high risk of wound complications [6,13], and one study reports a 30% rate in this population, with 24% requiring hospital readmission and 14% requiring re-operation [13]. The vast majority of these complications were only observed after hospital discharge, and the median post-operative day of diagnosis was 8.5 [13].

Some authors have suggested that maximum subcutaneous tissue thickness at the incision site is a better predictor of wound complications after CS than BMI [14], but the two are strongly correlated, so the distinction is probably not very useful from a clinical point of view.

One possible confounder for these associations is the co-occurrence of diabetes mellitus, which is known to be more common in obese patients. On multivariate analysis, diabetes mellitus was an independent risk factor for wound infection after CS, with a reported OR that varied between 1.4 (95% CI 1.1–1.7) [9] and 2.5 (95% CI, 1.1–5.5) [15]. The combination of obesity and diabetes resulted in an OR for wound infection after CS of 9.3 (95% CI 4.5–19.2) [9].

Given the higher risk of wound complications after CS in the obese population, it is important for clinicians to be aware of the measures that reduce its occurrence, and to apply the most effective treatment when these complications occur. Some of the measures for prevention of wound complications apply to all types of surgery [16], or are not specific to CS in the obese population. For this reason, they are not considered in detail in this review. Among these are preoperative skin preparation, surgical hand antisepsis, use of clippers instead of razors for trichotomy, preoperative vaginal cleaning with an antiseptic solution [17], avoiding manual removal of the placenta, avoiding manual cervical dilatation [18] and removal of skin sutures at 7–10 days [19]. Other measures, such as high inspired oxygen concentration during surgery, have not been shown to be useful in reducing wound complications [20].

This review focusses on the clinical dilemmas that are specific to CS in the obese population, such as appropriate dose of prophylactic antibiotics, selection of the abdominal skin incision, closure or non-closure of the subcutaneous tissue layer, use of subaponeurotic and subcutaneous drains and methods for closure of the skin. The second part of the chapter focusses on the treatment of surgical wound complications after CS in the obese population.

Prevention of wound complications in the obese patient

Appropriate dose of prophylactic antibiotics

The prophylactic use of antibiotics in women undergoing CS has been shown in randomised controlled trials (RCTs) to reduce the incidence of wound infections (RR 0.39; 95% CI 0.32–0.48), puerperal endometritis (RR 0.38; 95% CI 0.34–0.42) and serious maternal infectious complications (RR 0.31; 95% CI 0.19–0.48) [21]. When administered before skin incision, as opposed to intra-operative administration after cord clamping, it has been shown to decrease puerperal endometritis (RR 0.59; 95% CI 0.37–0.94) [22], with a non-significant trend towards a reduction in wound infections (RR 0.71; 95% CI 0.44–1.14). Cephalosporins and penicillins seem to have similar efficacy in reducing short-term post-operative infections, although there are limited data on neonatal outcomes and late infections [23]. These studies were carried out in the general CS population and no subgroup analysis of obese patients is available. Doses of 1 or 2 g of intravenous cefazolin were frequently used.

There are ample data from non-pregnant obese patients to suggest that tissue penetration of antibiotics is impaired in this population, and therefore higher doses need to be used for adequate