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## Short report: Post-operative wound infections after the gentle caesarean section



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### ABSTRACT

**Objectives:** Worldwide, the caesarean section (CS) is the most performed type of surgery and numbers are still rising. The gentle CS has become a more common procedure as it allows the parents to experience birth. Early and continuous skin-to-skin contact between the mother and her newborn is pursued. Parents are not separated from their newborns and stay with their child in the operation theatre and recovery room. However, data are limited on the incidence of surgical site infections (SSI) after gentle CS. The aim of our study was to examine the risk of postoperative wound infections after gentle CS. Secondary outcomes included other maternal complications and neonatal outcomes.

**Study design:** In this multicenter prospective cohort study, all women who underwent an elective gentle CS between January 2015 and January 2017 were eligible. Demographics, per procedural data, maternal complications and neonatal outcomes were collected. The follow-up lasted until six weeks post partum. **Results:** Of the 243 performed CSs, two (0.8%) SSIs occurred; one superficial and one deep wound infection. One patient (0.4%) was readmitted for treatment of endometritis. In total, 20 (8.2%) maternal complications were identified. Median time to skin-to-skin contact was 3 minutes (IQR 2–4.25) with a median neonatal oxygen saturation 10 minutes after birth of 95% (IQR 92–98). Mean gestational age was  $274 \pm 4.1$  days (39 + 1 weeks) and mean neonatal pH was 7.28 ( $\pm$ SD 0.07). All children had Apgar scores >7 at 5 minutes after birth. Neonatal admission occurred in 19 cases (7.8%) and neonatal readmission in 10 cases (4.1%).

**Conclusion:** The gentle CS seems to be a safe procedure for both mother and child and is not associated with an increased risk of surgical site infections or direct suboptimal neonatal outcomes. Therefore, more intensive mother-child interaction during CS is allowed.

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Dear Editor, we found that with the increase in caesarean section (CS) rate, a growing interest has risen for the gentle CS. With the gentle CS, parents are able to experience the birth and early skin-to-skin contact (SSC) between mother and child is pursued. Several studies reported on the implementation and effect of breastfeeding and neonatal outcomes after gentle CS, however, limited data are available on maternal safety and specifically surgical site infection (SSI) rates following the gentle

CS [1]. SSI is one of the most frequent complications after the conventional CS with incidences of 3–15% [2]. The gentle CS might be associated with a higher SSI rate as it is accompanied with higher ambient temperatures (to prevent neonatal hypothermia) and more people being present in theatre for a longer period of time during surgery.

This multicentre prospective observational study was performed in the Netherlands between 2015 and 2017. 243 women with singleton pregnancies underwent an elective gentle CS. Exclusion criteria were non-term birth, general anaesthesia, diabetes mellitus, connective tissue disease, immunocompromised patients, fever during labour, active infectious diseases or prelabour rupture of membranes. Mean age was 34.4 years and median Body Mass Index was 23. The median gestational age was 39<sup>+1</sup> weeks. Most common indications for an elective CS were

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**Table 1**  
Perioperative data, neonatal outcomes and follow-up.

	n (%)	Mean $\pm$ SD	Median (IQR)
Operating time (min.) <sup>a</sup>			47 (40–55)
Doormovements $\lambda$			4 (2–6)
Temperature operating room ( $^{\circ}$ C)		22.0 $\pm$ 2.0	
Bloodloss (mL)			400 (250–600)
Time to first skin-to-skin contact (min.) <sup>¥</sup>			3 (2–4.25)
Oxygen saturation at 10 minutes $\Delta$			95 (92–98)
Apgar 1 min $\infty$			9 (9–9)
Apgar 5 min $\infty$			10 (10–10)
Apgar <7 at 5min	1 (0.4%)		
pH		7.28 $\pm$ 0.07	
Temperature ( $^{\circ}$ C) $f$		36.7 $\pm$ 0.3	
Weight (grams)		3477 $\pm$ 477	
Direct neonatal admission			
Respiratory morbidity	5 (2.0%)		
Hyperbilirubinemia	3 (1.2%)		
Infection	1 (0.4%)		
Other	10 (4.1%)		
Maternal complications	20 (8.2%)		
Superficial wound infection	1		
Deep wound infection	1		
Suspected endometritis <sup>b</sup>	2		
Fever of unknown origin <sup>c</sup>	2		
Urinary tract infection	2		
Redness and/or pain wound <sup>d</sup>	4		
Mastitis	2		
Retention placental tissue	1		
Other	5		
Maternal readmission	1 (0.4%)		
Neonatal readmission	10 (4.1%)		

<sup>a</sup> n = 240,  <sup>$\lambda$</sup>  n = 225, <sup>¥</sup> n = 172,  <sup>$\Delta$</sup>  n = 206,  $\infty$  n = 241,  $\nabla$  n = 219,  $f$  n = 239.

<sup>b</sup> Cultures negative.

<sup>c</sup> One day postoperative, antibiotics for one day.

<sup>d</sup> Cultures negative, no admission.

previous CS (65.8%) followed by breech presentation (20.6%). The operative technique of the gentle CS was identical to the conventional and 1,000 mg of Cefazolin was administered after cord clamping. Parents were able to experience birth through a transparent sheet and early skin-to-skin contact was pursued after birth. See Table 1 for details. Median operating time was 47 min, with an average of 4 door movements per procedure. The operating room temperature was 22.0  $^{\circ}$ C. Median blood loss during CS was 400 cc, comparable to conventional CS. Time to first skin-to-skin contact was 3 min. The majority of children had good Apgar scores (99.6%  $\geq$  7 after 5 min) with median oxygen saturations of 95% at 10 min. 19 neonates (7.8%) had to be admitted. Admission due to respiratory morbidity occurred in 2.0%, mainly due to wet lung disease. Two children were shortly admitted to the NICU due to respiratory insufficiency. Other reasons for admission were congenital diseases, macrosomia, dysmaturity, nutritional problems and hypoglycaemia. No neonatal deaths occurred.

During the follow-up period until 6 weeks post-partum, 10 neonates were readmitted (4.1%). Two postoperative wound infections occurred (0.8%); one superficial due to staphylococcus aureus infection and one deep infection (endometritis) with a positive culture for *Escherichia coli*. SSI was defined as the existence of drainage of purulent material or one of the following clinical symptoms with a positive culture or drainage without any cultures set within 30 days postpartum: pain or irritation, local swelling, erythema or warmth. In our study the incidence of SSI (0.8%) after the gentle CS was low. Subgroup analysis was impossible due to low incidence rates of SSI. Our SSI rate is comparable to the Dutch national incidence in solely elective CSs (0.7%) and is lower than most numbers reported in literature. The World Health Organisation reports SSI incidence rates of 2.9% for European countries [3]. Other studies show rates of 3–15% [1,2]. The neonatal oxygen

saturation after the gentle CS is comparable to the conventional elective CS [4]. Admission due to neonatal respiratory morbidity was needed in five cases (2.0%) which is lower than reported in current literature for the conventional elective CS [5].

In conclusion, we found that the gentle CS is not associated with an increased risk of SSIs, nor did we find any adverse neonatal outcomes directly due to the early skin-to-skin contact, supporting that the gentle CS is a safe procedure for both mother and child.

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## Declaration of interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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