Beyond the short term effects of caesarean delivery and gynaecological surgery
Kok, N.

Citation for published version (APA):
Kok, N. (2015). Beyond the short term effects of caesarean delivery and gynaecological surgery
Chapter 1
General introduction
PART ONE: PREGNANCY AND DELIVERY AFTER CAESAREAN SECTION

History
Surgical termination of pregnancy or delivery by operative opening of the uterus has been practiced for centuries. Initially it was a post-mortem procedure, with Roman priests performing this procedure as burial ritual, as it was forbidden to bury a pregnant woman before the child was extracted from the womb. Numa Pompilius, a Roman king (716-673 BC), issued a law called The Lex Caesarea that refers to the post-mortem delivery of a child through incision in the abdomen. Our modern caesarean section procedure may have derived its name from this first legal reference.

The following centuries the caesarean section remained mainly a religious event, rather than a medical practice, with only incidental survival of the infant. This changed in the Renaissance, where the concept of caesarean section emerged as a medical procedure to save either mother or child, although until the 18th century, caesarean section almost always resulted in death of the mother. The main indication for caesarean delivery was complete arrest of labour, usually after intrauterine foetal death had occurred.

In the 19th century, with improvement of surgical techniques and the introduction of anaesthetics, antiseptic measures and superior material to close off the womb, mortality rates improved and safety of both mother and child became the objective of caesarean section. (1) Since the 20th century, caesarean section is considered to be a safe procedure. This diminished the threshold for the obstetrician to perform CS, resulting in an exponential growth of the number of CS. Today the caesarean delivery rates have increased to an average of 21% in developed countries and 17% in the Netherlands. (2)

State of the art
The World Health organization (WHO) stated that “a population-level caesarean section rate above 10–15 per cent is hardly justified from the medical perspective“, and exceeding this rate implicates an overuse of caesarean section without improvement of neonatal outcome. (3,4)

“Who cares?” stated private obstetricians in Brazil in response to the figures of WHO. Well, we should. Although immediate maternal mortality of caesarean sections in well-resourced countries is very low, it is still considerably higher than after vaginal delivery. Maternal adverse outcomes such as adhesion formation, surgical injury, postoperative infection, haemorrhage and transfusion, hysterectomy, and maternal death progressively increase as the number of previous caesarean deliveries increase. The long-term obstetric perspective after caesarean sections is poorer than after vaginal delivery, with an increased risk of defective placental implantation into the uterine scar in a subsequent pregnancy.
and chance of rupture of the uterine wall during subsequent delivery. (5) Also, the health of children born after caesarean section might be at stake, as there are reports of a higher risk of obesity and asthma. (6,7)

**Objectives**

The intention of this thesis is to show how intervention by means of caesarean section in a first pregnancy stipulates to a great extent the provided care and way of delivery in a subsequent delivery. The obstetric caregiver needs to constantly weigh the risk of neonatal and maternal morbidity or even mortality, when continuing labour versus caesarean section. Caesarean section for breech, multifoetal pregnancy, elective repeat caesarean and the introduction of “non-indicated” caesarean section are thought to be the main contributors to the rise of caesarean. But of all first caesarean sections, 50 % are indicated by non-progression or foetal distress. (8,9)

Failure to progress caesarean section rates are highest among nulliparous women, have great variation and are highly affected by provider practices, thus indicating that reduction is feasible. Reducing the rate of first caesarean section will consequently result in a reduction of the repeat caesarean section rate. (10)

The main indication for overall caesarean section rates is a history of caesarean section. One way of preventing repeat caesarean section and lower overall caesarean section rates is to encourage vaginal birth after caesarean section.

The safety of trial of labour after caesarean section has been scrutinized worldwide since the pandemic problem of increasing caesarean section. There is a growing realization that of a scarred uterus increases the risk of adverse events in next pregnancies. Uterine rupture is the most feared complication of the scarred uterus, as this generates an acute life-threatening situation for mother and child. (11,12) It is the awareness of the risk of uterine rupture that initiated the decline in trial of labour after caesarean section, although the incidence of uterine rupture is low. (13) The safety of trial of labour is however difficult to investigate. Randomized controlled trials would generate the highest level of evidence, but are thought to be unfeasible because of the reluctance of women to be randomized for mode of delivery and the high number of inclusions to generate enough statistical power. (14)

The objective of this thesis is to generate insight in consequences of first birth caesarean section, the safety of trial of labour after caesarean section and the success rates of vaginal birth after caesarean section in the Netherlands.
PART TWO: PREVENTION OF POST-SURGICAL ADHESIONS

Adhesion formation is the most common complication following abdominal and gynaecological surgery and the leading cause of small bowel obstruction, acquired infertility and inadvertent organ injury at reoperation. Adhesions develop after gynaecological surgery in the pelvic cavity in almost all cases and cause significant morbidity. (15,16) Prevention of post-surgical adhesion formation is the only way to combat adhesion-related morbidity because proper medical treatment does not exist and surgical adhesiolysis has the drawback of adhesion reformation. Using a ‘good surgical technique’ is a first step in preventing adhesions by minimizing injury to serosal surfaces and the parietal peritoneum. But also adhesion barriers or anti-adhesive agents are needed because refinements in surgical techniques do not seem to be sufficient in reducing adhesion-related morbidity.

Aim of this thesis
The work presented in this thesis focuses on:
• Uterine rupture after trial of labour and possibilities for sonographic evaluation of the caesarean scar in pregnancy to identify women at risk for uterine rupture.
• Risks of maternal and neonatal complications in pregnancies after previous caesarean section and comparing trial of labour with elective repeat caesarean section.
• Strategies for prevention of post-surgical adhesion formation.

Outline of this thesis:
In Chapter 2 we investigated the value of lower uterine segment thickness measurement in the prediction of uterine scar defects, either complete rupture or dehiscence at birth, during trial of labour in women with a history of a previous caesarean section.

In chapter 3 we investigated the localisation of the uterotomy is dependent of the gestational age and also on the amount of dilatation. The thickness of the lower uterine segment tends to be thin in a laboured uterus and thick in a non-laboured uterus. The risk of uterine rupture in the next pregnancy depends on the healing of the uterine scar. Consequently healing of a scar might be dependent on the indication of the caesarean section. We tested this hypothesis by comparing the risk of uterine rupture in women with a prior caesarean section during labour or a planned caesarean section.

In chapter 4 we investigated how far to go to prevent repeat caesarean section in a trial of labour? This study focuses on the safety of performing an operative vaginal delivery in women with a history of caesarean section.
In **Chapter 5** we compared the risks of adverse outcomes in women choosing for trial of labour, we performed a comparative analysis on a matched cohort of women having a trial of labour compared to women choosing elective repeat caesarean section, using the propensity score matching technique.

**Chapter 6** studies the consequences of the first caesarean indicated by non-progression for a subsequent pregnancy. We therefore investigated the mode of delivery and associated adverse outcomes in a low risk population of women with a history of caesarean section indicated by non-progression exclusively. This information is important in the counselling of women for their next pregnancy.

Chapter 7 and 8 deal with gynaecological surgery.

**Chapter 7** studies surgical techniques that reduce adhesion formation. To do so, we performed a systematic review of all randomized clinical trials (RCTs) comparing surgical techniques in patients undergoing abdominal or pelvic surgery.

**Chapter 8** studies the efficacy of polyethylene glycol (PEG) adhesion barrier after gynaecological laparoscopic surgery that evaluated in a randomized controlled pilot study and meta-analysis of existing data on PEG.
REFERENCES

4. Jiangfeng Ye, MD Searching for the Optimal Rate of Medically Necessary Cesarean Delivery BIRTH 41:3 September 2014