Comparison between use and nonuse of urethral catheterization during cesarean section on the prevalence of urinary tract infection: A prospective randomized controlled trial

Thesis

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By

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AIM OF THE STUDY

To evaluate the use versus nonuse of urethral catheterization during cesarean section and its effect onincidence of urinary tract infection.

RESEARCH QUESTION:

Does a primary cesarean section patient with preoperative urethral catheterization have more incidence of urinary tract infection than in patient with no use of urethral catheterization?

RESEARCH HYPOTHESIS:

The incidence of urinary tract infection in primary cesarean section patient with pre operative urethral catheterization will be more by 80% than patients with no urethral catheterization.

Introduction

Cesarean delivery is one of the most commonly performed surgical procedures in obstetrics (**Jaiyesimi RAet al.,2003**)

Empirical urinary catheterization is commonly performedduring cesarean delivery as it is widely believed that its placement can improve exposure of the lower uterine segment at the time of surgery, prevent urinary bladder injury and avoid postoperative urinary retention. (**Cunningham FG** et al.,2005)

The catheter is either removed at the end of surgery, or left *in situ* for a varying period of time (**Arulkumaran Sat al.,1986)**

(Barnes JS,1998)

The use of indwelling urinary catheters has been implicated as a main cause of urinary tract contamination(**Senanayake H**.,**2005)**

Rates of urinary tract infection in cesarean section range between 1.7 and 31.4 %(**Tangkrakul S,1994**)and accounting for greater than 80% of nosocomial urinary tract infections

(UTIs)(**Sedor J and Mulholland SG.,1999**)and greater postoperative pain(**Leksawasdi N,1995**).

Continuation of drainage postoperatively will further increase this risk and delay mobilization by contributing to discomfort. ‘Distress catheterization’ for postoperative urinary retention also increases the risk of infection. (**Senanayake H.,2005)**

Furthermore, other studies have shown a significant reduction in the rate of urinary tract infections in women who were not catheterized for cesarean delivery (**Ghoreishi J.,2003)**

A reduction in UTI rates among women who had cesarean section without catheterization is documented (**Barnes JS,1998**).

Chapter (1)

Cesarean section

Cesarean section (CS) was introduced in clinical practice as a life saving procedure both for the mother and the baby. As other procedures of some complexity, its use follows the health care inequity pattern of the world: underuse in low income settings, and adequate or even unnecessary use in middle and high income settings. **(Betran AP et al., 2007, Althabe F et al., 2006)**

A dramatic rise in abdominal deliveries has occurred over the past three decades. The cesarean delivery rate in the USA in (1970) was 5.5% compared to 26.1% in (2002)**.** Approximately one of ten women in spontaneous labour delivers by cesarean **(Cunningham et al., 2007).**

Recent studies have demonstrated an overall rate of severe morbidity of 27.3 per 1000 deliveries compared with an overall rate of 9.0 per 1000 planned vaginal deliveries. **(Shiliange L, 2007)**

In 1985 the World Health Organization (WHO) stated: "There is no justification for any region to have CS rates higher than 10-15%". **(WHO Core health Indicators)**

Indications of catheterization in cesarean section:

Traditionally a patient undergoing cesarean section is catheterized with the belief that empty bladder results in better exposure of the lower uterine segment and lowers the risk of bladder injury during surgery. Bruising and edema caused by surgery near the uterovesical area and lower abdominal wall lead to retention of urine that predisposes to urinary tract infection (UTI). **(Arulkumaran S et al., 1986)**

Following delivery of baby, full bladder does not allow proper retraction of uterus leading to uterine atonicity and postpartum hemorrhage (PPH) and so is a routine practice to keep urethral catheter for 24 hours after surgery. However several studies have shown that cesarean section performed without using urethral catheter also is as safe as the traditional approach. (**Senanayake H., 2005)**

Factors Contributing to the Increased Rate of Cesarean Birth:

A number of reasons have been proposed for the observed increase in cesarean birth. Proposed contributing factors include advanced maternal age, particularly with first birth, multiple pregnancy, breech presentation, suspected low infant birth weight, private hospital status and increasing maternal BMI**. (Naftalin J and Paterson-Brown S, 2008)**

Other contributing factors include organizational factors, women's choices regarding childbirth and preferences for care, in addition to obstetrician's characteristics and care practices**. (Thomas J., RCOG 2001)**

Increased use of interventions in pregnancy and childbirth, such as intrapartum fetal heart rate monitoring and induction of labor (IOL), may also play a role in the rising CS rate. The *Cochrane* systematic review by Alfirevic *et al.* evaluated the use of continuous cardiotocography in labor and subsequent birth outcomes. **(Alfirevic Z et al., 2006)**

The four most common indications for cesarean section according to **(Apuzzio and Salamon, 2006)** are:

- Failure to progress in labour.
- Non-reassuring fetal status (non-reassuring ante-partum fetal testing by fetal heart rate monitoring, nonstress test, contraction stress test, biophysical profile, Doppler assessment, fetal blood sampling, etc.).
- Previous cesarean delivery or hysterectomy made (secondary to myomectomy or uterine surgery, etc.)**.**
- Fetal malpresentation e.g., breech, transverse lie, etc...

Types of cesarean section: (David and Philip, 2010)

The RCOG definition of type of cesarean section

type	definition
emergency	Immediate threat to life of women or fetus
urgent	Maternal or fetal compromise which is not immediately life threatening
scheduled	Needing early delivery but no maternal or fetal compromise
elective	At a time to suit the patient and maternity team
Peri mortem	Carried out in extremis while the mother is undergoing active resuscitation
Post mortem	Carried out after the death of the mother in order to try to save the fetus

Cesarean delivery: Technique

OPENING THE ABDOMEN

***Skin incision*:**

In general, a transverse (eg, Pfannenstiel or Joel-Cohen) incision is most commonly used for cesarean delivery since it is associated with less postoperative pain, greater wound strength, and better cosmetic results than the vertical midline incision. **(Berghella V et al., 2005)**. However, vertical incisions generally allow faster abdominal entry cause less bleeding and nerve injury, and can be easily extended cephalad if more space is required for access**. (Wylie BJ et al., 2010)**

Subcutaneous tissue layer; we prefer blunt dissection (with fingers) to sharp dissection (with the knife), as blunt dissection has been associated with shorter operative times and less chance of injury to vessel. **(Holmgren G et al., 1999)**

Rectus muscle layer — Rectus muscles can be separated bluntly in most cases, avoiding transection of muscles preserves muscle strength **(Giacalone PL et al., 2002)**

Opening the peritoneum bluntly open the peritoneum to minimize the risk of inadvertent injury to bowel, bladder, or other organs that may be adherent to the underlying surface. **(Holmgren G et al., 1999)**

INTRAABDOMINAL PROCEDURES

Bladder flap: In two trials that randomly assigned women to undergo or not undergo development of a bladder flap, omitting this procedure reduced the incision-to-delivery interval by an average of one to two minutes and was not associated with an increase in adverse short-term outcomes. **(Tuuli MG et al., 2012)**

The uterine incision may be vertical or transverse. The type of incision depends upon several factors, including the position and size of the fetus, location of the placenta, presence of leiomyomas, and development of the lower uterine segment. The principal consideration is that the incision must be large enough to allow atraumatic delivery of the fetus.

Fetal extraction; Most studies have reported a direct association between a prolonged uterine incision-to-delivery

time and lower fetal blood gas pH values and Apgar scores, regardless of type of anesthesia

The mechanism is thought to be hysterotomy induced increased uterine tone, which can interfere with uteroplacental blood flow. Thus, careful attention to the duration of this interval by the surgeon is important, especially in a fetus with a nonreassuring fetal heart rate assessment prior to the onset of surgery. **(Fontanarosa M, 2008, Bader AM et al., 1990)**

PROCEDURES DURING CLOSURE

Uterine closure

For closure of the uterine incision, there are no high quality data to guide choice of suture material (eg, chromic catgut versus delayed absorbable synthetic [eg, polyglactin 910, poliglecaprone 25]) or technique (eg, continuous [locked or nonlocked] versus interrupted)

When performing uterine closure perform a two-layer, continuous closure with delayed absorbable synthetic suture incorporating all of the muscle in order to avoid bleeding from the incision edges. We do not use locking sutures unless arterial bleeding is evident.

The endometrial layer should probably be included in the full thickness myometrial closure. This opinion is based on a randomized trial that assigned 78 term pregnant patients delivered by cesarean to one layer myometrial closure either including or excluding the endometrial layer**. (Yazicioglu F et al., 2006)**

Peritoneum

There is high quality evidence from randomized trials that peritoneal nonclosure decreases operative time**. (Komoto Yet al., 2006)(Malomo OO et al. , 2006)** and has a similar rate of maternal infectious morbidity as closure **(CAESAR study collaborative group, 2010)**

Complications of cesarean section:

Women undergoing cesarean delivery may develop a number of postoperative complications that occur in any patient undergoing major surgery. Fortunately, serious complications are uncommon. When they occur, prompt recognition and treatment combined with usual good health of these women result in good outcome. **(Apuzzio and Salamon, 2006).**

Table (1): Potential maternal and fetal complications in cesarean section **(Apuzzio and Salamon, 2006).**

(I)-Operative complications:
1-Injury to important structures:
Bladder.
Ureters.
Bowel.
Vagina.
2-Vascular injury:
Uterine vessels.
Haemorrhage.
Haematoma formation.
(II)-Postoperative complications:
1-Pulmonary embolism.
2-Deep venous thrombosis (DVT).
3-Infections:
Endoparametritis.
Wound infection.
Septic pelvic thrombophlebitis.
4-Postoperative urine retention.
5-Anaemia.
6-Wound dehiscence and rupture.
(III)-Anesthetic complications.
Fetal complications.

Table(2);preoperative and intra operative complications of cesarean section. **(Apuzzio and Salamon, 2006).**

(1) Preoperative:
(A) Emergent delivery.
(B) Placenta previa.
(C) Malpresentation.
(D) Ruptured uterus.
(E) Previous abdominal or pelvic surgery.
(F) Previous abdominal or pelvic infection.
(2) Intraoperative:
(A) Haemorrhage.
(B) Placenta accreta.
(C) Cesarean hysterectomy.
(D) Distended bladder.
(E) Inadequate mobilization of the bladder.
(F) Extraperitoneal cesarean approach.

Chapter (2)

Urinary catheters

Urinary catheterization

Transurethral indwelling catheterization or urinary catheterization is defined as passage of a catheter into the urinary bladder via the urethra (urethral catheter).

(US National Institutes of Health)

A thin flexible tube, known as a catheter is inserted into the urethra (the opening in the penis or vagina which urine flows out of). The catheter is then guided into the bladder, allowing urine to flow through it and into a drainage bag. Suprapubic catheterization is the insertion of a catheter into the bladder via the anterior abdominal wall. (**Hanno et al., 2001)**

Indications: (Anders et al., 2001)

Catheters are used for a variety of reasons as follows:

-Prophylaxis: to maintain bladder drainage during and following surgery or epidurals, thus minimizing the risk of distension injury to the bladder.

-Investigations: during urodynamic investigations and for accurate urine output measurement (e.g., in intensive care units).