European Journal of Obstetrics & Gynecology and Reproductive Biology 147 (2009) 3–8

Contents lists available at ScienceDirect

European Journal of Obstetrics & Gynecology and Reproductive Biology

journal homepage: www.elsevier.com/locate/ejogrb

Review

To close or not to close? A systematic review and a meta-analysis of peritoneal non-closure and adhesion formation after caesarean section

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ARTICLE INFO

Article history:
Received 5 August 2008
Received in revised form 20 March 2009
Accepted 7 June 2009

Keywords:
Peritoneal closure
Adhesions
Caesarean section
Pelvic pain
Post-operative complication

ABSTRACT

Many gynaecologists do not currently close the peritoneum after caesarean section (CS). Recently, several studies examining adhesion formation after repeat CS appear to favour closure of the peritoneum after caesarean section. We performed a systematic review of the current available evidence with regard to the long-term outcome, mainly in terms of adhesion formation after closure versus non-closure of peritoneum during CS. We undertook a literature search between January 1995 and February 2008 using MEDLINE, Pubmed, EMBASE, Cochrane central controlled trials register and Cochrane pregnancy and childbirth group trials register. We also had searched all the references cited in the relevant studies. Both English and non-English language papers were included. Prospective studies which compared peritoneal closure versus non-closure during CS in terms of adhesion formation were included. Studies were included if they had a primary objective to examine adhesion formation in a repeat caesarean section, had a clear study design, had an adhesion scoring system, excluded patients who had adhesions in the primary caesarean section or interim surgeries after the primary caesarean section, and had no usage of anti-adhesion agents in the primary caesarean section. Retrospective studies which were performed by case-notes review alone, were excluded. Eleven studies were identified via our search strategy. Five were retrospective and six were prospective. Out of the eleven studies, three satisfied the inclusion criteria and were included ($n = 249$); two studies were follow-ups of RCTs and one was not randomised. Out of 249 women included in the analysis, 110 had peritoneal closure during CS whereas the other 139 did not have peritoneal closure. Meta-analysis was performed using the two randomised studies plus (i) the unadjusted estimate from the non-randomised study and (ii) the reported adjusted estimate, adjusted for baseline differences in the groups. Non-closure of the peritoneum during CS resulted in a significantly increased likelihood of adhesion formation in both meta-analyses—OR (95% CI): (i) 2.60 (1.48–4.56) and (ii) 4.23 (2.06–8.69). This systematic review has demonstrated that according to current data in the literature, there is some evidence to suggest that non-closure of the peritoneum after caesarean section is associated with more adhesion formation compared to closure.

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doi:10.1016/j.ejogrb.2009.06.003

1. Introduction

Traditionally, closure of the peritoneum was done to restore anatomy and decrease risks such as infection, wound dehiscence and adhesion formation [1]. The Royal College of Obstetricians and Gynaecologists (2002) recommends 'non-closure of visceral and parietal peritoneum' as it significantly shortens operating time and has less post-operative morbidity (Grade 1a), whilst the Cochrane meta-analysis review recommended non-closure of the peritoneum as 'there was improved short-term post-operative outcome' [2,3]. These recommendations have stemmed from many studies examining the short-term implications of peritoneal non-closure such as operation time, blood loss, analgesia requirement, febrile morbidity, return of bowel function, length of hospital stay, infection rate and wound healing.

Many surgeons, however, still practise closure of the peritoneum and the clinical significance of saving 6 min of operation time in non-closure versus closure of the peritoneum has also been questioned, especially given that there was not much information available on longer term implications such as adhesion formation, chronic pelvic pain, fertility issues, and urinary and bowel symptoms after closure versus non-closure of peritoneum during caesarean section (CS) [4]. The long-term sequelae especially related to adhesion formation can have significant morbidity and high health care cost [5,6].

Recently, several studies examining adhesion formation after repeat CS appear to favour closure of the peritoneum after caesarean section [7,8]. We therefore performed a systematic review on the current available evidence with regarding adhesion formation in closure versus non-closure of peritoneum during CS.

2. Methods

2.1. Search strategy

We performed a literature search between January 1980 and October 2008 using MEDLINE, Pubmed, EMBASE, Cochrane central controlled trials register, and Cochrane pregnancy and childbirth group trials register. We also had searched all the references cited in the relevant studies. Both English and non-English language papers were included.

2.2. Selection criteria

Prospective studies which compared peritoneal closure versus non-closure during CS in terms of adhesion formation were included. Studies were included if they had a primary objective to examine adhesion formation in a repeat CS, had a clear study design, had an adhesion scoring system, excluded patients who had adhesions in the primary CS or interim surgeries after the primary CS and had no usage of anti-adhesion agents in the primary CS. Retrospective studies which were performed by case-notes review alone, were excluded.

2.3. Types of interventions

The patients included in studies were divided into two groups: those with peritoneal closure and those with non-closure of the peritoneum. Peritoneum closure could be either parietal layer or both visceral and parietal layers.

2.4. Characteristics of studies

2.4.1. Included studies

Three studies were included (n = 249). The characteristics of the studies are summarized in Table 1. The design of the included studies fell into two main categories. Firstly, a randomised controlled trial (RCT) design for closure versus non-closure in the primary CS and then further follow-up to examine the adhesion formation in the repeat CS. These trials were originally designed to examine the immediate outcome of closure versus non-closure and the subsequent follow-up study was a secondary outcome from the original trial. Such trials can be regarded as having an intention to treat design, although the weakness will be the large attrition rate if women did not return for a second CS. These studies have a variable follow-up period of between five and 16 years. They had exclusion criteria such as post-operative wound infection, other abdominal or pelvic surgeries in the interval period, classical CS, intervening pelvic inflammatory and/or sexually transmitted disease, and other medical conditions which can predispose to poor wound healing and adhesion formation.

The second category of study design is that of prospective study examining adhesion formation at the time of the second CS and then dividing the patients into two groups based on their history of

Table 1
Characteristics of included studies—NC: non closure; C: closure.

Study	Method	Exclusion criteria	NC	C	Outcome	Adhesion scoring system present
Weerawetwat et al. [8]	Prospective; follow-up from RCT, F/U period = 16 years	Previous complication of pregnancy or laparotomy Pre-operative infection or medical conditions	20	45	Adhesion formation: 4/20 vs 3/25	Yes
Lyell et al. [7]	Prospective, non-randomised, F/U period = 7 years	Adhesion at primary CS, post-operative infection, wound break down, medical disease, intervening abdominal surgery	106	67	Adhesion formation: 77/106 vs 35/67. Adjusted OR: 5.00 (2.04, 12.5)	Yes
Zareian and Zareian [9]	Prospective; follow-up from RCT, F/U period = 5 years	Previous complication of pregnancy or laparotomy Pre-operative infection or medical conditions	13	18	Adhesion formation: 7/13 v 3/18	Yes

F/U: follow-up; RCT: randomised controlled trial.