

Single layer closure of the uterine wound at caesarean section. A safe technique?

Abstract

Objective. Due to the large number of caesarean sections (CSs) performed, it has become necessary for professional obstetricians to gain more attention at every technical detail of the procedure in order to reduce the short and long term complications. In spite of the tremendous number of CSs, controversies still exists regarding to the modalities of uterine closure: mono versus double layer. **Methods.** The aim of the present study is to evaluate the risks of dehiscence or uterine rupture and adhesions formation generated by the caesarean sections technique. In this regard, we conducted a descriptive study on 204 pregnant women with a single previous low-transverse caesarean section, performed by the same surgeon. We used in all cases the same technique, a single layer closure of the uterine wound and no closure of the visceral peritoneum. **Results.** Partial dehiscence was found at 3 (1.47%) of 204 patients included in this study and total dehiscence was not found in any case. There was no significant association between the presence of dehiscence and the time from previous caesarean section ($p=0.76$). Bladder adhesions were found in 11.37% of cases, omental adhesions in 4.19% of cases and intestinal adhesions had not been found at all. We noticed that in 86.22% the pelvic/abdominal cavity was free of adhesions. No significantly association between the presence of adhesions and the time from the previous caesarean section was found ($p=0.45$). **Conclusions.** Single layer uterine closure is a safe technique with a very low risk in terms uterine scar dehiscence and adhesions formation.

Keywords: caesarean section, single layer uterine closure, visceral peritoneum, adhesions formation

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Introduction

Caesarean section (CS) is one of the most frequently performed surgical procedures worldwide. Global rates around the world are from about 5% to over 20% of all deliveries in public hospitals. The rate in private hospitals is estimated to be up to 57%^(1,25).

CS aims to reduce maternal and fetal mortality and morbidity and has become a common practice in modern Obstetrics^(2,25). Due to the large number of caesarean sections performed, it is mandatory for practicing obstetricians to thoroughly pay attention to all technical details of the procedure in order to reduce the complication rates respecting the quality of the surgery⁽²⁾. The surgical targets of the CS consists mainly in the reduction of operating time and of blood loss, the decrease of risks for wound infection, uterine scar rupture, postoperative adhesions formation and the diminution of costs.

Despite the great number of procedures performed and the related huge experience accumulated, it doesn't exist yet a standardized surgical approach. The operative techniques vary considerably due, equally, to the surgeon preferences and the clinical situation⁽¹⁾.

Caesarean section is now performed using a lower uterine segment incision, which has stood the test of time over 75 years and remains the best approach⁽²⁾.

Several ways of uterine closure have been described: single or double layer suturing with intermittent

or continuous locking or non-locking sutures⁽²⁾, each of these modalities having advocates and opponents proving that no one of these approaches is obviously superior.

In the past years, several studies were conducted trying to establish advantages and disadvantages of single versus double layer uterine closure during caesarean section. The strength of the uterine scar and the risk of its rupture in subsequent pregnancies were in focus⁽²⁾.

Theoretically single layer closure takes less operating time and causes less tissue trauma, ischemia and necrosis, introduces fewer foreign material in the uterus and reduces blood loss resulting in better uterine wound healing and good prognosis in subsequent pregnancy⁽⁶⁾.

The main purpose of wound suturing is to coapt tissues, assist hemostasis and to resist at stress and strain on wound edges till healing gives its intrinsic strength. Continuous locking suture everts the wound edges and does not provide good coaptation^(5,6,11,12).

A common anatomical consequence of low-segment caesarean section is the finding of a pouch on the anterior uterine wall that can be detected by sonography or hysteroscopy. A recent prospective longitudinal study⁽¹⁰⁾, which evaluated the outcome of the caesarean scar (comparing two different types of sutures, single vs. double layer) concluded that locked continuous

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sutures seemed to cause larger defect as compared to interrupted sutures, probably due to a greater ischemic effect exerted on the uterine tissue⁽¹⁰⁾.

Ultrasonography studies in the postoperative period have shown no difference, except a thinner uterine scar with single layer closure⁽¹⁰⁾.

Two retrospective studies have reported that single layer closure was associated with a four-fold increase in the risk of uterine rupture compared with that in double layer closure and five times greater incidence of uterine dehiscences noted at subsequent caesarian delivery^(13,14).

There are studies that attempt to evaluate the outcome after single layer closure of uterus during CS with or without closure of the peritoneum (both uterovesical fold and parietal peritoneum). Results showed that short-term postoperative outcome was improved if the peritoneum was not closed. Long term studies are limited, but data from other surgical procedures are reassuring^(8,18,19).

A Cochrane review published in 2008 concluded that routine use of single layer closure compared with two layer closure had no advantages or disadvantages except a shorter operation time⁽¹¹⁾.

Some studies reported the security of the single layer closure technique with reference to vaginal delivery during subsequent pregnancy showing no increased risk of uterine rupture or dehiscence^(12,16).

Because for many years in our practice the single layer suture technique with non closure of the uterovesical peritoneum was the standard and the short and long term results were apparently excellent, we tried to objectivise this by a study which would evaluate the risk of uterine rupture or uterine dehiscence in a subsequent pregnancy. We also evaluated the risk of adhesion formation.

Methods

A retrospective study was performed over a four-year period, starting in January 2008 till December 2012 on 204 women with a previous single low-transverse caesarean section, performed by the same surgeon, attending the labor ward at Clinical Hospital of Obstetrics and Gynecology Brasov from Romania. Two senior surgeons were involved in the study.

All women were delivered by lower segment caesarean section through a Pfannenstiel incision. The subcutaneous tissue was incised and rectus sheath was cut transversely. Rectus muscles were separated and parietal peritoneum was opened vertically. The uterovesical fold of peritoneum was incised transversely and bladder downward retracted. The lower uterine segment was sectioned transversely and the incision was extended with scissors.

Uterus was closed by a single layer, figure of eight sutures using number 2 synthetic absorbable material made of polyglycolic acid. The utero-vesical peritoneum was not sutured in all cases. The parietal peritoneum was closed with number 0 continuous non-locked syn-

thetic absorbable suture. Rectus muscles were approximated with sutures and rectus sheath was closed by continuous suture using the same number 2 absorbable polyglycolide material.

The anesthesia was spinal or general and antibiotic prophylaxis was done in all cases.

The study group was identified and selected from delivery and surgical records using the inclusion and the exclusion criteria.

Inclusion criteria

- women with at term (>37 weeks) monofetal pregnancies with only one previous CS performed by the same surgeon;
- single layer closure of the uterus at the previous CS with synthetic absorbable sutures and non closure of the visceral peritoneum;
- documented labor.

Exclusion criteria

- multifetal pregnancies;
- other conditions that over distend the uterus (e.g. polyhydramnios);
- placenta inserted at the level of uterine scar;
- wound infections or other postoperative complications at the first surgical operation.

Our main outcome was to determine the value of single layer uterine suture with non closure of visceral peritoneum at subsequent caesarean section in terms of presence and degree of uterine scar dehiscence and adhesions formation.

Data was analyzed using SPSS version 9.1. Student "T test" was used for comparing continuous variables. Categorical variables were compared by Chi-square test or Fisher's exact test. In every case the taken level of significance was 0.05.

Results

Two hundred and four patients were included in the study and all patients have had only one previous caesarean section performed by the same surgeon. Data were extracted from the Delivery Registry and operative records. Demographic and clinical characteristics of the study are shown in Table 1.

Partial dehiscence had been seen in 3 (1.47%) of 204 patients included in study and total dehiscence had not been found in any case. There was no significant association between the presence of dehiscence and the time period from previous caesarean section ($p=0.76$). The mean time from the previous surgery was 2.11 ± 0.92 . Time was expressed in years (Table 2).

An important observation is that 98.53% of the patients had no dehiscence after caesarean section with single layer uterine closure.

Another parameter analyzed is the presence of abdominal adhesions. We distributed adhesions in three groups: bladder adhesions, omental adhesions and intestinal adhesions.

For the purpose of adhesion occurrence evaluation, 37 patients with previous surgery for other conditions than CS were excluded. In the remaining 167 patients,

Table 1 Demographic and clinical characteristics of the study group

Characteristics		Mean ± standard deviation*
Age (years)	20-38	28.94 ± 4.33
Gestational age (weeks)	37-40	38.5 ± 2.34
Parity	2 or 3	

*Results are expressed in percentage (%) or mean ± standard deviation (SD)

Table 2 Operative outcomes related to presence of uterine windows (dehiscences)

	Partial dehiscences*	Total dehiscences	Time period from previous CS**	P value
Total	3 (1.47%)	0	2.11 ± 0.92	0.76

*Results are expressed in percentage (%) or mean ± standard deviation; **CS=caesarean section.

Table 3 Operative outcome related to presence of abdominal adhesions

	Bladder adhesions	Omental adhesions	Intestinal adhesions	Time period from previous CS*	P value
Total	19(11.37%)	7(4.19%)	0	2.75±1.28	0.45

*CS=caesarian section.

bladder adhesions we found in 19 cases (11.37%), omental adhesions in 7 cases (4.19%) and intestinal adhesions had not been found at all. In 3 cases both bladder and omental adhesions had been recorded (1.79%). We noticed that in 86.22% the pelvic/abdominal cavity was free of adhesions. No significantly association between the presence of adhesions and time from the previous caesarean section was found ($p=0.45$) (Table 3).

Discussion

Several studies have reported superiority of single layer closure with decreased intra-operative and post-operative morbidity by reducing operative time, blood loss, febrile and infectious morbidity and hospitalization stay^(12,16).

There is no evidence to show that second suture layer gives increased strength to the wound. Additional suture material may result in more tissue ischemia and necrosis and more foreign tissue in the body, which potentially favors infection, impairing wound healing⁽¹²⁾.

Some studies concluded that single layer closure compared with double layer closure was associated with a statistically significant reduction in mean blood loss (three studies, 527 women, mean difference (MD) -70.11, 95% confidence interval (CI) -101.61 to -38.60); duration of the operative procedure (four studies, 645 women, MD -7.43, 95% CI -8.41 to -6.46); and presence of postoperative pain (one study, 158 women, RR 0.69, 95% CI 0.52 to 0.91)^(16,17).

Prolonged operating time has been associated with increased infectious morbidity rate at caesarean delivery as a consequence of prolonged exposure of the abdominal contents and possibly more blood loss⁽⁶⁾.

Second layer suture prolongs operating time and increases the number of needle punctures in the uterine wall⁽¹⁷⁾.

There are studies that concluded that single layer uterine suture may be more likely to result in uterine rupture and other studies had related a greater risk for uterine rupture only for continuous locked suture^(14,21).

A recent study reported that single-layer uterine closure is associated with decreased infectious morbidity in the index surgery, but no uterine rupture or other adverse outcomes in the subsequent gestation. In the second pregnancy, prior single-layer closure, was not associated with uterine rupture after a trial of labor (0% versus 1.2%, $p=0.30$), or other maternal or infant morbidities. Prior single-layer closure was associated with increased uterine windows (dehiscences) (3.5% vs 0.7%, $P=0.046$) at subsequent cesarean delivery⁽¹⁸⁾.

A non-randomized cohort study compared continuous with interrupted sutures for the closure of the lower uterine segment at cesarean section, and related that there were significant differences in total operating-time (32 min versus 40 min, $p= 0.001$). The main conclusion of the study was that continuous single-layer closure of the lower uterine segment at cesarean section saves operating time, reduces blood loss, and introduces fewer foreign materials into the wound⁽⁶⁾.

The objective of a recent study was to determine the association between single-layer or double layer uterine closure at primary caesarean delivery with the subsequent adhesion formation and the conclusion was that single-layer hysterotomy closure may be associated with more frequent bladder adhesions (24% versus 7%, $p=0.01$) regardless of other surgical techniques. There was no association between single-layer closure and other pelvic or abdominal adhesions⁽²²⁾.

Another important problem is peritoneal non-closure and adhesion formation after caesarean section. A systematic review and a meta-analysis of peritoneal non-closure and adhesion formation after caesarean section related that there is some evidence to suggest that non-closure of the peritoneum after caesarean section is associated with more adhesion formation compared to closure. Other studies demonstrated that there was improved short-term postoperative outcome if the peritoneum was not closed⁽¹⁾. Long-term studies following caesarean section are limited, but data from other surgical procedures are reassuring. There is in present no evidence to justify the time taken and cost of peritoneal closure^(1,9).

A recent meta-analysis and systematic review that evaluated the adhesion formation after previous caesarean section concluded that closure of the parietal peritoneum in caesarean section resulted in less adhesion formation and should be recommended ($p=0.01$)^(9,23,24).

According to our findings, the risk for adhesions was very low in the case of single layer uterine closure using "figure of eight" synthetic sutures with no visceral peritoneum closure; bladder adhesions was the most frequent accounting for 11.37% of cases.

A case report that described complications due to adhesion formation following caesarean sections and methods to prevent them, related that adhesion prevention measures should be routinely implemented to reduce adhesion formation after caesarean deliveries and thus decrease corresponding sequelae. Critical steps to decrease adhesion formation include practicing meticulous surgical techniques, gentle tissue handling, minimizing ischemia and desiccation, controlling hemostasis, avoiding powdered gloves, and achieving peritoneal closure. Based on available data, adhesion barriers are effective in preventing or reducing adhesions after gynecologic surgery and have also been effective following caesarean sections⁽⁶⁾. This conclusion was sustained by other prospective cohort study⁽⁷⁾.

While cost was not analyzed in this study, the use of less suture material would reduce the procedure costs, which may be of particular importance in poor-resourced countries⁽¹³⁾.

On the basis of current literature, it can be said that single layer closure saves blood loss and operating time, introduces fewer foreign materials into the uterine wound and reduces peri-operative morbidity when compared to double layer closure.

Conclusions

Single-layer uterine closure is safe, dehiscence risk is low and there is no association between time from previous caesarean section and the risk of dehiscence or uterine rupture. Adhesions formation risk is also low with single-layer uterine suture and non closure of the visceral peritoneum; the most frequent are bladder adhesions. We consider there is no reason to justify the increased time taken and cost of double layer closure of the uterine wound and visceral peritoneum during CS. ■

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