The Many Ways to Sew Up a Uterus


by Judy Slome Cobain, CNM, MSN

Abstract: Some clinicians have used a single, poorly-designed, retrospective study of single-layer vs. double-layer repair of the uterus during cesarean surgery to justify denying women the option of a trial of labor on subsequent pregnancies. This paper reviews the latest research and suggests the adoption of four new protocols for women after a cesarean. Women should receive a full summary of the repair methods used during their surgery; Women should be counseled as to the risk of delivering another child less than two years after uterine surgery; On subsequent pregnancies after cesarean birth, women should have an ultrasound near the end of the pregnancy looking for evidence of placental growth in the area of the scar and implications of this should be explained; and Vicryl sutures should be used for sewing up the uterus.

The low transverse (LST) uterine incision for cesarean surgery was introduced 78 years ago, in 1926. (1) Fifty years later, the low transverse uterine cut replaced the classic, vertical cut as a better technique for cesarean surgery. The vertical cut is associated with about a 5% rate of uterine ruptures on subsequent pregnancies, and the scar shows when a woman wears a bikini. The 5% risk of uterine rupture on subsequent pregnancies after a vertical incision was the justification for the "once a cesarean, always a cesarean" protocol. The low transverse uterine cut is associated with less than a 0.5% uterine rupture rate. When transverse incision is used, the "once a cesarean, always a cesarean" protocol is generally replaced with a trial of labor. In most cases, women after cesarean surgery with a low transverse uterine incision are offered the option of a trial of labor, possibly leading to a vaginal birth after a cesarean (VBAC). About 60% to 85% of women who try for a VBAC succeed in delivering vaginally.

The single-layer repair first appeared in the literature 34 years ago and was popularized by Dr. Michael Stark at Mtsigov Ladach Hospital in Jerusalem, starting in the 1980s. (2) The single-layer repair is also known as "one-layer repair" or the "Mtsigov Ladach method" of repair. The Mtsigov Ladach method was carefully described in the literature as follows: "The uterus is closed with a one-layer continuous locking stitch. The peritoneal layers are left open." (3) This means that the uterus is stitched together with single continuous stitching, like a hem. It can be done with locked or unlocked stitches. It can also be done with single interrupted stitches, which are knotted after each single stitch. Locked stitches provide for greater control of bleeding than unlocked for the first three hours after repair. After about three hours, it makes no difference whether the stitches are locked or unlocked, because the uterus has shrunk so much that the stitches become loose. The uterus continues to contract for the next six weeks, healing itself slowly as it gets smaller and smaller. The recommended suture is Vicryl (poliglactin). The peritoneal cavity is left unstitched to close on its own.

Double-layer repair generally means that a second row of stitches, locked or unlocked, is made over the first layer of stitches. The second row sometimes includes the opposing edges of the peritoneal cavity. Other times, a third layer of stitches is used to sew the peritoneum together. Finally, the outer skin is closed up. There are different ways to carry out "single-layer" and "double-layer" repairs, depending on whether locked or unlocked stitches are used and depending on the type of sutures.

From 1988 to 2003, 50 scholarly articles were published in the medical literature on single-layer versus double-layer repair. Some randomly assigned women to one group or the other. Others were retrospective, reviewing past medical records. All of these studies agreed that single-layer repair of the uterus is significantly faster, by 10 minutes on average. Reducing an operation by 10 minutes means less time under anesthesia and less anesthetic. Intestinal function returns faster, allowing women to eat sooner. They get out of bed significantly sooner and take fewer painkillers. Less suture material and operating room time reduce the cost. Sewing human flesh causes trauma to the tissues; the more stitches, the more broken blood vessels. Large broken vessels must be tied off to stop bleeding. Broken vessels mean more blood loss. More sutures introduce more foreign bodies to the area, and foreign bodies increase the local inflammation. Local inflammation, theoretically, weakens the strength of the scar that forms. The single-layer technique has the theoretical advantage of less tissue damage, which may result in a stronger bond. Longer surgery is associated with a higher infection rate, possibly from: lengthier exposure of the wound to hospital air, with the doctor breathing over the patient; the trauma of suturing; and/or the introduction of more suture material. Half of the studies show a similar infection rate for single- and double-layer methods, and half show a significantly lower infection rate (sometimes by as much as half) with the single-layer repair. No studies show single-layer repair to cause more fever or infection. Infection can cause adhesions and scarring, which may cause problems in future pregnancies. The use of catgut sutures has been associated with higher inflammation and infection rates and has been banned in Germany and Moscow.

Dr. Stark has lectured widely on the subject. In a recent conversation, he estimated that single-layer repair was used in approximately 10% of cesareans in Israel by 1995 and guessed that the rate is about 50% now. He said single-layer repair is predominant in Germany, where he currently works, adding that in China, 100% of cesareans are repaired by the single-layer technique.

The following statement appeared in an article in Best Practice & Research: Clinical Obstetrics & Gynaecology in 2001: "Closure of the uterus in single layer appears to be acceptable, whenever technically possible. Closure of the visceral and parietal layers of the peritoneum no longer seems to be necessary." (4)

In 2002, Bujold published the third study on the uterine rupture rate of women after single- versus double-layer repairs. (5) The two previous studies had found no significant differences between single- and double-layer repair in subsequent
pregnancies. (6,7) Bujold retrospectively studied 1,527 women at Ste-Justine Hospital in Montreal who had their first baby by cesarean and underwent a trial of labor for their second pregnancy. Twenty-one uterine ruptures occurred (1.4% rupture rate). Fourteen of the 21 ruptures were in the single-layer repair group, while seven of the 21 ruptures were in the double-layer repair group. At Ste-Justine Hospital, the double-layer closure was done with two layers of continuous locking stitch to close the uterus and another layer to close the peritoneum (three layers). In their single-layer repair these doctors close “the entire thickness of the uterine wall from decidua to visceral peritoneum” with a continuous locking stitch, using chronic catgut suture. There were no maternal deaths and no hysterectomies in either group. Fetal outcomes are not revealed in the study. The rupture rate for women who delivered their second babies within 24 months of the cesarean section was 2.8%, compared to 0.9% in women who had their second babies more than 24 months after the first. The successful VBAC rate was 71%. Thirty percent of the women undergoing trial of labor were induced with oxytocin or early breaking of water, except for four women who used prostaglandins to induce; none of the women who used prostaglandins had a rupture. Sixty percent had oxytocin at some point in the labor. Seventy-five percent had an epidural. The women who had a uterine rupture in this study were significantly more likely to have been induced, used an epidural and/or had a previous cesarean for slow labor (dystocia) than the women who did not have a uterine rupture during labor. The group of women who had both single-layer repair and delivered less than 24 months after their cesarean had a 5% rupture rate in this study. This study suggests that women who deliver less than 24 months after a first birth by cesarean with single-layer repair at Ste-Justine Hospital in Montreal have a 5% chance of uterine rupture. This study confirms previous studies showing that it is not advisable to have another baby within two years of a previous cesarean. It is possible that it takes that long for the uterine muscle to return to its full strength. This study implies nothing about women who have had a previous vaginal birth before or after delivering a baby by cesarean.

There is not enough information to judge whether Bujold’s findings are generalizable to women at other hospitals or to homebirths, and there are at least three strong indications that they are not. The incidence of uterine rupture in both the single- and double-layer groups is high: 1.4%, when it should be less than 0.5%. The indications for performing either a single- or double-layer closure of the uterus were not specified. It is possible that the women with a double-layer closure may have been substantially different from those with single-layer closure. The study does not indicate the infection rate at the primary cesarean. High infection rates are associated with the use of catgut sutures and are associated with weak scars. The only unbiased way to determine the relative effects of single- versus double-layer uterine closure will be in randomised controlled trials (or meta-analysis of randomised controlled trials) of 3000-4000 women attempting VBACs.

More recently, Durnwald published a similar study to Bujold’s retrospective study using 768 attempted VBACs after a first birth and found NO uterine ruptures in the 267 women who had a single-layer repair at their first cesarean. (8) The double-layer repair group had a 0.8% uterine rupture rate. In each case of uterine rupture, a cesarean was performed for a non-reassuring fetal heart rate. There were no neonatal deaths in either group. Infant outcomes were similar. No hysterectomies were required. In this study at MetroHealth Medical Center in Ohio, Vicryl sutures with a continuous unlocked stitch were used, whereas Bujold used catgut in a locked stitch. Vicryl holds the tissue together for seven to 10 days. Chronic catgut loses half its strength within seven to 10 days and even sooner if there is an infection—which occurred 25% of the time in Durnwald’s double-layer repair group. Durnwald suggests that using catgut, which deteriorates faster, may account for the higher uterine rupture rate in Bujold’s single-layer repair group. Durnwald found
that women on average get pregnant five months sooner after the single-layer repair than after the double-layer repair.

To date, no one has published any research showing an increase or decrease in the occurrence of placenta accreta or placenta percreta associated with single-layer repair. It is known that one of the causes of placenta accreta and placenta percreta is the placenta’s embedding in the scar. As would be expected, the number of placenta accretas and percretas is increasing as the cesarean rate rises.

A search on Medline reveals only individual case studies of placenta percreta. Each study heralds the remarkable occurrence of one or, at most, two cases of placenta percreta. Any doctors who can document 10 cases of placenta percreta per year should do so and attempt to find well-documented medical records on the number of layers with which the original cesarean was repaired. Before single-layer repair is blamed for an increase in placenta problems, an association must be established.

Evidence is accumulating to show that cesarean section bears increased risks for future pregnancies in the form of increased stillbirths (10), increased placenta previa and increased placenta accreta and percreta. These risks must be considered before a woman is offered a repeat cesarean over a VBAC, especially if she is planning to have more children. Uterine rupture does not happen in a previously untraumatized uterus during spontaneous labor of a normal fetus. The most common cause of rupture is previous cesarean section. The next most common cause is stimulation of labor with oxytocin or prostaglandins. It can also happen with fundal pressure or trauma from sharp or blunt instruments, trauma from a previous D&C and also from marked overdistention of the uterus from multiple pregnancy or hydramnios. “The previously untraumatized, spontaneously laboring uterus will not persist in contracting so vigorously as to destroy itself.” (11) Sometimes a uterus ruptures and the woman does not know it unless it is seen on an ultrasound, because there is no bleeding and the uterus heals itself. Sometimes a woman has all the signs of rupture during a VBAC and is hurried off to the operating room, only to find that the uterus did not rupture at all. The best one can do is offer a woman an informed choice.

**Background**

- Placenta accreta occurs when a placenta attaches itself too deeply and too firmly into the wall of the uterus (80% of accretion cases). This occurs in 1:111 to 1:1,500 births. (9)
- Placenta increta occurs when a placenta attaches itself even more deeply into the uterine wall (15% of accretion cases).
- Placenta percreta occurs when a placenta attaches itself through the uterus, sometimes growing into nearby organs, like the bladder. (5% of accretion cases).

Since the placenta cannot easily separate from the wall of the uterus, the uterus is often surgically removed. A new surgical procedure, embolization, which involves closing off some of the arteries to the uterus, can save the uterus. The placenta grows into the uterus in the presence of placenta previa, a history of prior cesarean section or curettage (D&C) and/or grandmultiparity of six or more pregnancies. (12)

**Implications for Practice:**

Women undergoing cesarean surgery should insist on not being sewn up with catgut or chronic catgut sutures because of the increased chance of infection. Women should insist on knowing if single-layer or double-layer repair was used, in case future research reveals some finding about one or the other. Dozens of articles in peer-reviewed medical journals over the past 15 years show that single-layer repair leads to faster, easier recovery after cesarean section. Current research shows that if this technique is done correctly, it is preferable.

After a first birth by any type of cesarean, women and their families should be counseled as to the risks of delivering another child within the following two years.

No well-designed studies show that a woman whose first birth was a cesarean sewn up with single-layer repair had an increased risk of uterine rupture or placenta percreta on her second pregnancy. No studies exist on groups of women who have had a previous vaginal birth and undergo a trial of labor after a cesarean with single-layer repair. Therefore, there is absolutely no medical basis for changing protocols regarding VBACs for women who have had a previous vaginal delivery. Women with a cesarean scar, particularly those who want a homebirth, should have an ultrasound around 37 weeks to see if the placenta is covering the uterine scar. If it is, they should be informed of the risks associated with a homebirth, since the risk of placenta accreta or placenta percreta is increased. They should have a proper medical consult.

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**References**


12. Ibid., 621.

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