

MISGAV-LADACH CESAREAN SECTION: GENERAL CONSIDERATION

Zlatan Fatušić, Igor Hudić and Asim Musić

University Department of Gynecology and Obstetrics, Tuzla University Clinical Center, Tuzla, Bosnia and Herzegovina

SUMMARY – Among obstetric techniques, cesarean section seemed to represent a well-defined procedure and significant advances in this intervention were considered to be unlikely. However, obstetric surgery has recently undergone many improvements. In 1972, Joel-Cohen presented a new method for transverse incision of the abdomen. This method, with some modifications, was integrated into the Misgav-Ladach cesarean section. The philosophy of this technique is to cause the least possible damage to tissues, to refrain from superfluous steps, and to make the intervention the simplest possible. Advantages of this method are lower incidence of fever and urinary tract infection, reduced use of antibiotics and narcotics, faster re-establishment of normal bowel function, shorter maternal hospital stay and less postoperative adhesion formation. The Misgav-Ladach method of cesarean section is suitable for emergency and elective procedures, justifying its use in daily routine.

Key words: *Cesarean section – methods*

Introduction

The idea of delivering a baby through the abdominal wall of the mother goes into deep history and mythology. Zeus is supposed to have torn premature Dionysus out of the abdomen of his dead mistress Semele and implanted him into his own thigh. Apollo is supposed to have killed his mistress Coronis and while she was lying on the pyre that was meant to consume her, he removed his unborn child Aesculapius from her abdomen. Brahma is said to have been delivered from the umbilicus of his mother and Buddha from his mother's right flank in 563 BC. Rostam, a legendary Persian hero, is said to have been delivered abdominally¹.

Although cesarean section is a favorite topic in the folklore of all nations, there is no mention of the

operation upon a living mother in the writings of ancient Egyptians, Greek, Roman or Arabic physicians. However, the laws of the Hebrews indicate that such an operation must have been known among them: "... that it is not necessary for the woman to observe the days of purification after removal of the child through the parietis of abdomen ...". The Mishnah, the first large commentary on the Hebrew bible compiled in the second century (135-175 AD), mentions the operation several times.

In 1500 AD, Jacob Nufer cut open his wife as recounted later and delivered the baby with his wife's survival. However, the first definitely authenticated report of the operation intentionally performed on a woman was carried out on April 21, 1610 by Trautmann of Wittenberg.

Since that time, countless variations of the procedure have been introduced. Some have concerned seemingly small details of the operation, but others have presented major breakthroughs. Among obstetric techniques, cesarean section seemed to represent a well-defined procedure and significant advances

Correspondence to: *Prof. Zlatan Fatušić, MD, PhD*, University Department of Gynecology and Obstetrics, Tuzla University Clinical Center, Trnovac bb, 75000 Tuzla, Bosnia i Herzegovina

E-mail: jax@bih.net.ba

Received January 25, 2010, accepted October 6, 2011

in this intervention were considered to be unlikely. In particular, this obstetric operation appeared to be little if not at all susceptible to improvement from the perspective of invasiveness.

During the last few decades, gynecologic and obstetric surgery has undergone innumerable and outstanding improvements, such as the incision proposed by Joel-Cohen method of opening the abdomen, adapted for cesarean section^{2,3}. In the 1970, Joel-Cohen presented an innovative approach providing an alternative to both vertical and different transverse abdominal incisions (Pfannenstiel, Kustner, Cherney, Mackendrot-Maylard, etc.). The philosophy of this really impressive technique is that of tending to cause the least possible damage to tissues, to refrain from superfluous steps, and to make the intervention the simplest possible by critical assessment of each surgical step⁴⁻⁷. It is a less traumatic approach to the oldest major surgical intervention in the history that makes it innovative and worthy of being brought to the attention of all obstetricians⁸.

Surgical Technique

It is performed by a superficial transverse cut in the skin, about 2-3 cm below the line between the anterior superior iliac spine; deepening the cut in the midline with scalpel to expose the fascia; dissecting fascia laterally by about 2 cm, below the fat tissue with a slightly opened tip of the scissors. At this point, using index fingers the fascia is stretched caudally and cranially to make room for the next step and to find the midline separation of the rectus muscles. Both the surgeon and the assistant insert their index and third fingers under the muscles and stretch the muscles, fascia and subcutaneous fat tissue bilaterally, at the same time, until the required opening is achieved. The parietal peritoneum is then opened transversely: both index fingers are used to stretch the peritoneum until a hole is formed on the midline and then, by stretching it in a cranial-caudal direction, the peritoneum opens transversely, to avoid damage of the bladder. This procedure is quick, almost bloodless and enables easy access to lower abdomen.

A Fritsch retractor is inserted to facilitate handling of the low uterine segment, and no intra-abdominal swab is used. A small transverse incision is made with the scalpel in the low uterine segment, 2 cm above the

vesico-uterine fold until the membranes bulge and the two index fingers are inserted to stretch the opening laterally. After the baby has been born, we approach to placental separation and exteriorization of the uterus.

The uterine incision is closed in one layer with a continuous, non-locking suture reapproximating the full thickness of the myometrium with absorbable monofilament (Monocril, Ethicon).

After manually removing blood clots, the uterus is placed back into the abdomen. Visceral and parietal peritoneum are left open. The muscles are not approximated. Fascia is closed with a continuous non-locking sutures of polyglactin (Vicril, No. 1). While the assistant lifts the lateral edges of the fascia, the surgeon starts to stitch from inside of his own corner, and makes the first knot under the fascia. The subcutaneous tissue is not approximated. The skin is closed with widely spaced sutures, generally three stitches, using 00 polyester or silk with big needle. The margins between the stitches are approximated with four Allis clamps for 5 min^{4,7}.

Postoperative Care

On the day of operation, intravenous hydration is used. Early ambulation is encouraged 8 hours after the surgery. On the first postoperative day, urinary catheter is removed. Resumption of drinking about 12 hours after the operation is enabled if bowel sounds are present. A light diet is enabled on the first postoperative day and regular diet is permissible from the second day. If bowel function does not resume spontaneously within the third postoperative day, a small enema is prescribed. Stitches are removed on the fifth to seventh postoperative day.

Discussion

The Misgav-Ladach approach of cesarean section as a new one means the following: 1) difference from the traditional procedures is the Joel-Cohen method for opening the abdomen; 2) suturing the uterus in one layer; and 3) non-closure of the visceral and parietal peritoneal layers.

The Joel-Cohen opening of the abdomen offers many benefits for both the surgeon and the patient, i.e. reducing blood loss during this step and in most

cases hemostasis being unnecessary because of lateral traction despite cutting of the superficial epigastric vessels. Joel-Cohen opening is also particularly effective in case of emergency, since it is a very quick way to open the abdomen. In fact, it can take just about 50 seconds to enter the abdominal cavity and reach the pregnant uterus. The transverse opening of the parietal peritoneum aims at preventing damage to the bladder.

The single-layer repair of the uterine incision has been proven to be safe and we agree with the others that a non-locking suture is superior to locking closure for wound healing⁹ because of a decreased tendency to produce ischemic necrosis. The use of a new synthetic monofilament improves wound healing. We want to stress that the traditional two-layer method of repair of the low uterine segment transverse incision was simply borrowed from the technique used to repair classic vertical incision and did not undergo scientific validation⁴.

No swab is inserted into the abdominal cavity in order to decrease the risk of adhesion formation and to avoid reducing the bacteriostatic properties of amniotic fluid¹⁰. In addition, there is no risk of leaving them inside (Table 1).

Peritoneal healing differs from that of other epithelial tissues. Reepithelialization of peritoneal surfaces occurs simultaneously through the surgical site because mesothelial cells migrate into the supportive matrix and simultaneously initiate multiple sites of repair¹¹. Re-establishment of the peritoneal layer is observed within 72 h of surgery and complete surface repair of the peritoneum is usually completed in 5-8 days. The normal reparative process is profoundly

influenced by ischemia. Normal fibrinolytic activity is suppressed under ischemic conditions. Fibrin that is not resorbed becomes stabilized, infiltrated by fibrinoblasts, and ultimately organized into permanent adhesions. Despite these observations, suture of the peritoneum remains popular among obstetricians. Closure of the visceral and of parietal peritoneum is indeed described in most gynecologic surgery textbooks. The rationale for this step is rarely discussed. The most frequent explanation is advocated by providing a seal over the uterine incision protecting the abdominal cavity from infection, to help tissue healing, or to avoid adhesion formation.

These arguments are not supported by scientific research and are in opposition to experiments conducted in animals¹². Mc Donald *et al.*¹³ evaluated the effects of suturing or stapling the peritoneum after excision, abrasion, and cauterization of the peritoneum in rabbits. They found that two weeks after peritoneal injury, no intervention was preferable to re-approximation of free edges with either staples or sutures. Milewczyk¹⁴ found that parietal peritoneum in rabbits that had not been sutured healed better with fewer adhesions than sutured peritoneum.

These studies were followed by clinical investigations, which showed that there were no differences in women after cesarean section and laparotomy in wound infection, fever, and antibiotic administration between the groups with and without closure of peritoneum¹⁵⁻¹⁷. Several investigators examined whether or not peritoneal closure influences wound integrity. These studies found that peritoneal closure did not influence wound integrity and that non-closure of the peritoneum was not detrimental to wound closure^{16,18}.

The most frequent cause of intraperitoneal adhesions is prior surgery. Adhesion occurred in 55%-100% of surgical procedures for infertility as determined by second-look laparoscopy¹⁹. Appendectomy and gynecologic surgery were the most frequent surgical procedures implicated in the formation of clinically significant adhesions. Additionally, other studies concluded that suturing of peritoneum actually increased the incidence of adhesions. There are no current data on postoperative adhesions as a complication of previous cesarean section, except for the article by Fatušić and Hudić²⁰, which shows that Misgav-Ladach method of

Table 1. Misgav-Ladach method of cesarean section

-
- Joel-Cohen opening of the abdomen
 - Parietal peritoneum opened transversally
 - No intra-abdominal swab in use
 - Transverse incision of lower uterine segment
 - Child extraction
 - Uterus sutured continuously in single layer
 - Visceral and parietal peritoneum left open
 - Non-locking continuous closure of the fascia
 - Few (usually three) spaced skin stitches
-

cesarean section is associated with a lower incidence of peritoneal adhesions than cesarean section by low medial and Pfannenstiel incision as a late postoperative complication of previous cesarean section.

Additional advantages of Misgav-Ladach method of cesarean section are reduced blood loss²¹⁻²³, shorter time from skin incision to birth of the baby, shorter duration of surgery, diminished postoperative pain, less febrile morbidity, less local wound infection, quicker recovery and shorter postoperative hospital stay²⁴⁻²⁸.

Despite few articles raising suspicion of the Misgav-Ladach method advantages, generally because of the possibility of uterine rupture and wound dehiscence^{29,30}, many articles show that Joel-Cohen based method has many advantages compared with Pfannenstiel and traditional (lower midline) cesarean section techniques^{20,26,27}.

Many reports show that the Misgav-Ladach technique of cesarean section is associated with faster postoperative recovery, lower morbidity and blood loss, shorter length of operative procedure, lower incidence of operative complications, lesser postoperative use of analgesics/antipyretics and lower utilization of surgical materials. The Misgav-Ladach method of cesarean section is suitable for emergency and elective procedures, justifying its use in daily routine.

References

- FATUŠIĆ Z. Carski rez kroz historiju. In: FATUŠIĆ Z, editor. *Historija ginekologije i porodiljstva*. Tuzla: PrintCom, 2001:208-18.
- TOLEDO J, GIRON JJ, DOMINGUEY A, KUNNACHERY J, AI TERKAWI A. Laparotomies in gynecology using the Joel-Cohen technique. *Med Univ Navarra* 1981;25:29-32.
- DUFF P. Cesarean delivery and cesarean hysterectomy. In: PAUERSTEIN CJ, editor. *Clinical obstetrics*. New York: J Wiley & Sons, 1987:883-921.
- FEDERICI D, LACELLI B, MUGGIASCA L, AGAROSI A, CIPOLLA L, CONTI M. Cesarean section using Misgav-Ladach method. *Int J Gynaecol Obstet* 1997;57:273-9.
- STARK M. Adhesion free cesarean section. *World J Surg* 1993;17: 419.
- STARK M, FINKEL AR. Comparison between the Joel-Cohen and Pfannenstiel incision in cesarean section. *Eur J Obstet.Gynecol Reprod Med* 1994;53;121-2.
- STARK M, CHAVKIN Y, KUPFERSZTAIN C, GUEDJ P, FINKEL AR. Evaluation of combinations of procedures in cesarean section. *Int J Gynecol Obstet* 1995;48:273-6.
- DURFEE R. Cesarean section. In: NICHOLS HD, editor. *Gynecologic and obstetric surgery*. St. Louis: Mosby-Year Book, 1993:1075-122.
- BAKER ER, D'ALTON ME. Cesarean section birth and cesarean hysterectomy. *Clin Obstet Gynecol* 1994;37:806-15.
- LARSEN B, DAVIS B, CHARLES D. Critical assessment of antibacterial properties of human amniotic fluid. *Gynecol Obstet Invest* 1984;18:100-4.
- IRION O, FOURNET N. Will you leave the peritoneum open when performing your next cesarean section? *Contemp Rev Obstet Gynaecol* 1996;8:209-12.
- DUFFY DM, Di ZERGA GS. Is peritoneal closure necessary? *Obstet Gynecol Surv* 1994;49:817-22.
- Mc DONALD MN, ELKINS TE, WORTHAM GF. Adhesion formation and prevention after peritoneal injury and repair in the rabbit. *J Reprod Med* 1988;33:436-9.
- MILEWCZYK M. Experimental studies on the development of peritoneal adhesions in cases of suturing and non-suturing of the parietal peritoneum in rabbits. *Ginekol Pol* 1988;60:1-6.
- TULANDI T, HUM HS, GEFLAND MM. Closure of laparotomy incisions with or without peritoneal suturing and second-look laparoscopy. *Am J Obstet Gynecol* 1988;158:536-7.
- HULL DB, VARNER MW. A randomized study of closure of the peritoneum at cesarean delivery. *Obstet Gynecol* 1991;77:818-21.
- PIETRANTONI M, PARSONS MT, O'BRIEN WF. Peritoneal closure or non-closure at cesarean. *Obstet Gynecol* 1991;77:293-6.
- ELLIS H, HEDDLE R. Does the peritoneum need to be closed at laparotomy? *Br J Surg* 1977;64:733-6.
- DIAMOND MP, de CHERNEY AH. Pathogenesis of adhesion formation/reformation: application of reproductive pelvic surgery. *Microsurgery* 1987;8:103-7.
- FATUŠIĆ Z, HUDIĆ I. Incidence of post-operative adhesions following Misgav-Ladach caesarean section – a comparative study. *J Matern Fetal Neonatal Med* 2009;22:157-60.
- HOFMEYER JG, NOVIKOVA N, MATHAI M, SHAH A. Techniques for cesarean section. *Am J Obstet Gynecol* 2009;201:431-44.
- MATHAI M, HOFMEYER GJ. Abdominal surgical incision for cesarean section. *Cochrane Database Syst Rev* 2007;24:CD004453.
- KULAŠ T, HABEK D, KARŠA M, BOBIĆ-VUKOVIĆ M. Modified Misgav-Ladach method for cesarean section: clinical experience. *Gynecol Obstet Invest* 2008;65:222-6.
- POONAM BANEERJE B, SINGH SN, RAINA A. The Misgav-Ladach method: a step forward in operative technique of cesarean section. *Kathmandu Univ Med J* 2006;4:198-202.
- BELČI D, KOS M, ZORIČIĆ D, KUHARIĆ L, SILVAR A, BEGIĆ-RAZEM E, GRDINIĆ I. Comparative study of the Misgav-Ladach and traditional Pfannenstiel

- surgical techniques for cesarean section. *Minerva Ginecol* 2007;59:231-40.
26. HOFMEYR GJ, MATHAI M, SHAH A, NOVIKOVA N. Techniques for cesarean section. *Cochrane Eatabase Syst Rev* 2008;23:CD004662.
27. FATUŠIĆ Z, KURJAK A, JAŠAREVIĆ E, HAFNER T. The Misgav-Ladach method – a step forward in operative technique in obstetrics. *J Perinat Med* 2003;31:395-8.
28. HABEK D, KULAŠ T, KARŠA M. The Misgav-Ladach method for cesarean section. *Acta Med Croatica* 2007;61:153-60.
29. SCHOLZ HS, PETRU E, TAMUSSINO K, WINTER R. Wound rupture after Misgav-Ladach cesarean section: a case report. *Gynakol Geburtshilfliche Rundsch* 2004;44:238-9.
30. KASUM M. Carski rez. In: KUVAČIĆ I, KURJAK A, ĐELMIŠ J, editors. *Porodništvo*. Zagreb: Medicinska naklada, 2009:482-9.

Sažetak

CARSKI REZ PO MISGAV-LADACHU: OPĆA PITANJA

Z. Fatušić, I. Hudić i A. Music

U posljednjih nekoliko desetljeća opstetrijska kirurgija je prošla kroz brojna i značajna poboljšanja. Jedno od značajnijih je i uvođenje transverzalne incizije prednjega trbušnog zida po Joel-Cohenu, tj. metode koja je uvedena 1972. godine i uz neke preinake integrirana u carski rez po Misgav-Ladachu. Filozofija ove tehnike je da uzrokuje najmanje moguće oštećenje tkiva, suzdržavanje od suvišnih koraka i izvođenje intervencije na najjednostavniji mogući način. Prednosti ove metode su manja učestalost poslijeoperacijske groznice i infekcije mokraćnog sustava, smanjenje uporabe antibiotika i narkotika, brže uspostavljanje normalne funkcije crijeva, kraći boravak u bolnici majke i manja učestalost poslijeoperacijskih adhezija. Tehnika carskog reza po Misgav-Ladachu pogodna je za hitne i izborne postupke koji opravdavaju primjenu ove metode carskog reza u svakodnevnom radu.

Ključne riječi: *Carski rez – metode*

