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Caesarean section according to Misgav Ladach

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Abstract

The Misgav Ladach method for cesarean section is based on the principles of surgical minimalism. This is based on the Joel Cohen laparotomy, somewhat higher than the Pfannenstiel incision. Subcutaneous tissue is left undisturbed apart from the midline, rectus muscles are separated by pulling. The peritoneum is opened by stretching with index fingers. The hysterotomy is closed with one layer extraendometrial continuous absorbable stitches (Vicryl), and the visceral and parietal peritoneal layers are left open. Fascia is stitched with a continuous synthetic absorbable stitch. The skin is closed with intracutaneous resorptive suture or metallic stapler sutures. The Misgav Ladach method is restrictive in the use of sharp instruments preferring manual manipulation: it gives faster recovery, shorter period to normal bowel function, less peritoneal adhesions and less scarring in the abdominal layers, less use of postoperative antibiotics, analgesics and antipyretics, and a shorter anesthetic and operative time. It is ideal for emergency and planned cesarean section.

Introduction

In the past 100 years, since the modern cesarean section was promoted by John Martin Munro Kerr (1868-1960), many variations have been introduced into the surgical procedure. There are dozens of technical variations of cesarean section, if we include the different ways of skin incision and opening of the rectus muscle sheath of the abdomen, the ways of incision, opening and closure of the uterus, peritoneum and subcutaneous tissue. In addition, different suture materials can be used for the closure of the various layers, either with continuous recessed or nonrecessed mode or with detached stitched sutures, or staples.

The main difference between the modern cesarean section and the traditional cesarean section is the more frequent use, since the 1970s, of the low abdominal incision according to Pfannenstiel instead of the vertical incision along the midline. The main disadvantage of this second type of incision is the higher risk of incurring postoperative wound

dehiscence and the development of incision hernia; moreover, the vertical scar is less aesthetically pleasing than that resulting from the Pfannenstiel incision. Interestingly, the vertical midline incision remained the preferred technique until the 1970s and is still performed in some countries, despite the fact that more than 100 years earlier Pfannenstiel had described the incision that bears his name.

In the 1980s and 1990s, changes to the standard cesarean section procedure were proposed; one of these major changes, introduced by Sidney Joel-Cohen, was the introduction of a higher transverse incision than Pfannestiel's low transverse incision used for opening the abdomen in traditional hysterectomy [1, 2]. Like Pfannenstiel, who was a uro-gynecologist, Joel-Cohen was primarily a gynecological surgeon and never comprehensively described a new executive method for cesarean section. The modified Joel-Cohen incision technique (JCI) to open the abdomen was evaluated and implemented for routine cesarean section at Misgav Ladach General Hospital in Jerusalem, Israel, in the late 1980s [3-5]. In addition to cutaneous JCI, the "Misgav Ladach cesarean section" also involves some variations: manual manipulation is preferred to the 'use of sharp instruments and less suture material is used.

Opening of the abdomen and pelvis in Misgav Ladach's cesarean section

The straight horizontal skin incision described by Joel-Cohen is made three fingers (4-5 cm) above the pubic symphysis, 3 cm below the line joining the antero-superior iliac spines. This skin incision is therefore more cephalic than the Pfannenstiel incision (Figure 1).

Figure No. 1 General view of the Joel-Cohen incision.

The cut is then deepened along the midline to expose the sheath of the rectus.The anterior leaflet of this sheath is opened at the midline with a transverse incision of no more than 2-3 cm (Figure 2A). The rectus sheath incision is extended laterally using the slightly open tip of straight round-tipped scissors (Figure 2B).

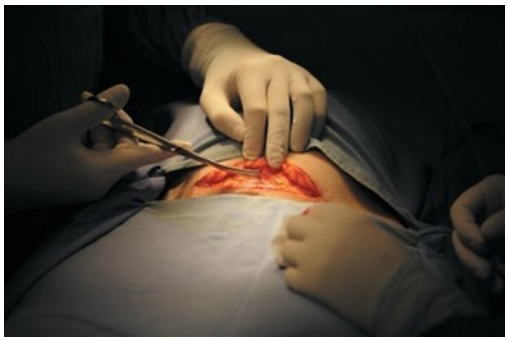

Figure No. 2: A. Exposure of the rectus abdominis muscle sheath and transverse opening for a few centimeters at the midline. B. Lateral extension of the sheath incision with round-tipped scissors.

The rectus muscles and subcutaneous tissues are then separated by bilateral finger traction (Figure 3).

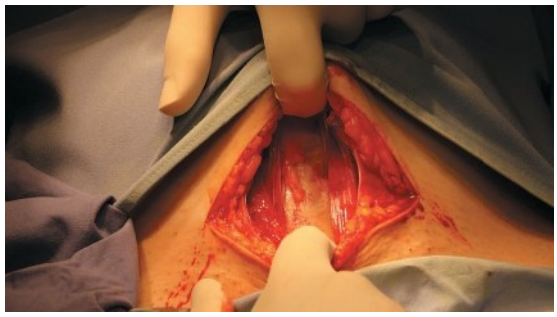

Figure No. 3: Separation of rectus muscles and subcutaneous tissue by bilateral finger traction

Unlike the Pfannenstiel incision, in JCI the fascial plate is not released upward and the peritoneum is opened transversely (rather than longitudinally) by repeated bi-digital stretching (Figures 4 and 5).

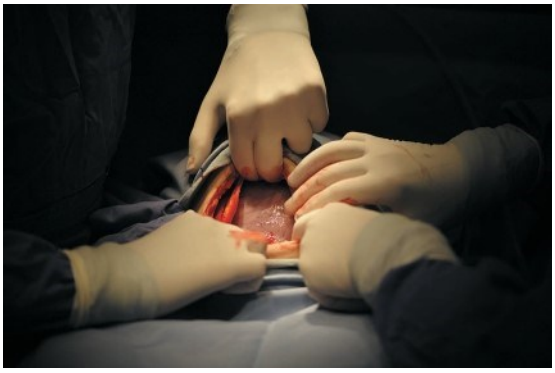

Figure No. 4: Opening the peritoneum transversely by repeated bi-digital stretching.

Figure No. 5: Separation of rectus muscles and subcutaneous tissue by bilateral finger traction.

The incision according to JCI does not require separation of the rectus muscle sheath of the abdomen from the underlying muscle bundles, and subcutaneous tissue is not incised deeply with the scalpel. Because the incision according to JCI is positioned higher than the Pfannenstiel incision and involves blunt separation of tissue along the natural planes of the tissue with minimal sharp dissection, the main branches of the epigastric arteries are less likely to be injured; furthermore, no retractors are used and only a scalpel and straight scissors are used to open the abdomen.

Opening of the uterus during a Misgav Ladach cesarean section, extraction of the fetus, and closure

The opening of the uterus in Misgav Ladach's cesarean section is similar to that described by Kehrer and Kerr while the rest of the procedure consists of a series of surgical techniques drawn from various sources [3].

The uterine incision is made on the lower uterine segment, after pushing down the vesico-uterine plica (the peritoneal fold that extends from the uterus to the back of the bladder); doing so incises

where the uterine wall is, by its nature, thinner as it consists primarily of bundles of fibrous rather than muscular tissue.

One enters the uterine cavity from which the fetus is first extracted and then the placenta as well.
In Misgav Ladach's cesarean section, the uterus is exteriorized to facilitate its closure, allowing for its manual contraction and simultaneous examination of the ovaries (Figure 6).

Figure No. 6: Esterization of the uterus and suturing of the uterine breach.

The uterine wall incision is closed with a single-layered continuous suture encompassing the decidua and visceral peritoneum while the parietal peritoneum is not sutured. The fascia is sutured with a continuous suture and the skin is closed with as few woven silk sutures as possible (Figure 7).

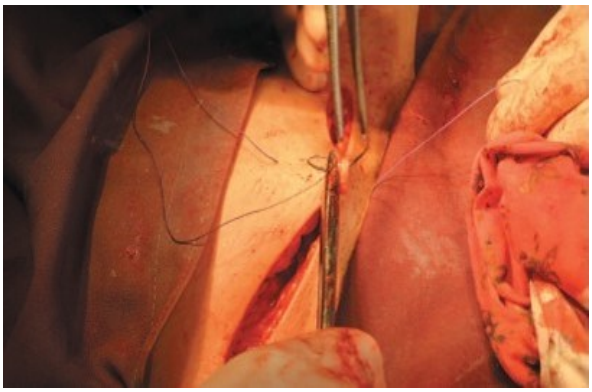

Figure No. 7: Suturing the skin breach with silk thread

Before skin suturing, the two skin breach flaps are, if necessary, re-approached with Allis forceps (Figure 8) left in place for about 5 minutes while the surgical drapes are removed.

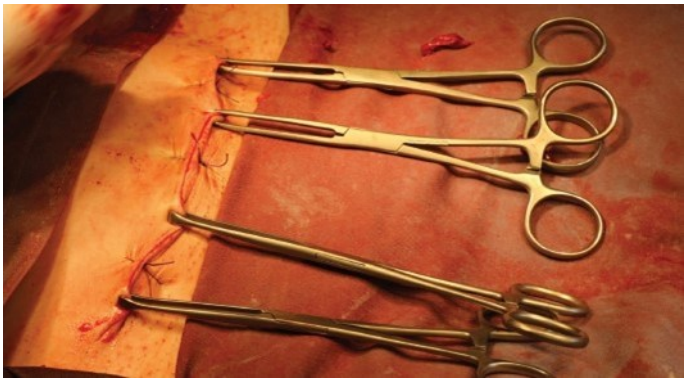

Figure No. 8: Allis forceps exploited to approximate skin margins.

Discussion of techniques used in Misgav Ladach cesarean section

As reported by the first study at Misgav Ladach General Hospital comparing the skin incision according to Joel-Cohen and according to Pfannenstiel, the main advantage of the JCI method for opening the abdomen is that its execution appears to be slightly faster than the Pfannenstiel skin incision resulting in reduced risks of postoperative febrile morbidity and pain [3].

The Misgav Ladach procedure is faster than the standard procedure since there are fewer steps to be performed and sharp dissection is minimized; consequently, there is less trauma and fever morbidity in this type of cesarean section than in the standard procedure. Less intraoperative blood loss has also been shown with the Misgav Ladach cesarean section, but these measurements are known to be subjective [6].

It is unclear whether the advantages attributed to Misgav Ladach cesarean section are due solely to the sec JCI skin incision or to the entire technique developed at the major hospital center whose name it bears. A recent meta-analysis confirmed the superiority of the Misgav Ladach technique (Table 1) but to date there are only two randomized controlled trials (RCTs) comparing different abdominal incisions [6].

Another study from Misgav Ladach General Hospital [4] showed that adhesions were present in 6.3% of women operated on with the Misgav Ladach technique compared with 28.8% after standard cesarean section.

More recently, other studies have confirmed that Misgav Ladach cesarean section, with the modification of not creating a bladder flap and avoiding visceral and parietal peritoneal closure, reduces inflammatory processes and subsequent intraperitoneal adhesions [7, 8].

Two meta-analyses and two recent RCTs compared different cesarean section techniques [9-12]. Overall, the meta-analyses found that Misgav Ladach cesarean section was associated with: less blood loss, reduced operative time, reduced mobilization time, and reduced length of postoperative hospital stay (Table .2). In contrast, RCTs did not show statistically significant differences between different surgical techniques (e.g., blunt entry or with sharp instruments, such as scissors; exteriorization vs intra-abdominal uterine repair ; single-layer vs double-layer uterine closure; closure vs nonclosure of the peritoneum) due to the high incidence of serious adverse events, including bleeding and infection [11, 12].

Table No. 1: Comparison of the sec. Joel-Cohen engraving and the Pfannenstiel engraving.

Joel-Cohen incision is associated with:
- Reduced fetal extraction times (MD -1.90; 95% CI, -2.53 to -1.27 minutes);
- Reduced operative time (MD, -11.40; 95% CI, -16.55 to -6.25 minutes);
- Reduced estimated blood loss (MD, -58.00; 95% CI, -108.51 to -7.49 ml);
- Increased time to first dose of analgesia (MD,0.80; 95% CI, 0.12 to 1.48 hours);
- Reduced postoperative analgesic requirement (risk ratio (RR), 0.55; 95% CI, 0.40 to 0.76);
- Reduced total analgesia dose in the first 24 hours (MD, -0.89; 95% CI, -1.19 to -0.59);
- A 65% reduction in postoperative febrile morbidity (RR, 0.35; 95% CI, 0.14 to 0.87);
- Lower postoperative hospital stay for the mother (MD, -1.50; 95% CI, -2.16 to -0.84 days)
Legend: MD: mean difference, CI: confidence interval

Table No. 2: Comparison of Joel-Cohen-based cesarean section and Pfannenstiel's C-section

Compared with Pfannenstiel cesarean section, Joel Cohen-based cesarean section is associated with: - Shorter time from skin incision to child birth (n = 575; weighted mean difference (WMD), -3.84 minutes; CI, -5.41 to -2.27 minutes); - Shorter operative time (n = 581; WMD, -18.65; 95% CI, -24.84 to -12.45 minutes); - Less blood loss (n = 481; WMD, -64.45 ml; 95% CI, -91.34 to -37.56 ml); - Reduced time for postoperative resumption of oral food intake (n = 481 women; WMD -3.92; 95% CI, -7.13 to -0.71 hours); - Less fever (n = 1412 women; RR 0.47;95% CI 0.28 to 0.81); - Shorter duration of postoperative pain (n = 172; WMD, -14.18 hours; 95% CI, -18.31 to -10.04 hours); - Less need for analgesics (n = 151; WMD, -0.92; 95% CI, -1.20 to -0.63). Legend: WMD: weighted mean difference/ CI: confidence interval/ RR: relative risk

Table No. 3: **Comparison between Misgav Ladach cesarean section and traditional low midline abdominal cesarean section**

Compared with traditional low midline abdominal cesarean section, Misgav Ladach cesarean section is associated with: - Lower blood loss (n = 339; WMD, -93.00; 95% CI, -132.72 to -53.28 ml); - Reduced operative time (n = 339; WMD, -7.30; 95% CI, -8.32 to -6.28 minutes); - Mobilization time (n = 339 women; WMD, -16.06; 95% CI, -18.22 to -13.90 hours); - Postoperative length of stay for the mother (n = 339 women; WMD, -0.82; 95% CI, -1.08 to -0.56 days). Legend: WMD: weighted mean difference/ CI: confidence interval/ RR: relative risk

However, as highlighted by the authors of the CORONIS RCT, surgeons do not always comply with the assigned surgery [12]. Compliance is an important issue when comparing actual events in a surgical procedure with a well-defined operation whose steps are carefully coded . These studies also do not provide information on long-term morbidity and mortality, risks of pathologic placental adhesion and scar rupture in later labor.

Recent but smaller randomized clinical trials performed in Nigeria [13] and Turkey [14], respectively, comparing Misgav Ladach cesarean section with the traditional Pfannenstiel method, confirmed that the former is associated with shorter operative time, less need for suture material, and faster maternal recovery time (shorter hospitalization periods). These results highlight the economic advantage of the Misgav Ladach procedure, a feature that is particularly important in resource-poor countries. Similarly, the clinical significance of the difference (less than 100 ml) in estimating blood loss may be of greater importance in women with anemia [9] in countries where malaria is endemic. Other clinical advantages for women, not only those in low-income countries, include lower incidence of fever, pain and analgesic requirements, less blood loss, and reduced duration of hospital stay intervention.

Although the time between skin incision and child birth is shorter with JCI, it is unclear whether this difference has clinical relevance. The CORONIS study found no evidence of a difference between JCI and Pfannenstiel incisions with respect to the risk of low Apgar score or perinatal mortality in planned cesarean section [12]. A recent prospective cohort study evaluated the feasibility of the Misgav Ladach technique in patients with previous cesarean section [15]. This study found that the Misgav Ladach technique is feasible in more than three-quarters of patients undergoing previous cesarean section, with a slight increase in the incision-birth interval compared with patients with previous natural childbirth. Furthermore, according to that study, the two main conditions in which the entire Misgav technique could not be performed were fibrosis of the anterior rectus aponeurosis and severe peritoneal adhesions.

"Modified" procedures of Misgav Ladach have also been used and studied, including:

- the opening of the skin, for cosmetic reasons, at the same level as the Pfannenstiel incision [16]
- the closure of the uterus with an uncut continuous suture [17, 18],
- the omission of the opening of the visceral peritoneum
- closure of the uterus with two layers of uncut suture [19], of the skin with a subcutaneous Intradermal suture [20], and various other methods of closure [21].

In an RCT [19] involving a small group of women (n = 116), Misgav Ladach cesarean section was associated with a longer time from skin incision to the birth of the baby than "modified" Misgav Ladach cesarean section. The study did not find significant differences in terms of operative time, blood loss, time to resume oral intake, time to restore bowel function, postoperative pain score, or length of the woman's hospitalization.

Most studies regarding Misgav Ladach cesarean section show numerous benefits of this procedure over other methods, some in terms of operative time and others in terms of febrile morbidity or need for pain medication. The reason for the different results is the lack of standardization of the operation, and so each different detail of the procedure could lead to different results:

- fetal extraction done with the right hand, which

avoids accidental extension of the uterine scar, is easy if the operator was right-handed standing and positioned on the patient's right side; the same cannot be said for a left-handed operator.

- The use of large needles when closing the uterus might allow the use of less suture material than small needles. At the same time, it must be considered that when the uterus contracts, the suture material cannot contract with it, which could cause a foreign body reaction and result in a weaker scar than would be obtained with smaller needles

- In addition, the use (or not) of abdominal gauze could cause different types of adhesions .

Obviously, only standardized methods will allow future comparisons between different surgical techniques and to establish, even from an institutional point of view, the best variant [22].

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