



Technical Note

Added value of surgical interdisciplinarity- The Joel-Cohen's abdominal incision

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ABSTRACT

Background: Surgical methods have profited from the exchange of knowledge among different specialties. Endoscopy which was introduced by gynecologists, surgeons, and internists is used now by all disciplines, and most of yesterday's laparotomies have now endoscopic alternatives. However, laparotomies are still needed, and there is no agreement among surgeons about what is the optimal abdominal incision. The Joel-Cohen incision which is used by gynecologists and obstetricians could become a valid alternative to the methods in use.

Method: The Joel-Cohen Method, which was evolved for abdominal hysterectomy is described here in detail. Only two instruments are used to open the abdomen, usually with no need for hemostasis.

Conclusion: The Joel-Cohen incision is suggested as a valid alternative for any emergency or elective surgical or urological abdominal operation. Its benefits are short operation time diminished blood loss and less need for analgesics.

1. Introduction

Prior to today's minimally invasive era, abdominal incisions were done in different ways according to the targeted organs, e.g., the Kocher incision for right hemicolectomy [1], the short sub-costal incision for gallbladder operation [2] or the McBurney incision for Appendectomy [3].

Most of today's operations do have endoscopic alternatives. The first experimental laparoscopy was done by Georg Kelling (1866–1945), a German surgeon who performed an experimental laparoscopy on a dog in 1901 [4]. Hans Christian Jacobaeus (1879–1937), a Swedish internist, performed the first clinical endoscopy surgery in 1910, based on Kelling's experiments [5,6].

However, the wide distribution of endoscopy was mainly influenced by an innovative French gynecologist, Raoul Palmer (1904–1985), who designed endoscopic instruments and used CO₂ for pneumoperitoneum [7].

Thereafter, surgeons and gynecologists from different countries continued the emerging discipline, first as a diagnostic tool and gradually as a surgical alternative. Kurt Semm, a gynecologist from the university hospital in Kiel, Germany, was, in 1982, the first to perform

endoscopic appendectomy [8].

Many surgeons were inspired by the emerging new discipline, such as Ernst Muehe who performed an endoscopic cholecystectomy in 1985 using a *trans*-umbilical designed instrument, the Galloscope [9,10]. Today, nearly every operation where space is available can be done endoscopically. This is certainly the result of the exchange of knowledge among surgeons, gynecologists, and internists.

However, when laparotomy is indicated, different methods are used by surgeons, urologists or gynecologists and obstetricians. Urologists use Pfannenstiel's transverse or longitudinal incisions for prostatectomies [11] and these incisions are used also by Gynecologists [12]. For many years obstetricians used the longitudinal incision for Cesarean Section until it was shown that the transverse incision outcomes included a lower rate of wound dehiscence [13]. There is still no agreement among surgeons about what is the optimal abdominal incision. Some prefer the midline longitudinal one, claiming that no major nerve, muscle or blood vessels are severed, and therefore no neural or abdominal wall dysfunction results [14]. Others prefer the transverse incision due to its lower rate of wound dehiscence and pulmonary morbidity, but advocate the longitudinal incision for emergencies due to claimed short time for entering the abdomen [15]. Some surgeons prefer the left paramedian

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incision, claiming fewer incisional hernias results [16].

In 1972 Sidney J. Joel-Cohen (1913–2002) described a modified transverse abdominal incision which he used for abdominal hysterectomy [17–19]. This method was adapted for Cesarean Sections in the 80s [20]. This incision is used today in many countries in Cesarean Sections. Scores of studies that compared the Joel-Cohen with longitudinal or transverse incisions in Cesarean Sections proved it to be shorter, with a diminished need for hemostasis and reduced need for analgesics [21–24].

We were unable to find any description of the Joel-Cohen incision in surgical or urological literature. This method is described in detail, as we believe that using this knowledge will add value to all concerned disciplines. The aim and objectives of this article is to introduce the Joel-Cohen abdominal incision, used by gynecologists, to other surgical disciplines as a valid, simple, time saving and safe method.

The Joel-Cohen incision

The length of the incision should be individually planned according to the estimated need, taking into account the structure of the abdomen and the weight of the patient.

The first incision is done one inch below, at, or above the line joining both anterior superior iliac spines, according to the surgical indication. It is done at this level in order to reach the fascia above the arcuate line. Above the arcuate line, the fascia moves freely over the muscle, and therefore separation of it from the muscles is not necessary, as must be done by the Pfannenstiel incision. The incision is done along the transverse skin lines, so the scar tends to disappear over time. To make the skin lines visible the surgeon pulls the skin toward the contralateral side with the left thumb, and the planned incision can be marked. The first incision is very superficial, cutting only through the cutis; therefore, minimal bleeding if any occurs (Fig. 1). The deepening of the incision is done only in the middle of the skin incision, where there are no significant blood vessels and therefore hemostasis is usually not needed. When the fascia is exposed, a transverse incision of about 4–5 mm is made (Fig. 2). Straight scissors with round tips are used to cut the fascia open as wide as needed. In the created hole one blade of the scissors is placed above and the other one below the fascia. The tips of the scissors should not be opened more than 4 mm in order not to cut any blood vessel, as the blood vessels will move away from the scissors' round tips (Fig. 3). The scissors are pushed first to one side and then to the other. The opening of the fascia is done below the subcutaneous tissue and above the straight muscles.

The surgeon inserts two index fingers between both straight muscles and pulls the fascia up and down in order to create a space where the surgeon and the assistant insert index and middle fingers below the straight muscle. Both stretch the muscles laterally, including fat and



Fig. 2. Short transverse incision of the fascia.



Fig. 3. Round tipped straight scissors pushed laterally to open the fascia below the blood vessels.

blood vessels, as much as needed (Fig. 4).

The blood vessels have a lateral sway but nearly no length elasticity, similar to a string on a string musical instrument. The pulling should be done slowly in order to enable the tissues to adapt to the stretching. If done properly, before closing the abdomen the superficial epigastric vessels can be seen returning to their former place.

The optimal way to open the peritoneum without risk of damaging any abdominal structure is by repeat stretching until an opening appears [25]. The peritoneum opens transversely if two index fingers are used to pull the opening up and down.



Fig. 1. Superficial cutis incision.



Fig. 4. The straight muscles are pulled laterally including fat tissue and blood vessels.

Closure of the abdomen

There are controversies concerning the optimal strategy of abdominal wall closure. Following the experimental work of Harold Ellis [26], the peritoneum is left open in obstetrics and in other disciplines, as no evidence has been shown for short- or long-term advantage in its closure [27,28]. Therefore, it is recommended to close the abdomen with only two layers, Fascia, and skin. The Fascia is closed continuously, including its two lateral layers, with the first knot under the Fascia in order to prevent knot irritation in the subcutis (Fig. 5). Subcutis and skin are closed with just a few widely spaced silk Donati sutures.

Discussion

The Joel-Cohen incision is widely used by obstetricians. It is an optimal way for emergencies, as opening the abdomen should not take longer than 40–60 seconds.

Only two instruments are needed (scalpel and roundtipped straight scissors), and in most cases hemostasis is not necessary. Scores of studies compared Cesarean Sections done using the Misgav Ladach method (Stark Cesarean) to operations using other incisions. With no exception, all showed benefits when using the Joel-Cohen incision. The mean incision to delivery time was 1.25 minutes and in the Pfannenstiel group 4.10 minutes ($P < 0.05$) [29]. In another study comparing the mean incision to delivery time in seconds using the Joel-Cohen incision it took 96.2 sec. compared to 294.1 sec. when using the Pfannenstiel incision [30].

Short operation time was reported in several studies from different countries [31–33].

Also the needed dosage of analgesics was reduced [34], and the blood loss was significantly less [35].

The main advantages of the Joel Cohen incision are summarized in Table 1.

Unlike the Maylard transverse incision, there is no need to cut blood vessels or the Recti muscles [36], as they return to their place at the end of the surgery.

The control groups in all the studies include elements beyond the abdominal incision, such as the use of abdominal towels, the different ways to suture the uterus, and the handling of both peritoneal layers.

Nevertheless, in a study comparing the Joel-Cohen to the Pfannenstiel incisions in Cesarean Section, where all surgical details were similar except for the abdominal incision, a significantly lower rate of febrile morbidity was shown [37]. It seems that this abdominal incision, due to its simplicity, with no need to separate muscles from the fascia, and usually no need for hemostasis, should be considered by surgeons and urologists as an alternative method when laparotomy is indicated.

The disadvantage of the Joel-Cohen incision is its limited access to the upper abdomen.

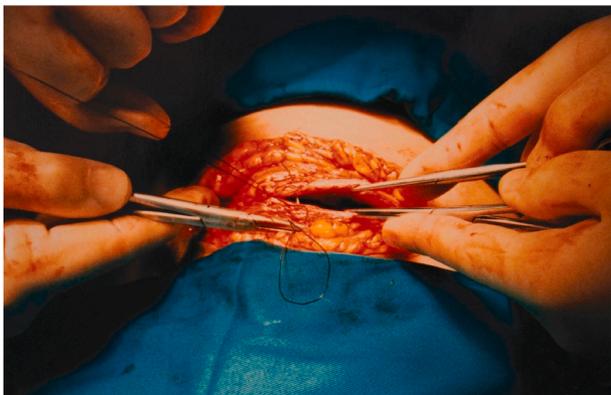


Fig. 5. The fascia is sutured continuously.

Table 1

The advantages of the Joel Cohen incision compared to the Pfannenstiel incision in cesarean section.

Category	Joel Cohen	Pfannenstiel	significance	Reference
• Incision to delivery time	96.2 sec.	294.1	<0.001	[30]
• Febrile morbidity	5.45%	13.2%	<0.05	[29,37]
• Post Op. adhesions	11,3%	35,5%	P = 0.0026	[32]
• Blood loss	128 ± 35 ml	212 ± 147	P < 0.05	[35]
• Analgesics dosage	0.52	1.17	P = 0.001	[34]

Conclusion

Interdisciplinarity, the exchange of know-how among different specialties contributed to the development of innovative methods, such as the endoscopy, or the Trans-Douglas surgery where gynecologists and surgeons are cooperating on appendectomies, gall-bladder and colon operations [38,39].

The Joel-Cohen incision is a simple, easy to learn and perform method and could be used for elective and emergency operations in all surgical disciplines.

It is expected that studies comparing the Joel-Cohen incision to others will show its benefits concerning operation time, post-operative need for analgesics, and early mobility of the patients. Therefore, comparative and randomized studies should be encouraged.

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Consent

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Author contribution

The article is result of a long-time discussion among us, two gynaecologists and two surgeons. The initial text was written by MS, all other authors contributed by checking and modifying the text, suggesting modifications, checking and suggesting references in a process of six weeks. The article was sent after agreement of all authors.

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Declaration of competing interest

No conflict of interest.

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