NESA
NEW EUROPEAN SURGICAL ACADEMY

SEPTEMBER 17, 2010

The evidence-based Caesarean Section

Michael Stark
The New European Surgical Academy

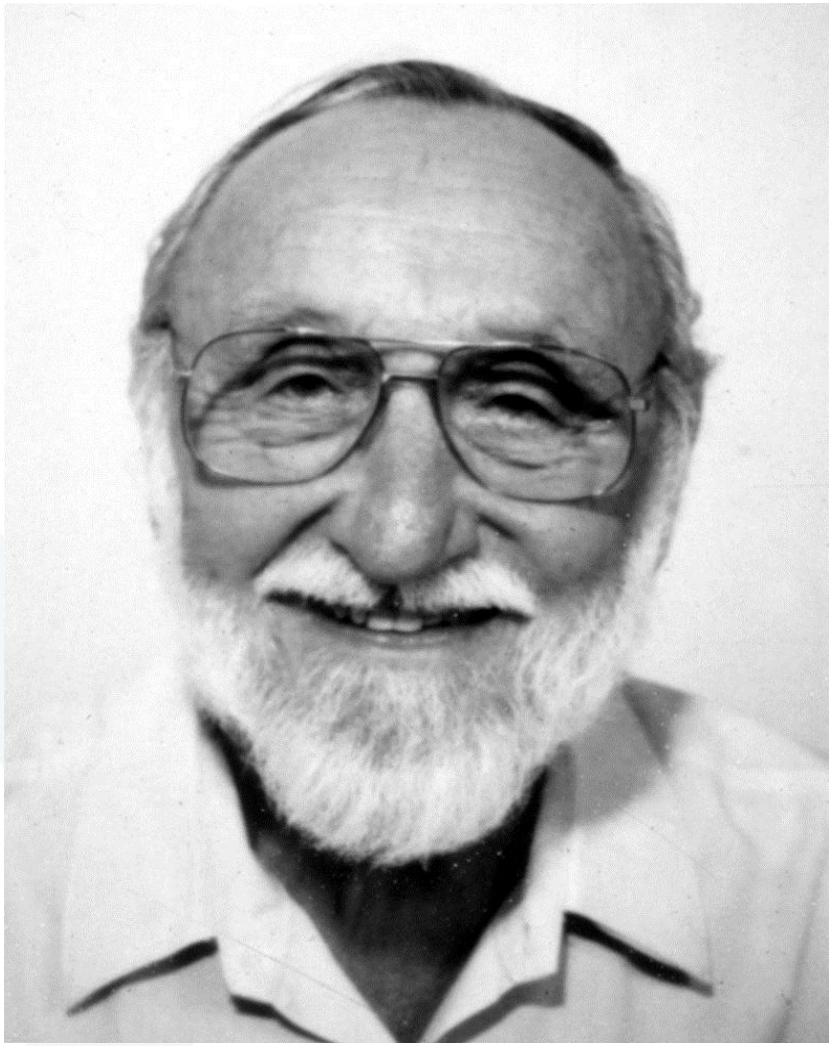
“Throughout history the authorities and systems were the main obstacles for any medical development.“

Dr. Rudolf Virchow (1821-1902)
Physician and initiator of the study of cellular pathology

ABDOMINAL WOUND DEHISCENE AFTER C-SECTION (vertical vs. Pfannenstiel)

	Vertical	Transverse
No.	1635	540
Dehiscence	48	2
Rate	2.94 %	0.37 %

Mowat J, Bonnar J. Br Med J 1971; 2 (756): 256-257



Prof. S. J. Joel-Cohen 1913 - 2002

POST-OPERATIVE RECOVERY RELATED TO INCISION IN C/S

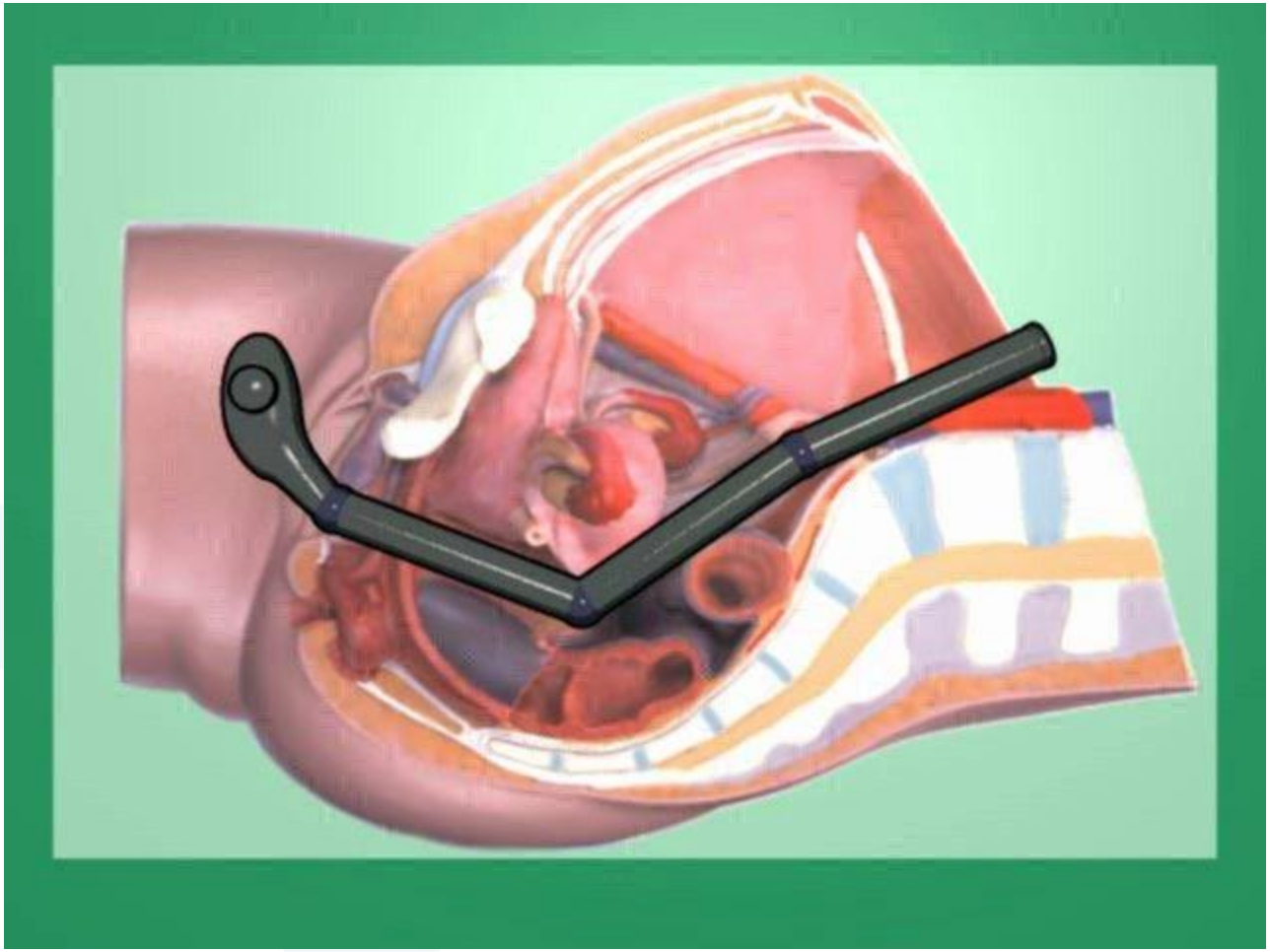
	Modified Joel-Cohen	Pfannenstiel	p
Number of cases	121	124	
Febrile morbidity (%)	7.4	18.6	< 0.05
Duration of analgesics requirement (hours)	16.6	20.1	NS
Doses of analgetics given	2.9	3.3	NS

Stark M, Finkel A. Eur J Obstet Gynecol Reprod Biol 1994; 53 (2): 121-122

Caesarean Section might be your last chance to perform a laparotomy!

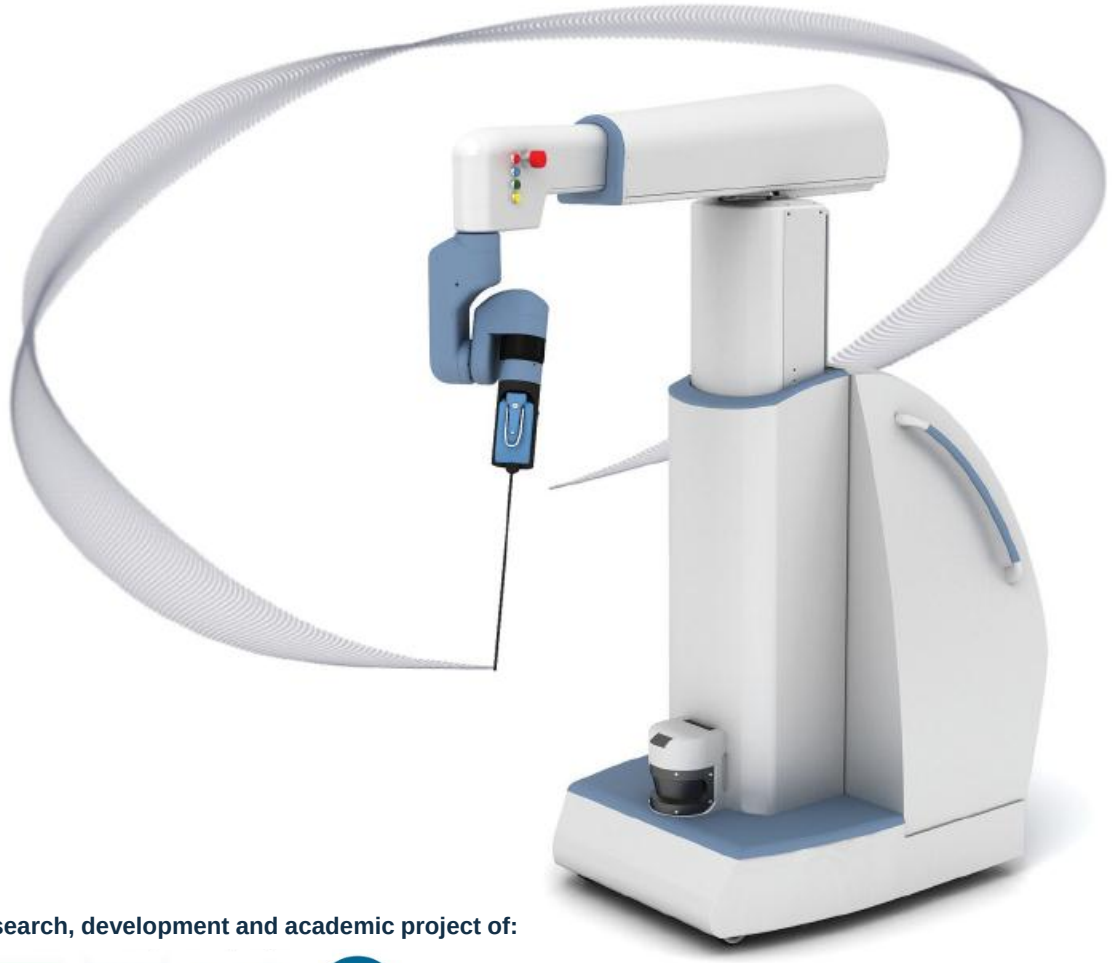
Because…

…today, most abdominal operations have endoscopic alternatives



Da Vinci® surgery

The new Advanced Laparoscopy through Force-Reflection with tactile sensing



Research, development and academic project of:

SOFAR

JRC EUROPEAN COMMISSION

NESA NEW EUROPEAN SURGICAL ACADEMY

Every step in every operation should be analyzed and, if found necessary, the optimal way of its performance should be determined.

ELSEVIER

THE JOURNAL OF
MINIMALLY INVASIVE
GYNECOLOGY

Special Article

The Importance of Analyzing and Standardizing Surgical Methods

Michael Stark, MD*, S. Gerli, MD, and G. C. Di Renzo, MD, PhD

From the New European Surgical Academy (NESA) and the HELIOS Hospital Group, Berlin, Germany (Dr. Stark), and the Department of Obstetrics and Gynecology, University Hospital Monteluce, Perugia, Italy (Drs. Gerli and Di Renzo).

ABSTRACT The outcome of operations performed in different institutions or by different surgeons can hardly be compared if the operative methods are not standardized. Six different vaginal hysterectomy methods were studied. The steps common in all of them were defined. These steps were analyzed for optimal performance and sequence during the operation. The resultant modified method was subjected to a prospective randomized study, which showed that the operation time and the need for pain drugs were reduced. This method was introduced to several departments in different countries. The optimization and standardization of surgical methods are expected not just to improve the postoperative outcome, but also to enable a comparison between different departments and surgeons. Journal of Minimally Invasive Gynecology (2009) 16, 122–125

Keywords: Vaginal hysterectomy; Surgery; Hysterectomy; Vaginal surgery; Vaginal prolapse; Surgical technique; Surgical method

Table 1 Prospective, randomised comparison of vaginal hysterectomies performed by the Heaney and the Ten-step Vaginal Hysterectomy methods.

	Heaney method *n* = 52 Median (25th–75th percentile)	Ten-step Vaginal Hysterectomy *n* = 44 Median (25th–75th percentile)
Age (years)	61.6 (46–75.9)	66.2 (53–77)
Operation time (min)	52.3 (23.3–90)	34.1 (20.5–50)*
Pain killers needed (h)	48.7 (19–86)	29.6 (8–75)*
Average hospital stay (range)	5.8 (4–8)	5.9 (4–8)

*Statistically significant difference ($P < 0.05$).

The data were stored in a database. The evaluation was done using SPSS for Windows. Frequencies and standard differences were calculated as mean variations.

Chi square analysis was used.

Stark M/Di Renzo GC/Gerli S, in: Progress in Obstetrics and Gynaecology 2006, Vol. 17, 358-368

Advantages of the Ten Step Vaginal Hysterectomy:

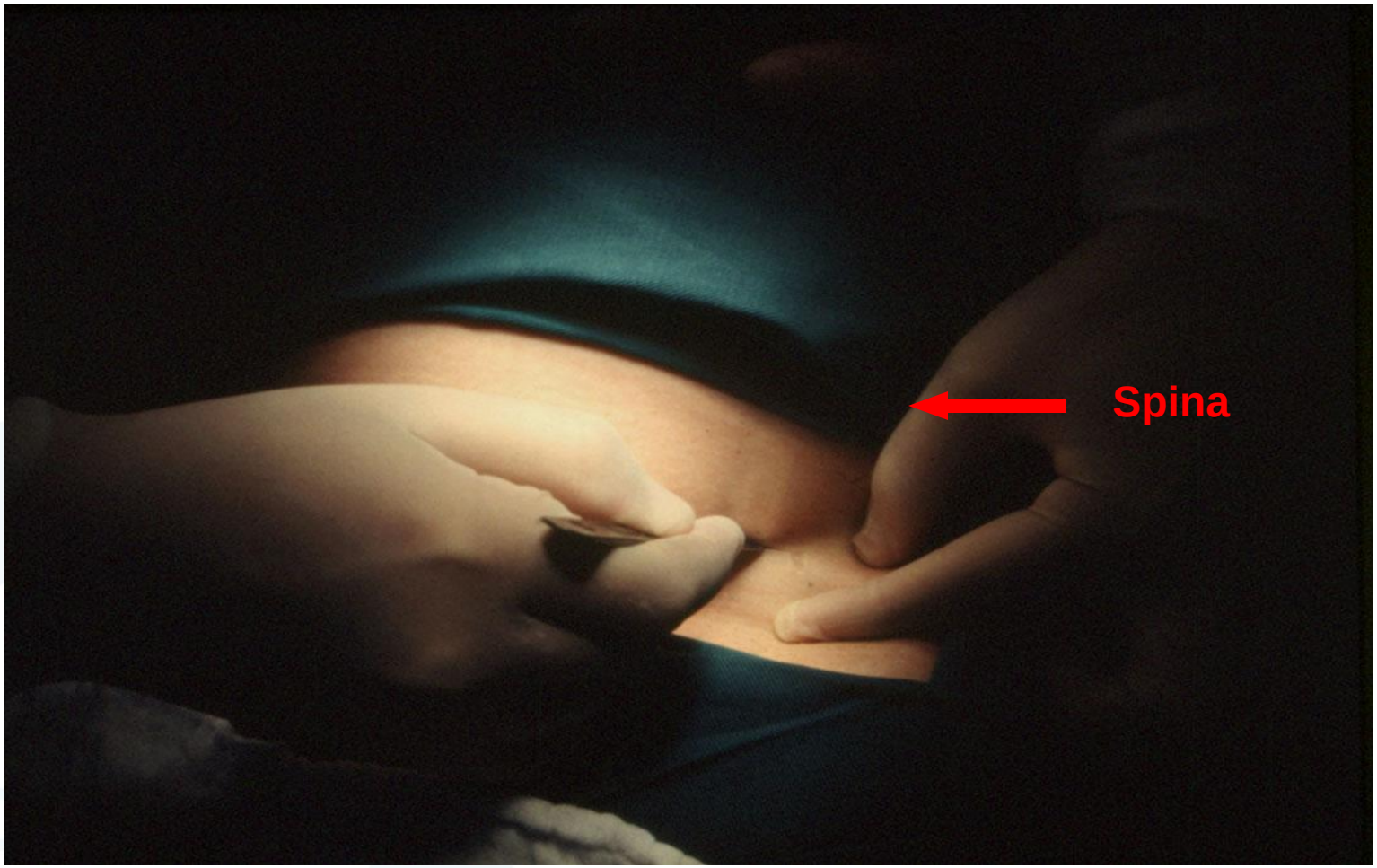
- Makes sense anatomically and physiologically
- Requires less pain killers
- Is easy to learn, perform and teach
- Saves theatre time

Caesarean Section- Ergonomics

Ergonomic considerations are an undivided part of an optimal planning of any operation.

ERGONOMICS: RIGHT-HANDED SURGEON SHOULD STAND ON THE RIGHT SIDE OF THE TABLE

- More ease and comfort in delivering the baby
- Needle points away from the bladder while stitching the uterus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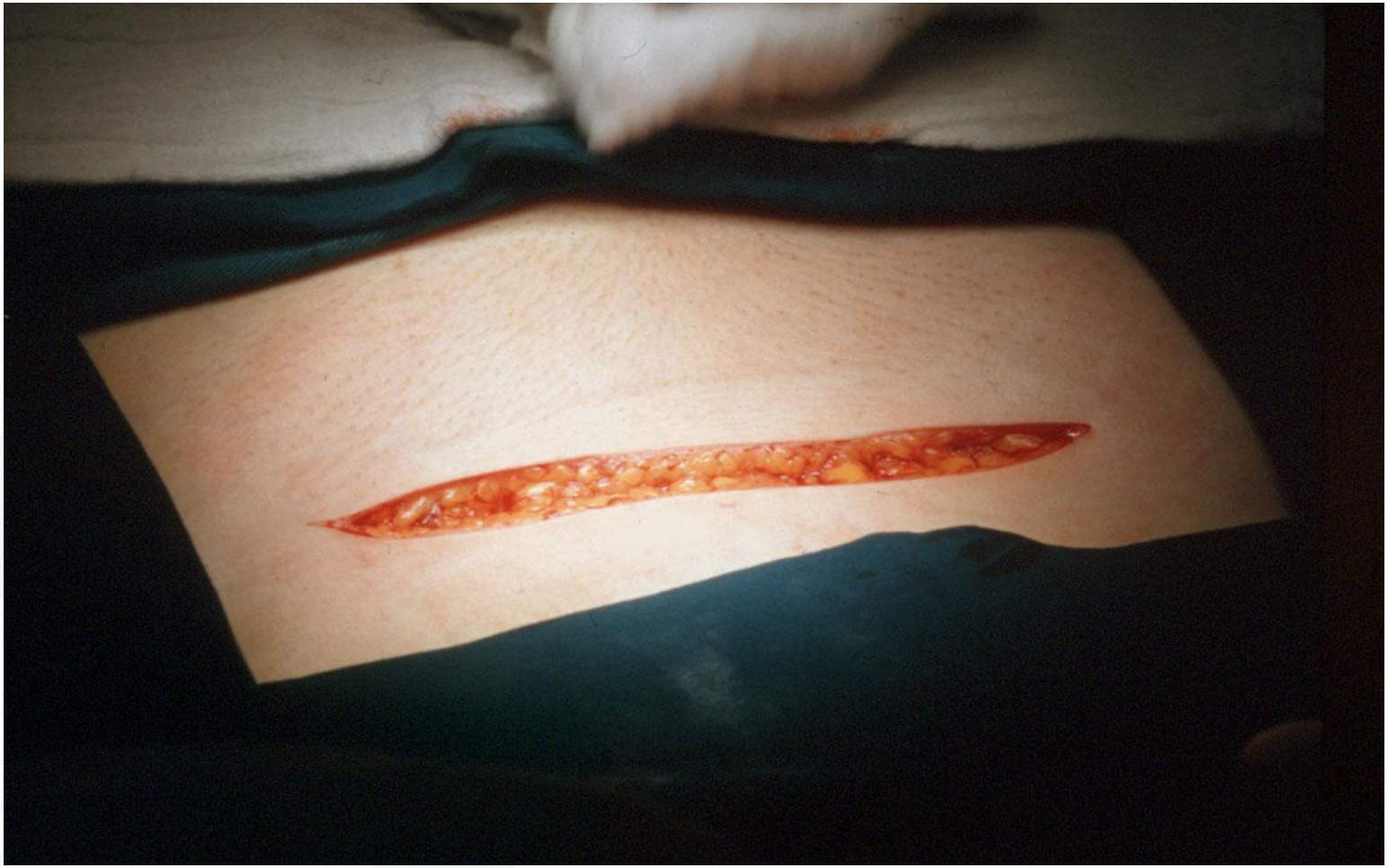
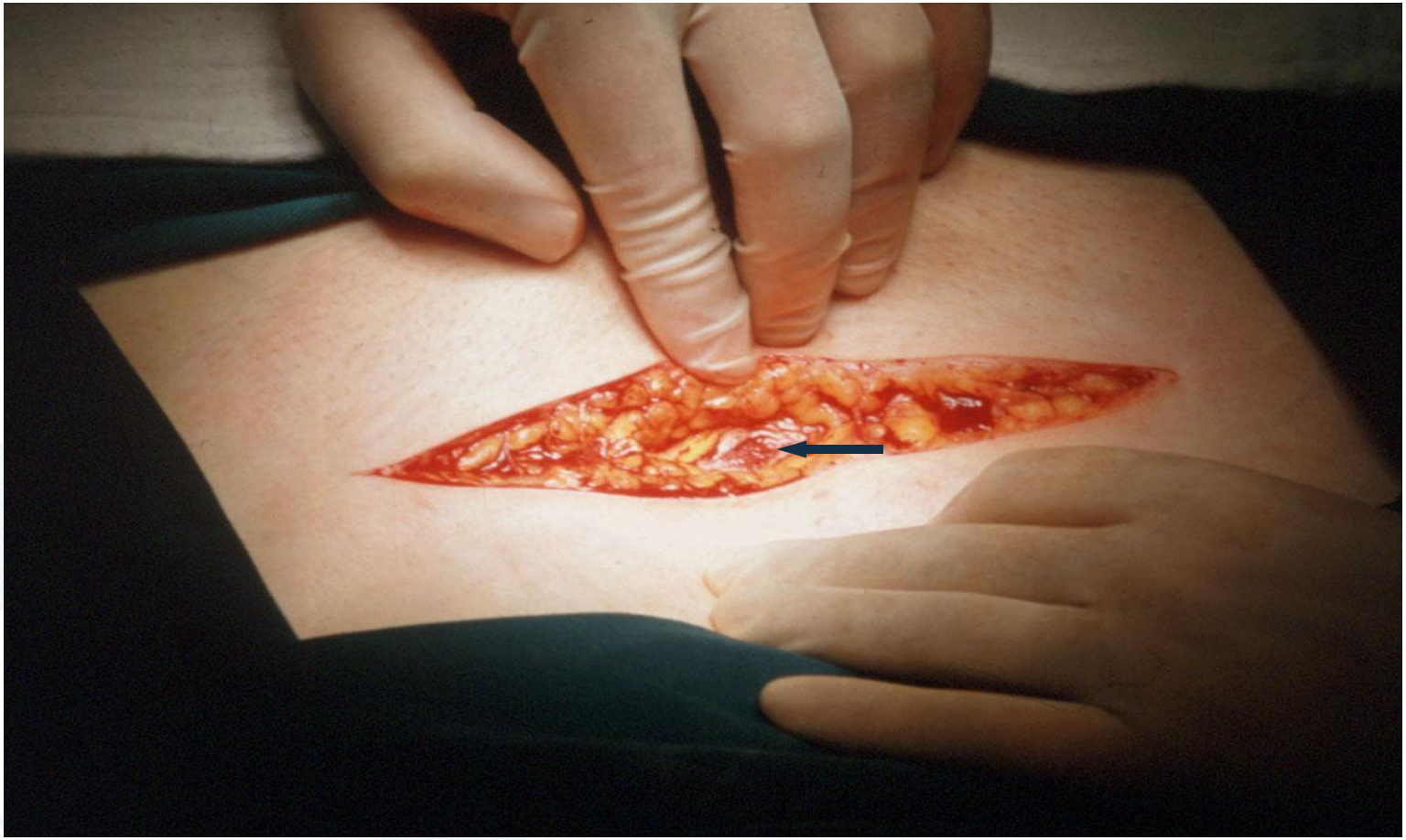
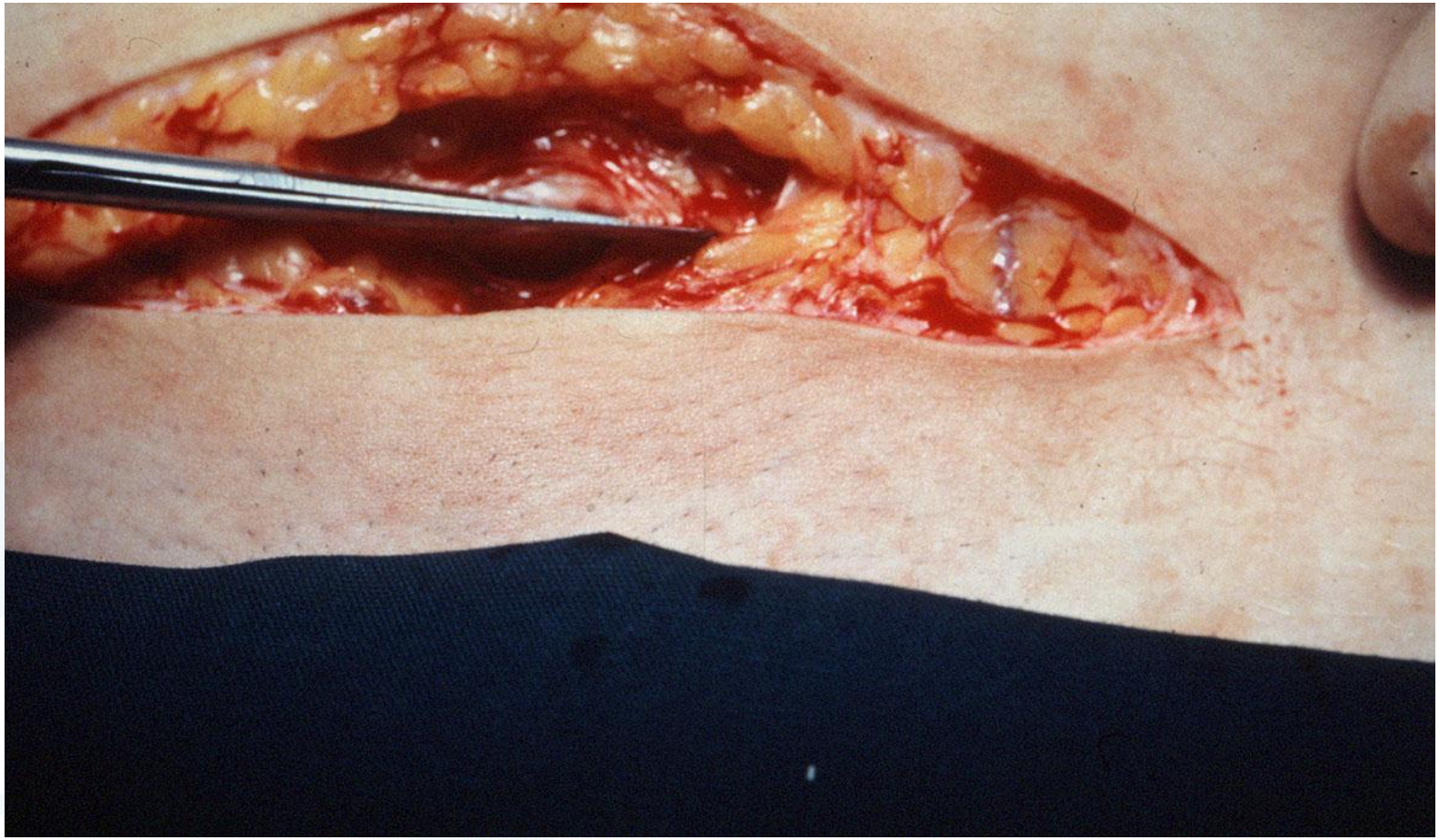
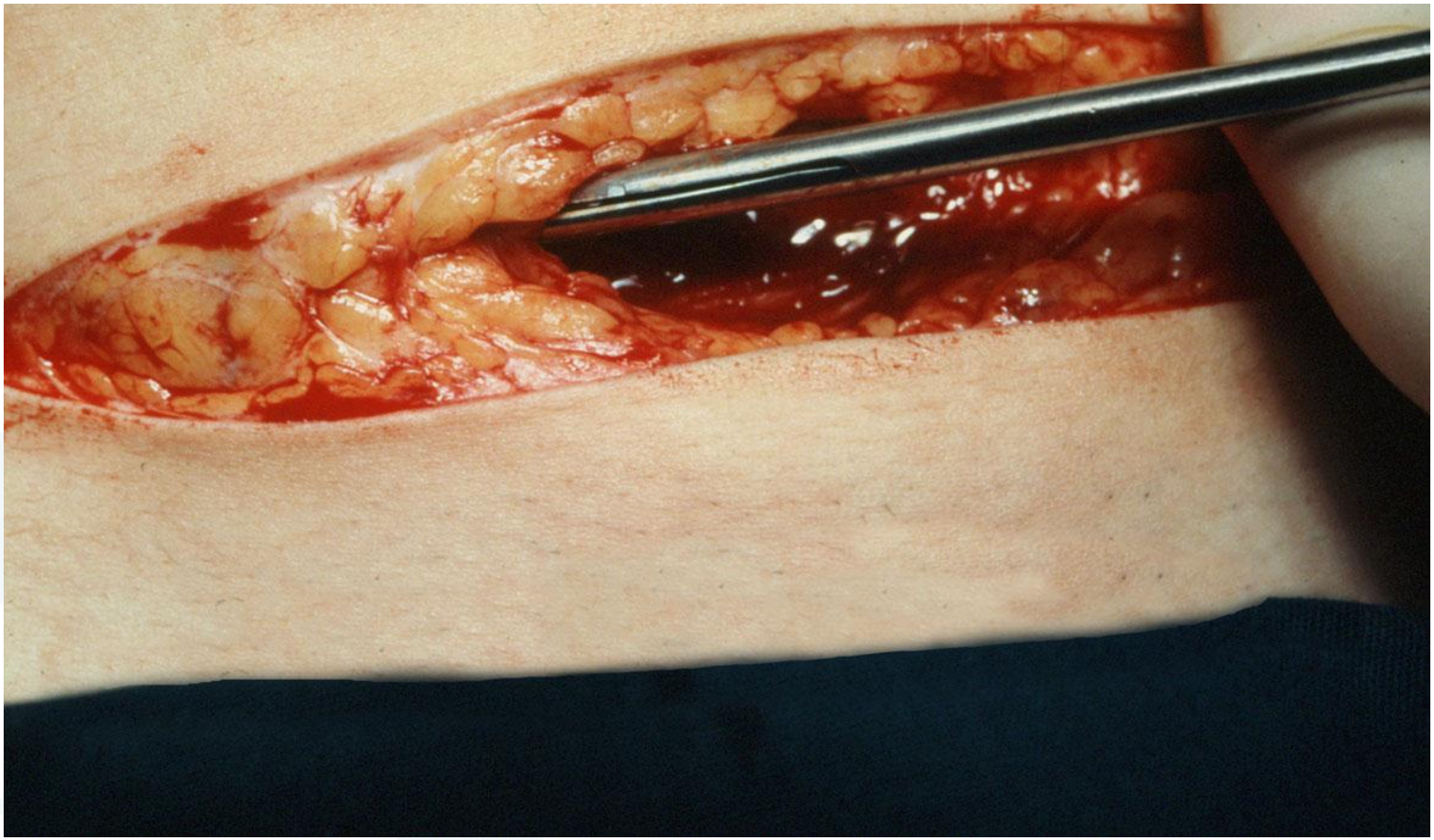
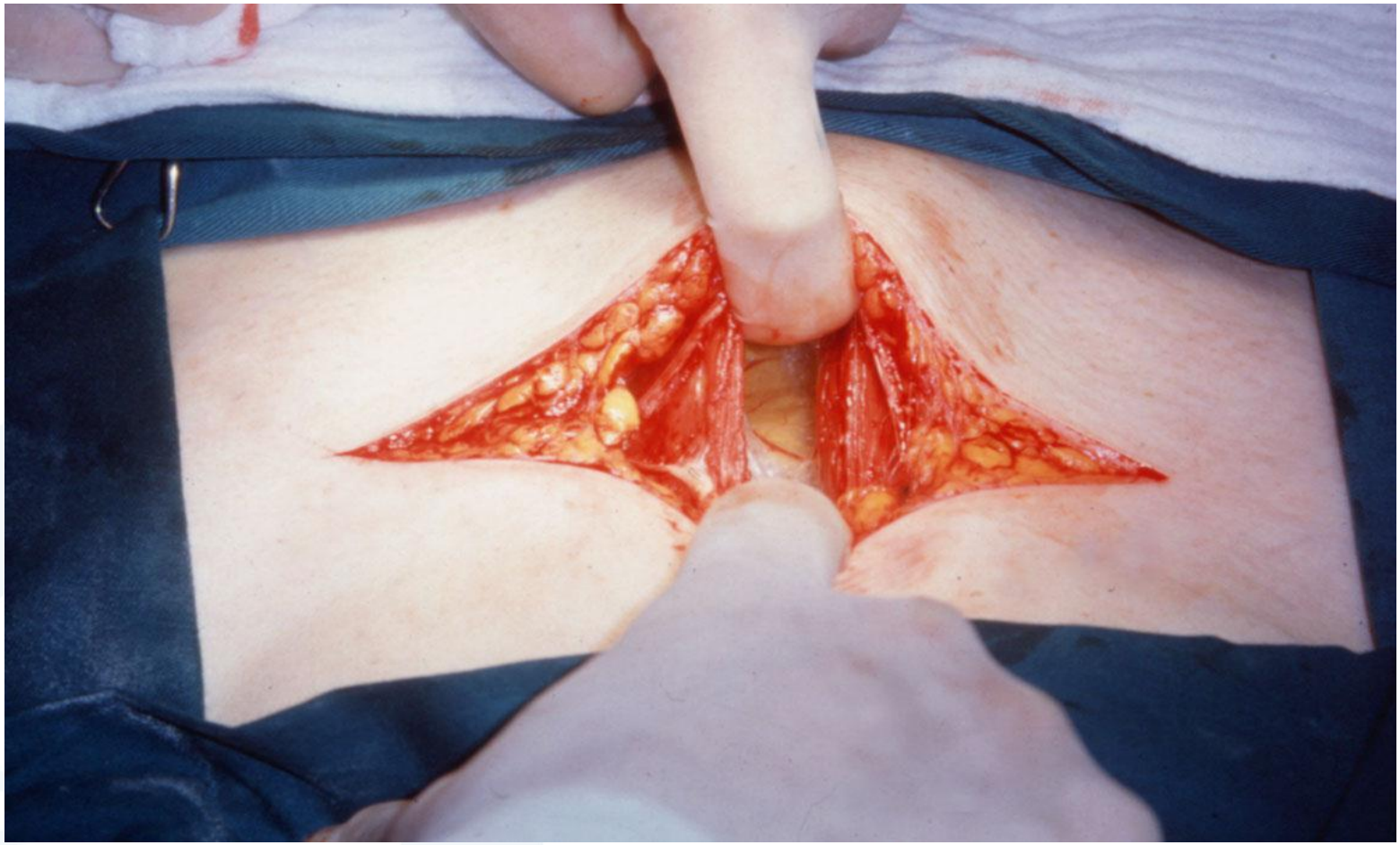
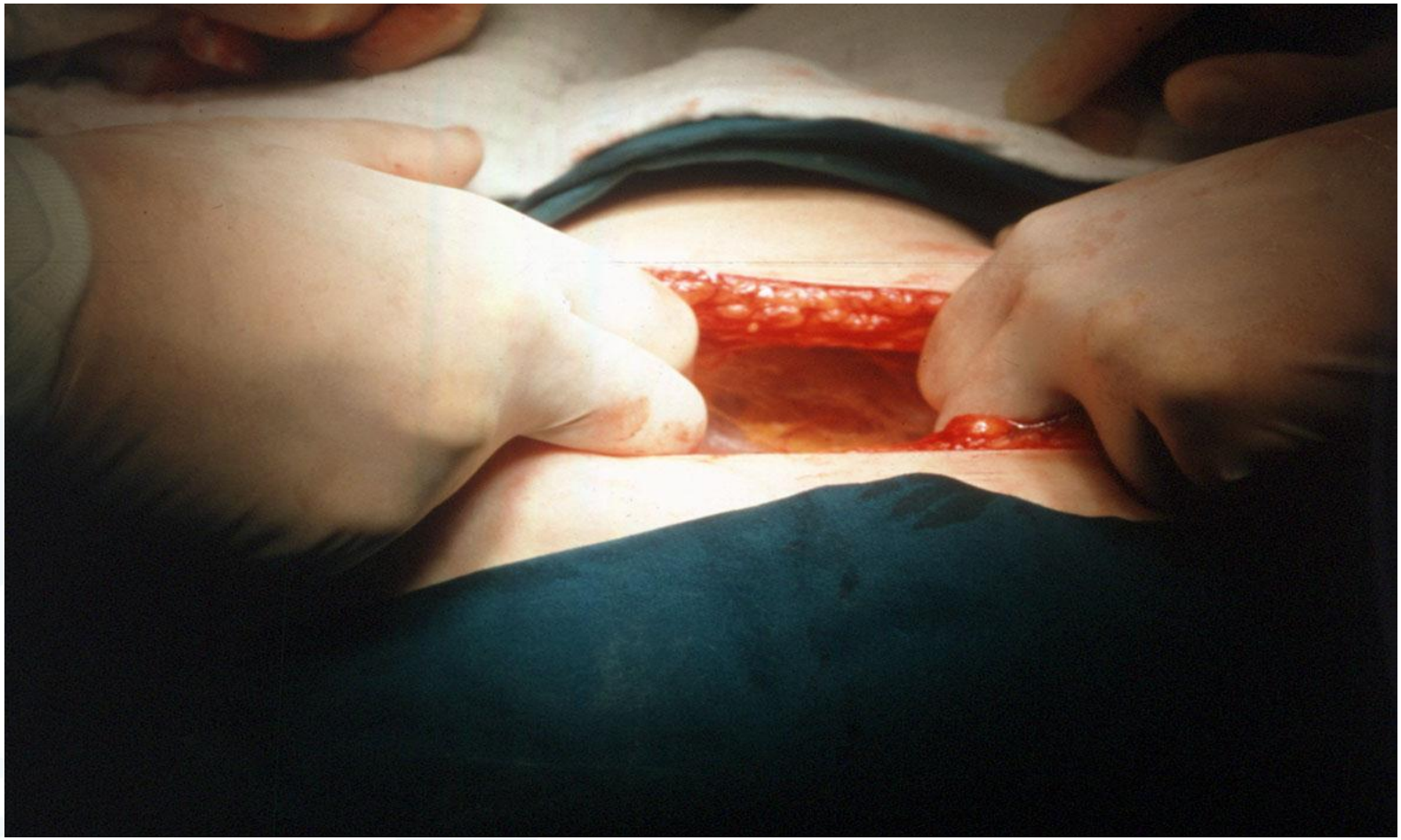


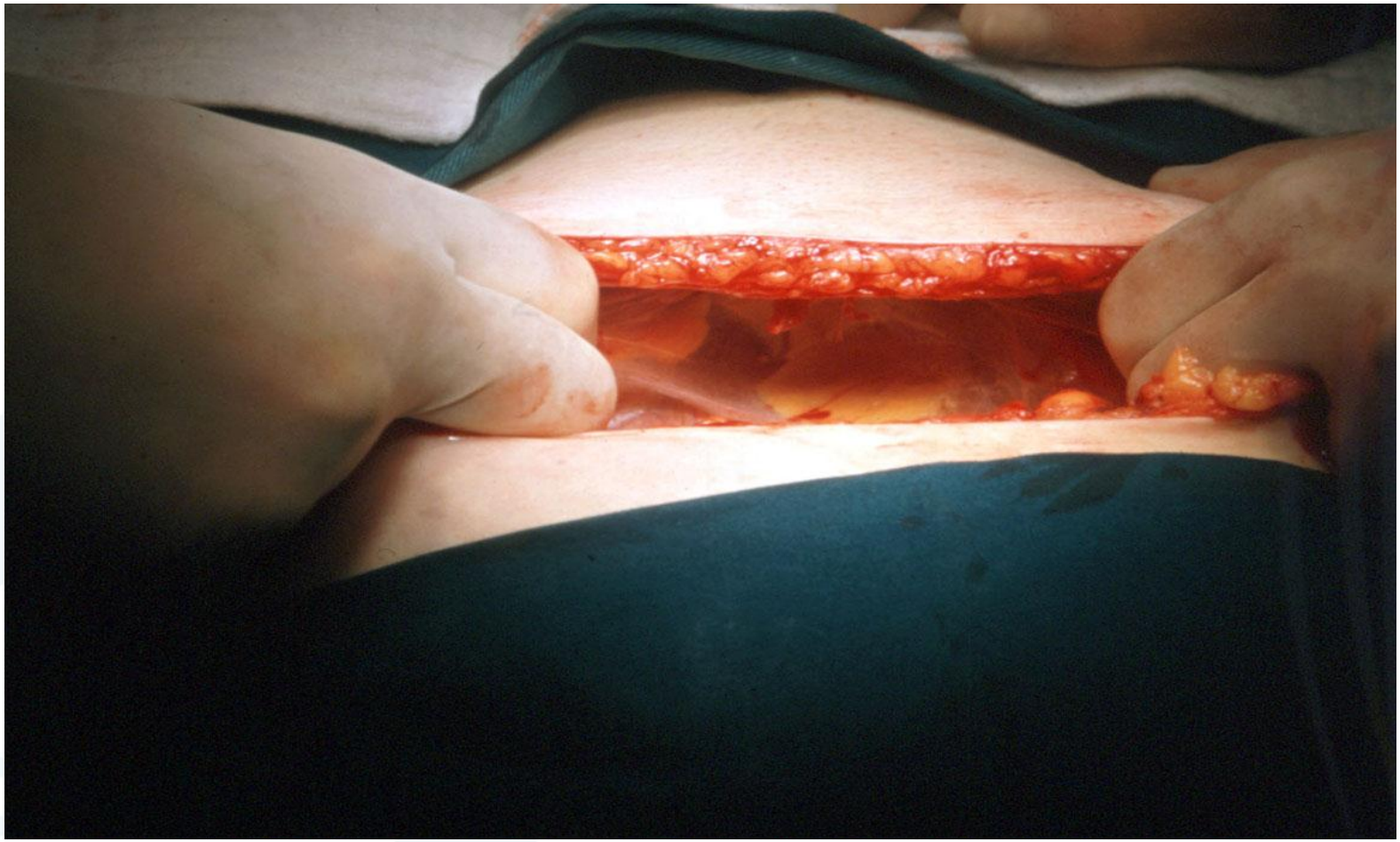


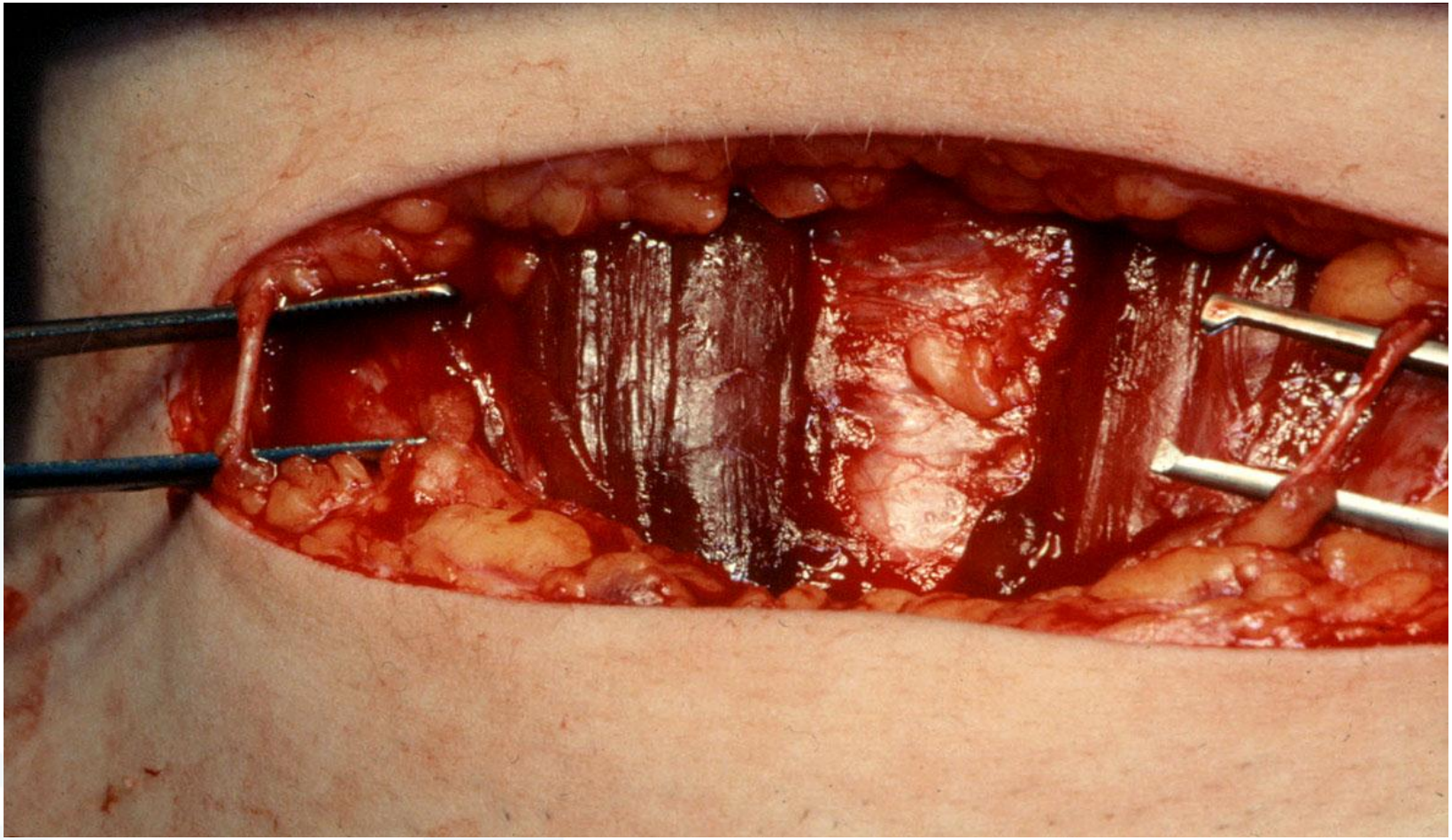


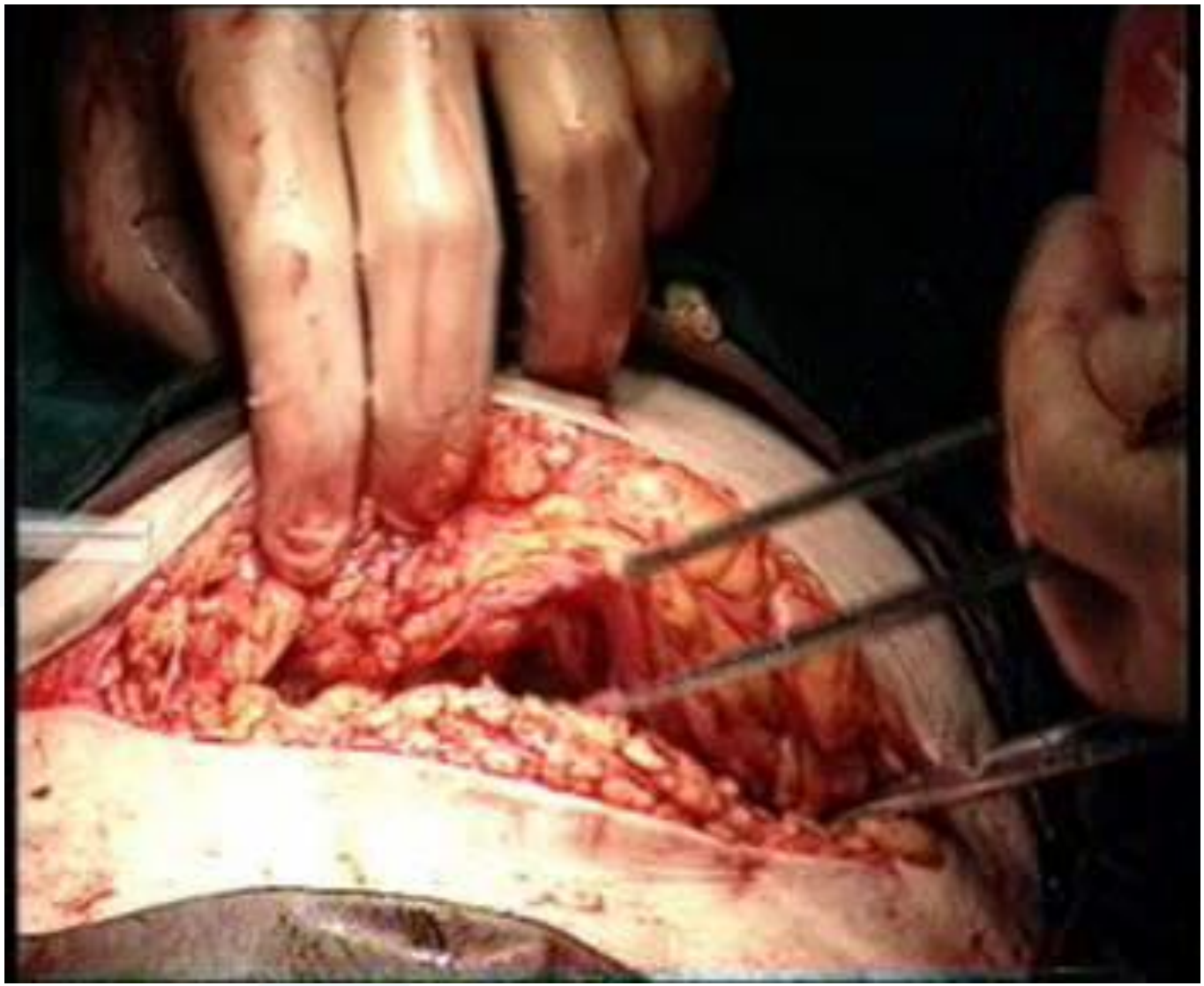




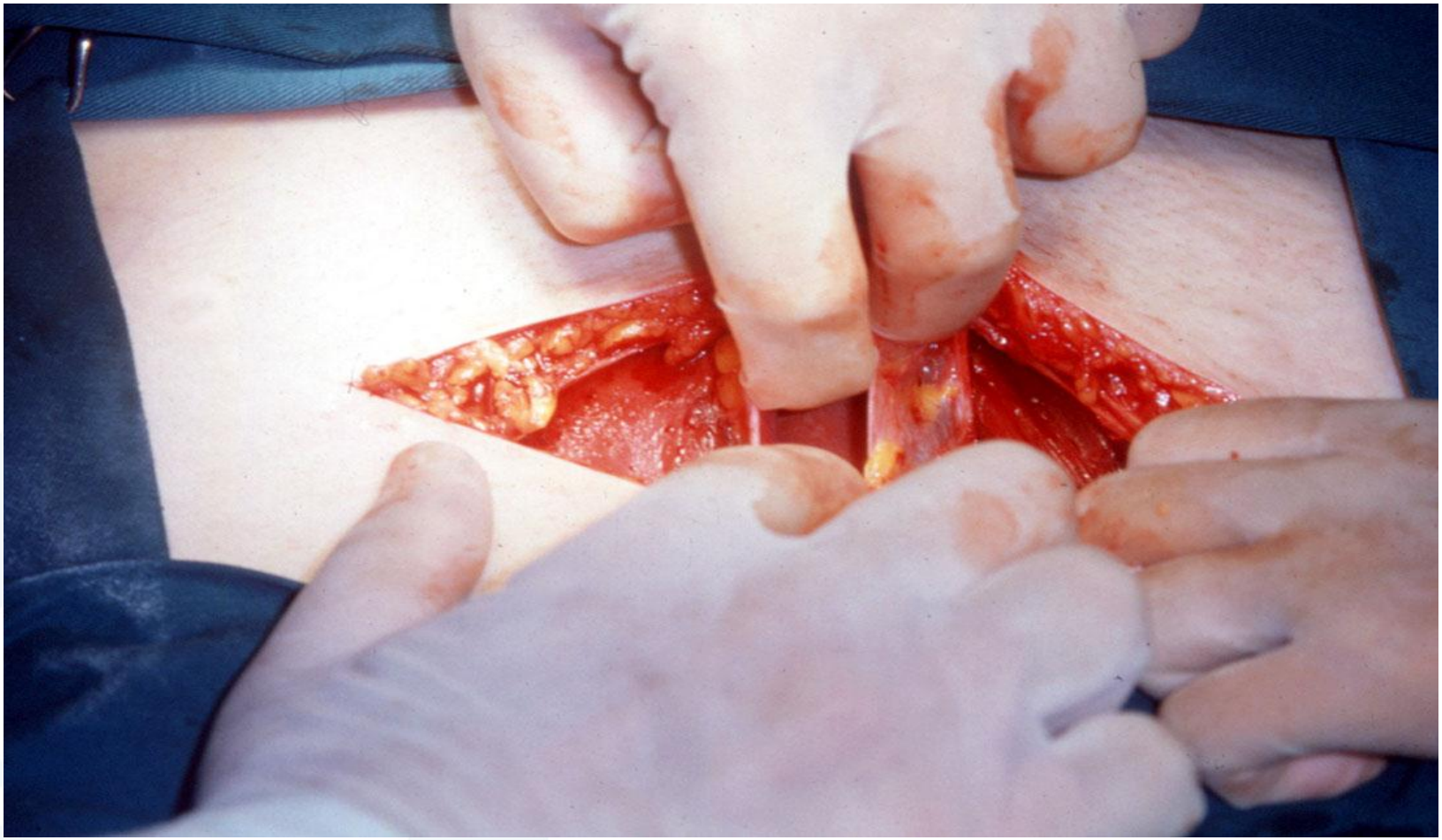








Opening peritoneum by bi-digital repeated stretching



In the era of ‘non-closure of the peritoneum’, how to open it? (Not every simple method is optimal, but every optimal method is simple)

Stark M, Acta Obstet Gynecol Scand, 2009, 88(1): 119.

NO SWABS ARE INSERTED INTO THE PERITONEAL CAVITY

- Fewer adhesions formed

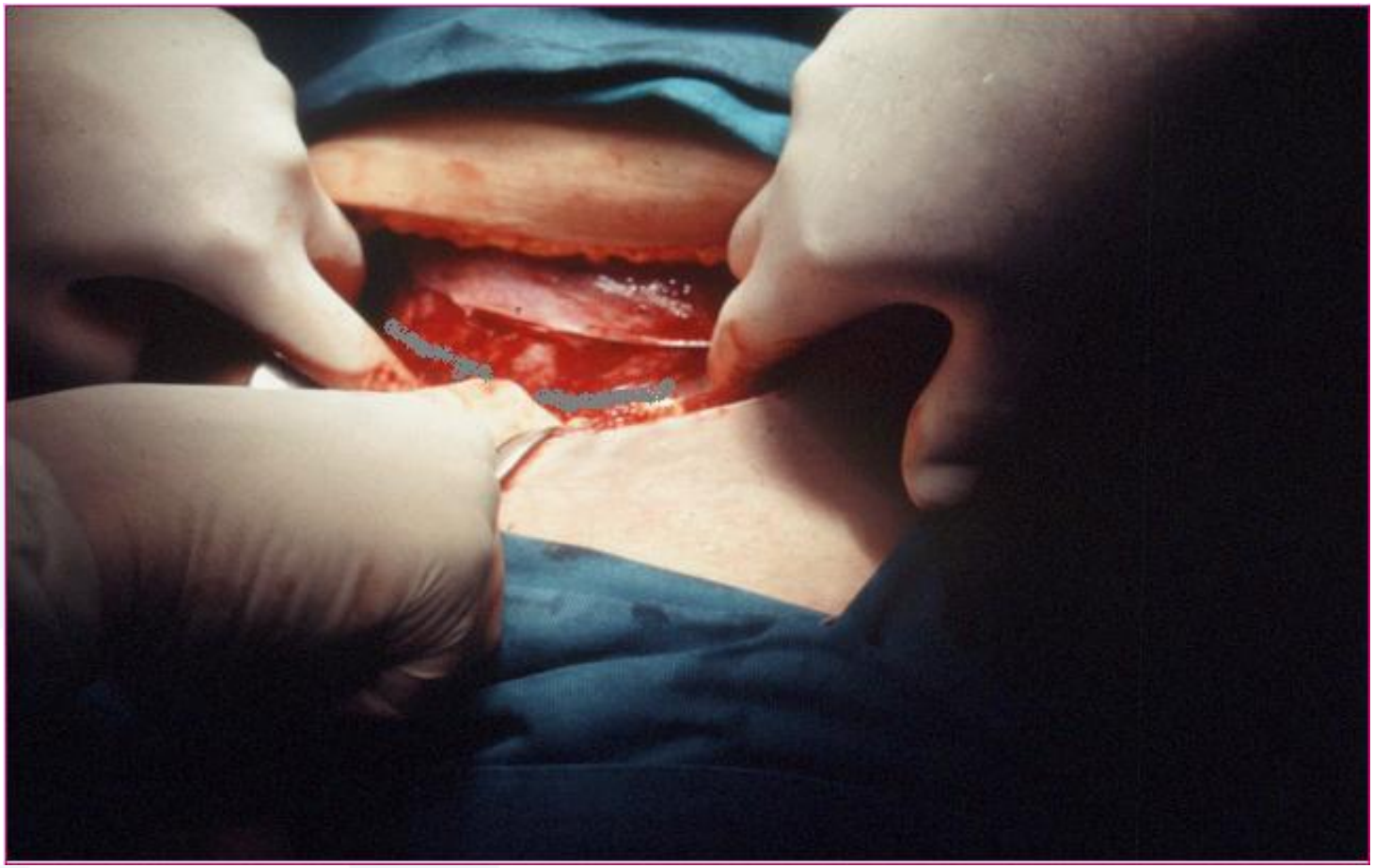
Why do surgical packs cause peritoneal adhesions ?

Down RH, Whitehead R, Watts JM. Aust N Z J Surg 1980; 50 (1): 83-85

- Enables bacteriostatic action of the amniotic fluid

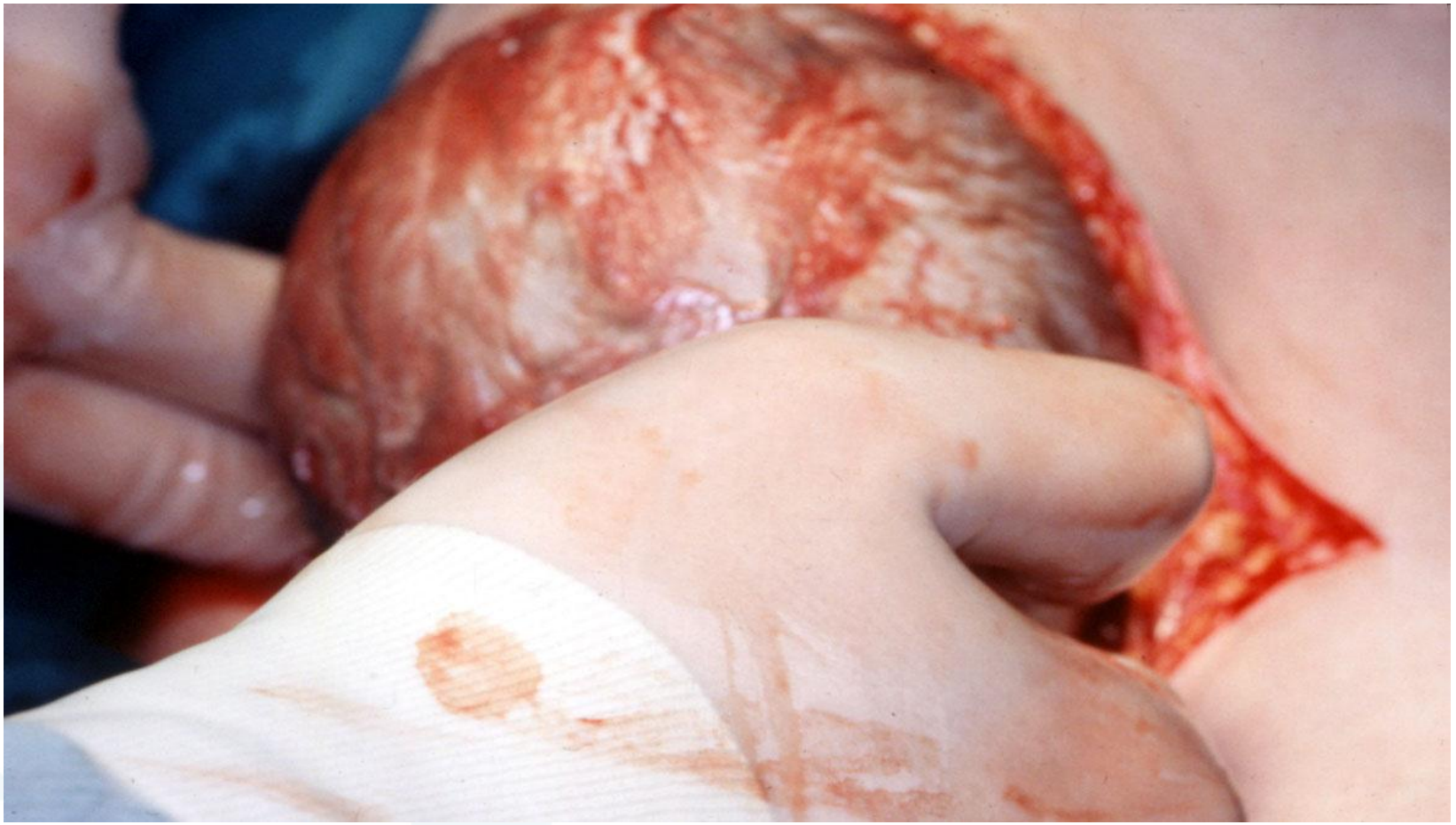
Enhancement of the antibacterial property of amniotic fluid by hyperthermia.

Larsen B, Davis B. Obstet Gynecol 1984; 63 (3): 425-429



Lower segment transverse incision (1924)

(J.M. Munro Kerr 1868 – 1960)



EXTERIORIZATION OF THE UTERUS AFTER DELIVERY...

Controversial, but:

- makes stitching easier
- prevents damage to abdominal organs while stitching
- enables manual contraction of the uterus, therefore less bleeding
- makes inspection of the ovaries easier

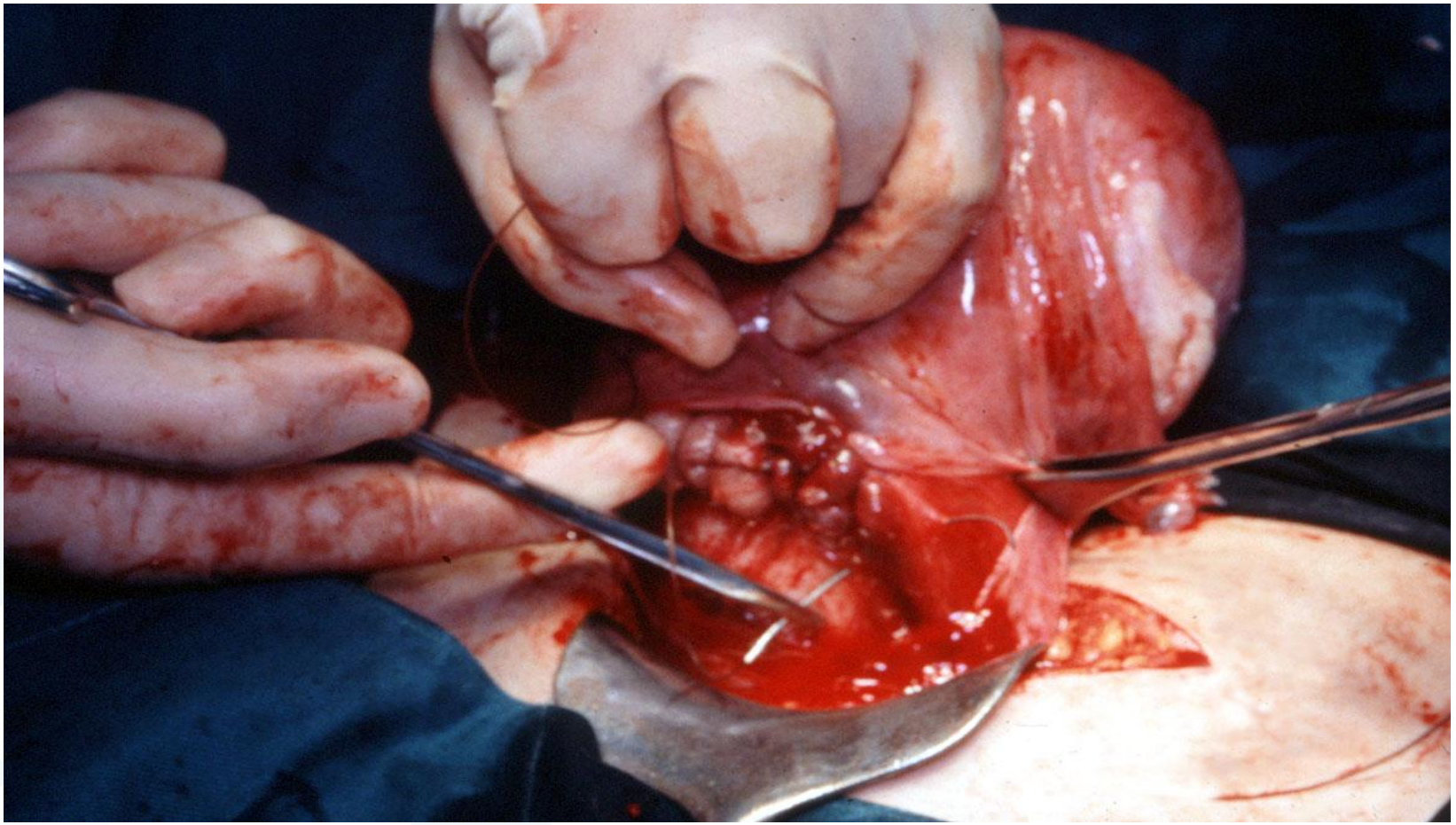
SUTURING THE UTERUS IN ONE LAYER...

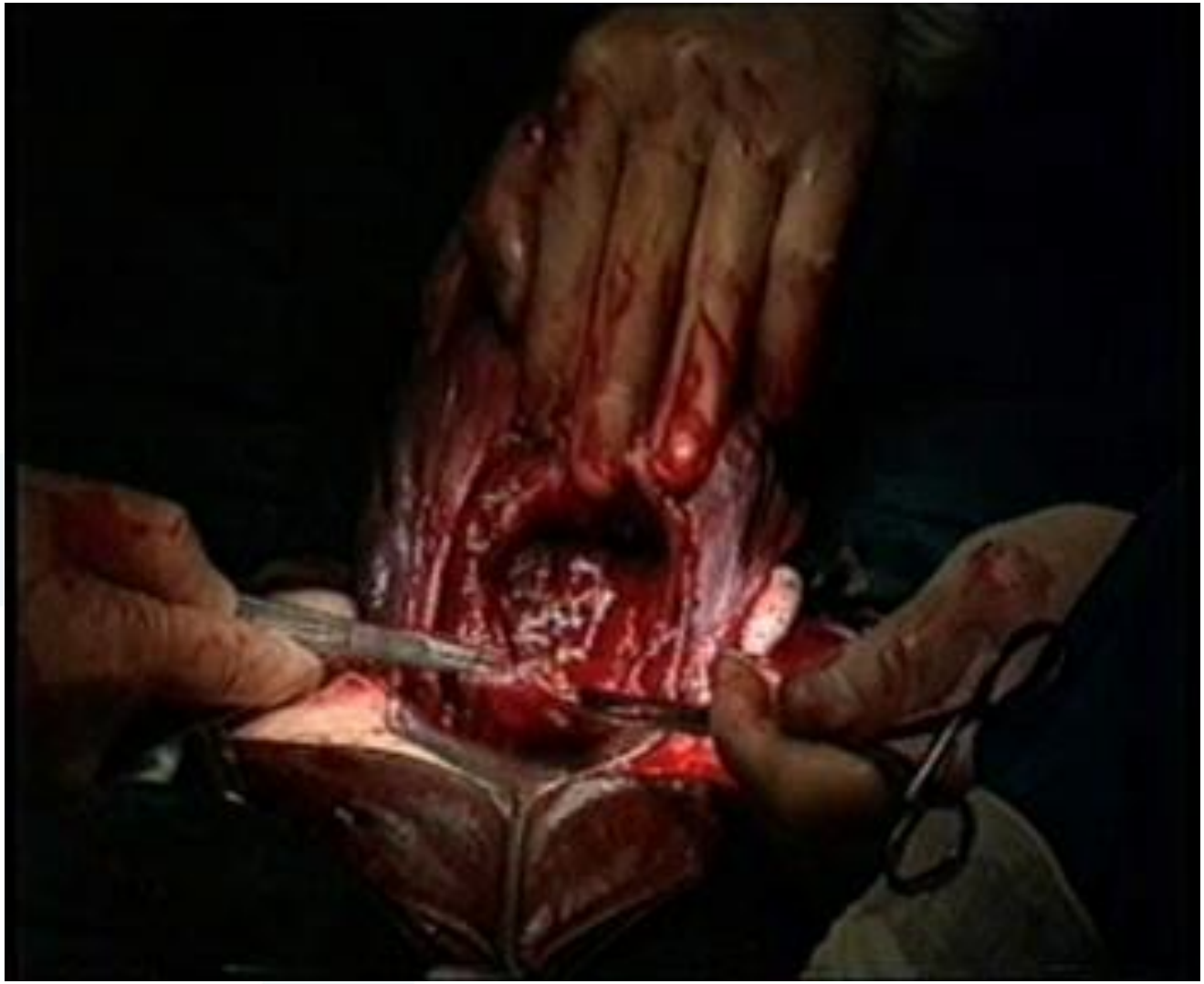
- causes less sacculations
- makes stronger scars

Csucs L, Kott I, Solt I. Zentralbl Gynäkol 1972; 94 (34): 1121-1126

Hauth JC, Owen J, Davis RO. Am J Obstet Gynecol 1992; 167 (4 Pt 1): 1108-1111

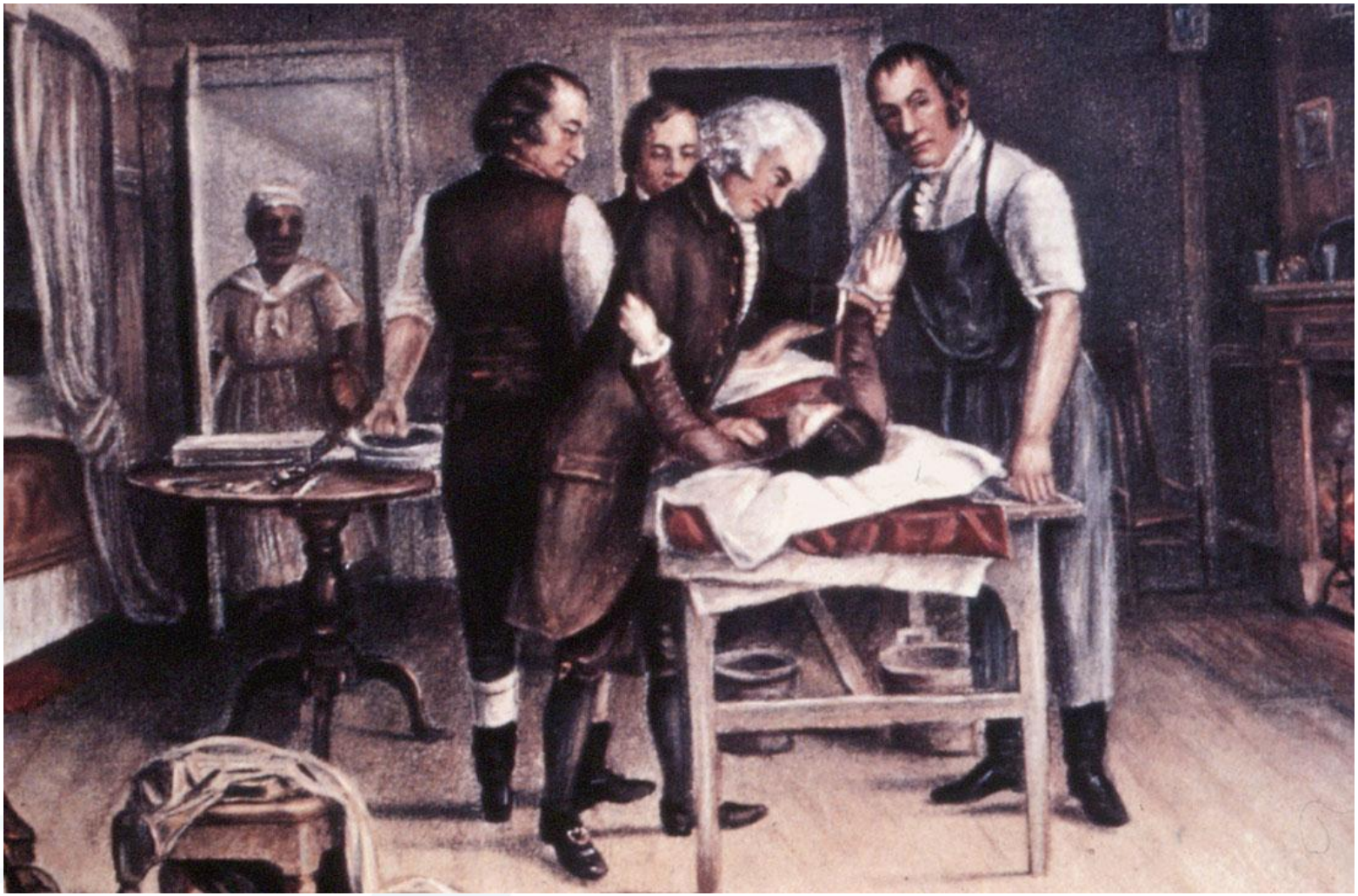
Jelsema RD, Wittingen JA, Vander Kolk KJ. J Reprod Med 1993; 38 (5): 393-396



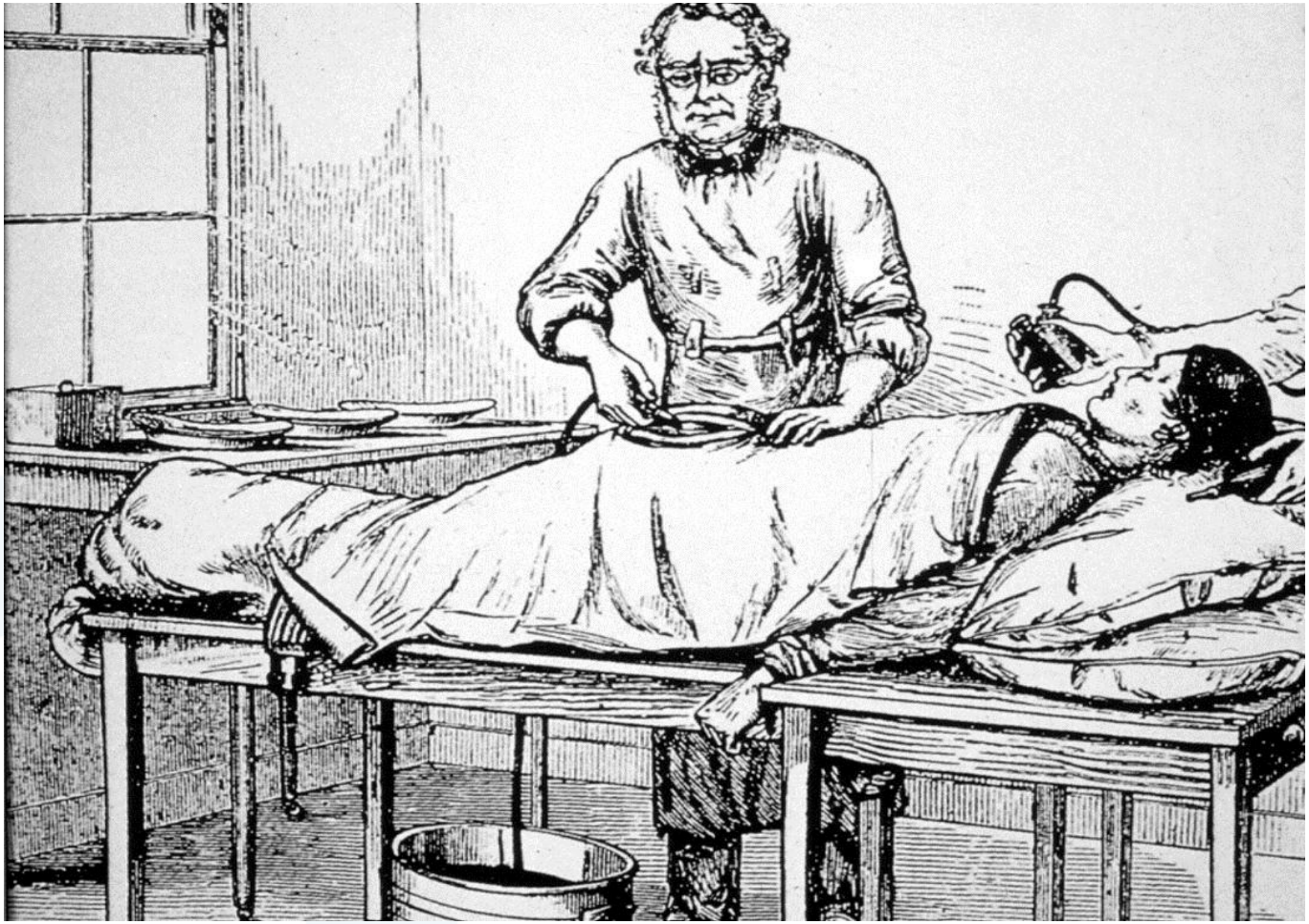


POSTOPERATIVE ANALGESICS REQUIREMENT (WITH MORPHINE ADMINISTERED EPIDURALY) (ONE SURGEON)

	No.	Doses	Duration (h)
Uterus sutured in one layer	15	2.3	12.1
Uterus sutured in two layers	19	3.1	22.2
		p=NS	p<0.1



Ephraim McDowell 1771 - 1830



Ether anaesthesia, started 16. October 1846
by William T.G. Morton (Boston, Massachusetts)

- Suturing the peritoneal layers is unnecessary
- Peritoneum does not heal by approximation of its edges
- New peritoneum is formed within 24 – 48 h from the coelum cells
- Sutures are providing focal points for adhesions

Ellis H. Internal overhealing: the problem of intraperitoneal adhesions. World J Surg 1980; 4: 303-306

ADHESIONS IN REPEATED OPERATIONS

	No.	Adhesions	%
Peritoneum previously left open	16	1	6.3
Peritoneum closed previously	147	35	23.8

Stark M. World J Surg 1993; 17 (3): 419

MOBILITY OF THE PLICA IN REPEATED OPERATIONS (C/S)

	No.	Plica mobile	%
Plica previously left open n = 108	16	7	58.3
Plica previously closed n = 349	29	9	31

Stark M, Burstein M, Kupfersztain C 1995.

Royal College of Obstetricians and Gynaecologists

Setting standards to improve women's health

Guideline No 15
Revised July 2002

PERITONEAL CLOSURE

Non-closure of the parietal peritoneum at caesarean section is recommended because it is associated with lower postoperative febrile morbidity and postoperative use of analgesics.

Non-closure of the visceral peritoneum at caesarean section is recommended because it is associated with significantly shorter operating time and postoperative hospital stay, as well as significantly lower postoperative febrile and infectious morbidity.

Visceral peritoneum suturing of women requiring CS for dystocia is associated to increased rate of blood collection in the vesico-uterine space, which could possibly explain the higher rate of puerperal complications in these patients.

Malvasi A, Tinelli A, Guido M, Zizza A, Farine D, Stark M. Should the visceral peritoneum at the bladder flap closed at cesarean sections? A post-partum sonographic and clinical assessment. J Matern Fetal Neonatal Med. 2010;23(7):662-9.

Incidence of significant adhesions at repeat cesarean section and the relationship to method of prior peritoneal closure

Adhesions grade 3 and 4 were found in 21 % of all repeat cesarean sections.

1/18 when Peritoneum was closed

17/40 when left open

(Fisher‘s exact probability = 0.003)

Myers SA, Bennett TL, J Reprod Med 2005; 50 (9): 659-62

Long-term outcomes of two different surgical techniques for cesarean

A total of **124 woman** were assessed at repeat cesarean section

Adhesions were found

- in **7 (11.3 %)** of women who underwent the **Stark CS**
- in **22 (35.5 %)** of women who had a **Pfannenstiel-Kerr CS**

(p = 0.0026; relative risk 3.14 [95 % CI, 1.45-6.82])

Nabhan AF, Int J Gynaecol Obstet. 2008; 100 (1): 69-75

Incidence of post-operative adhesions folowing Misgav Ladach caesarean section – A comparative study

Table III. Analysis of mean adhesion scores dependent on cesarean section method.

Cesarean section method	Adhesion score		
	Mean	SD	*p*-value
Misgav Ladach	0.43	±0.79	$p < 0.05$
Pfannenstiel-Dörffler	0.71	±1.27	
Misgav Ladach	0.43	±0.79	$p < 0.05$
Low midline laparotomy-Dörffler	0.99	±1.49	
Pfannenstiel-Dörffler	0.71	±1.27	$p = 0.0529$
Low midline laparotomy-Dörffler	0.99	±1.49	

SD: standard deviation.

Fatusic Z, Hudic I, J Matern Fetal Neonatal Med. 2009 22(2):157-60.

Effects of visceral peritoneal closure on scar formation at cesarean delivery

Table 2
Histologic characteristics of samples taken from serosa to mucosa on the low uterine segment scar[a]

Characteristic	Closure of VP (group 1, $n=54$)	Non-closure of VP (group 2, $n=58$)	P value[b]
Adhesions	31 (57.4)	12 (20.6)	<0.05
Mesothelial hyperplasia	28 (51.8)	8 (13.7)	<0.05
Fibrosis involving mesothelial stroma	26 (48.1)	4 (6.8)	<0.05
Neoangiogenesis of mesothelial stroma	24 (44.4)	7 (12)	<0.05

Abbreviations: VP, visceral peritoneum.

[a] Values are given as number of patients (percentage).

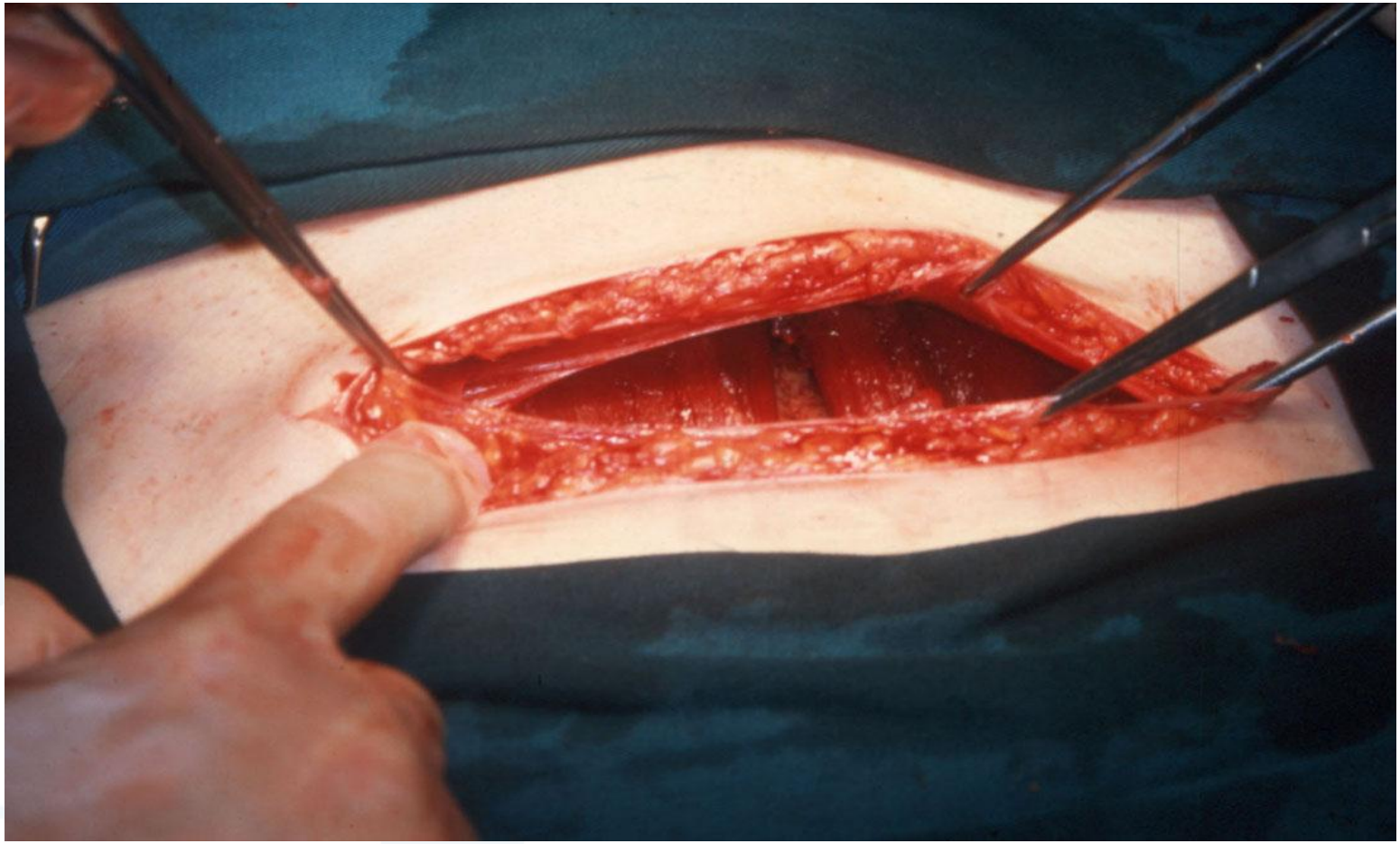
[b] For statistical analysis, differences among the percentages of positive patients were assessed using the χ^2 test.

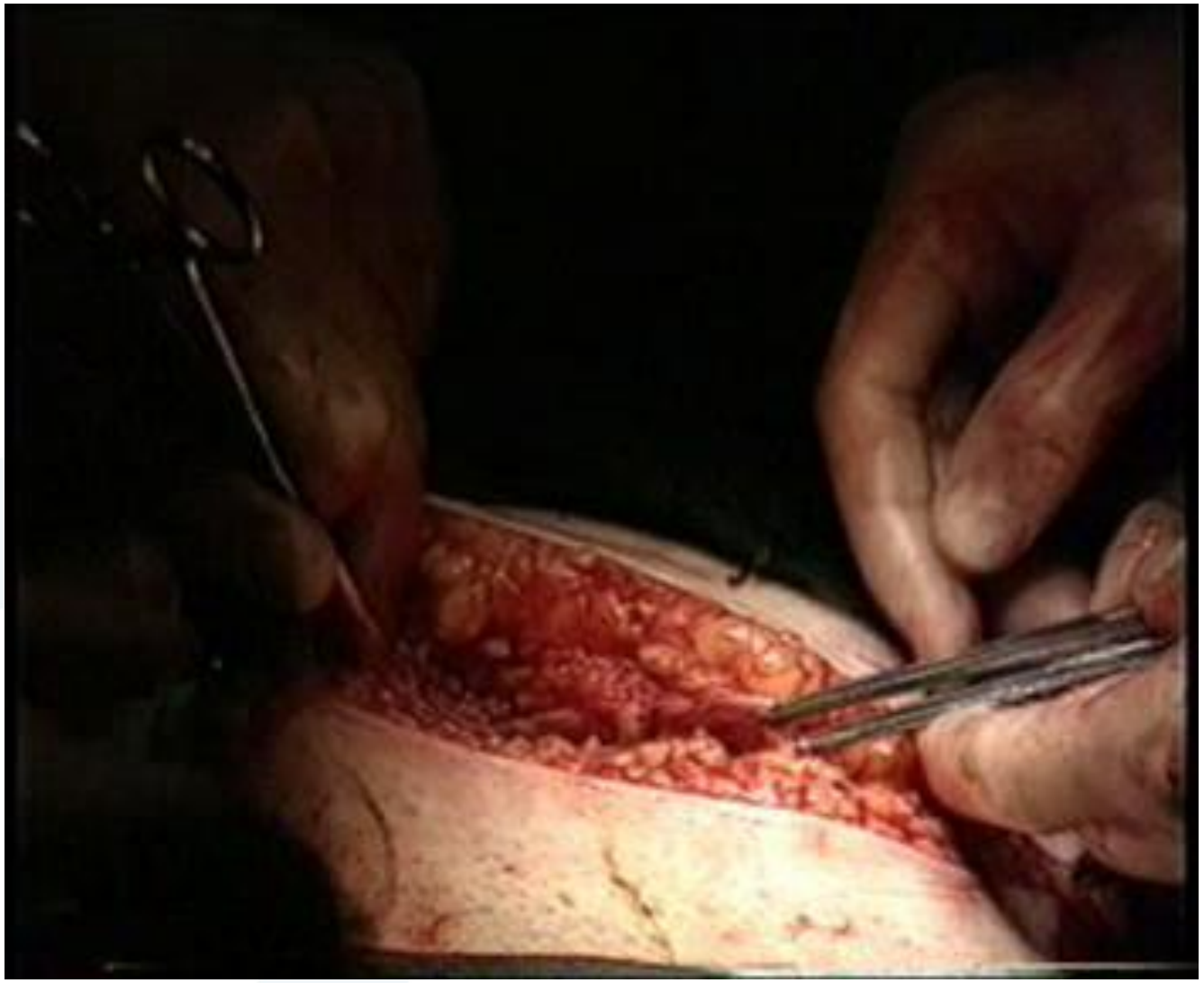
Malvasi A, Tinelli A, Farine D, Rahimi S, Cavallotti C, Vergara D, Martignago R, Stark M, Int J Gynaecol Obstet 2009 Feb 19

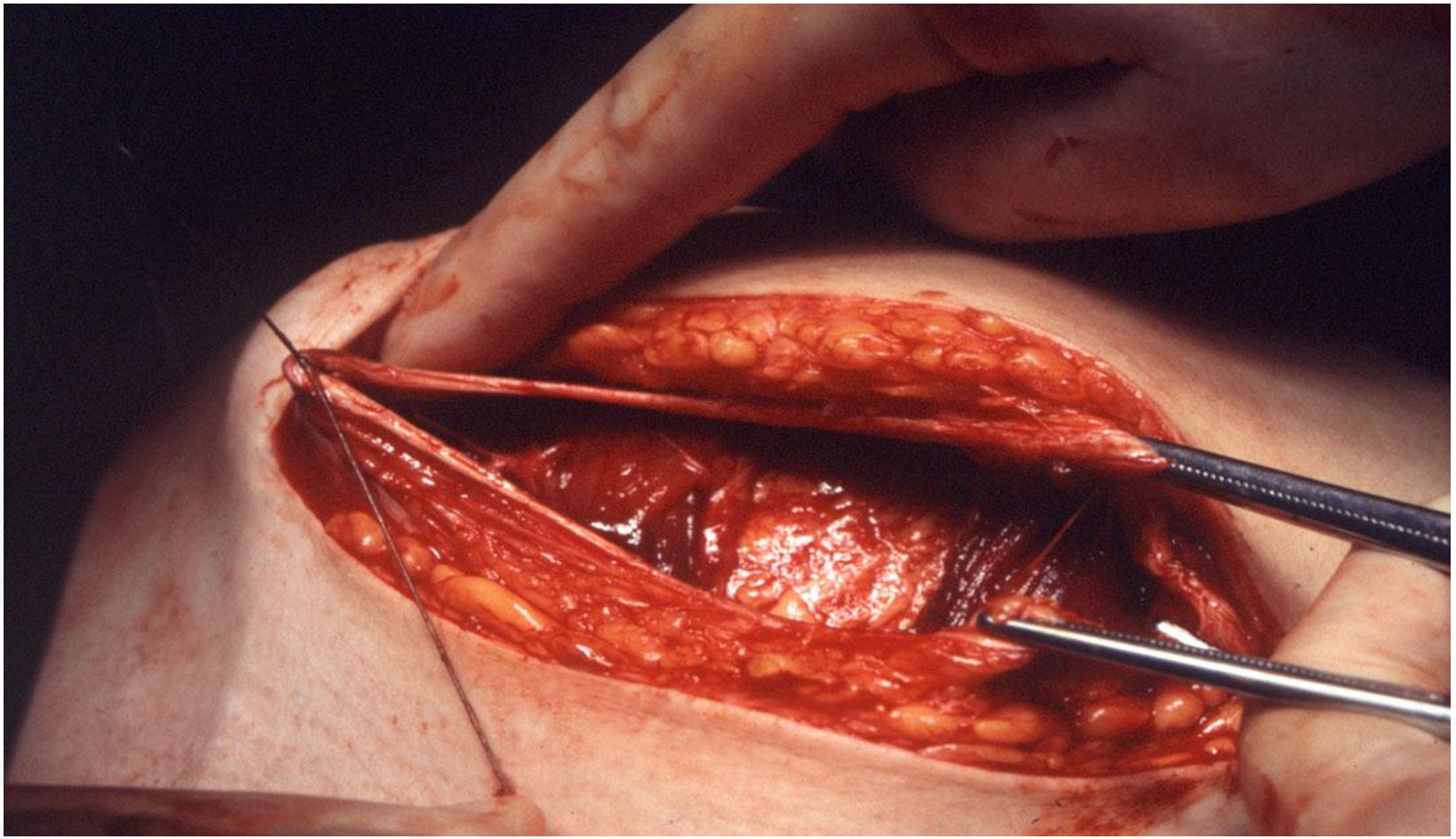
Post-cesarean adhesions - Are they a unique entity?

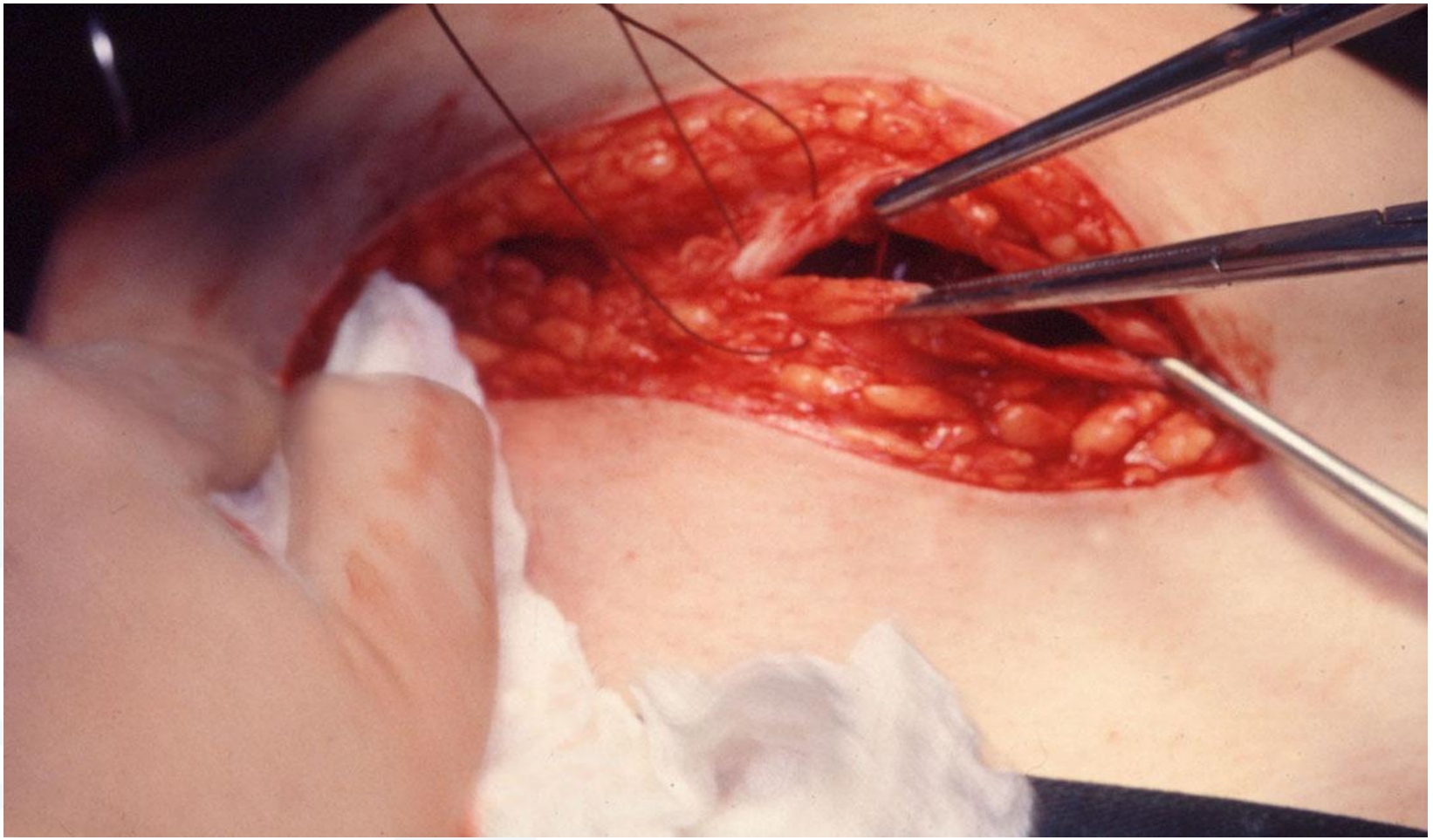
No correlation was found between the clinical symptoms after caesarean sections and the operative findings in the following one regarding abdominal pains, urinary symptoms, dyspareunia or dysmenorrhea.

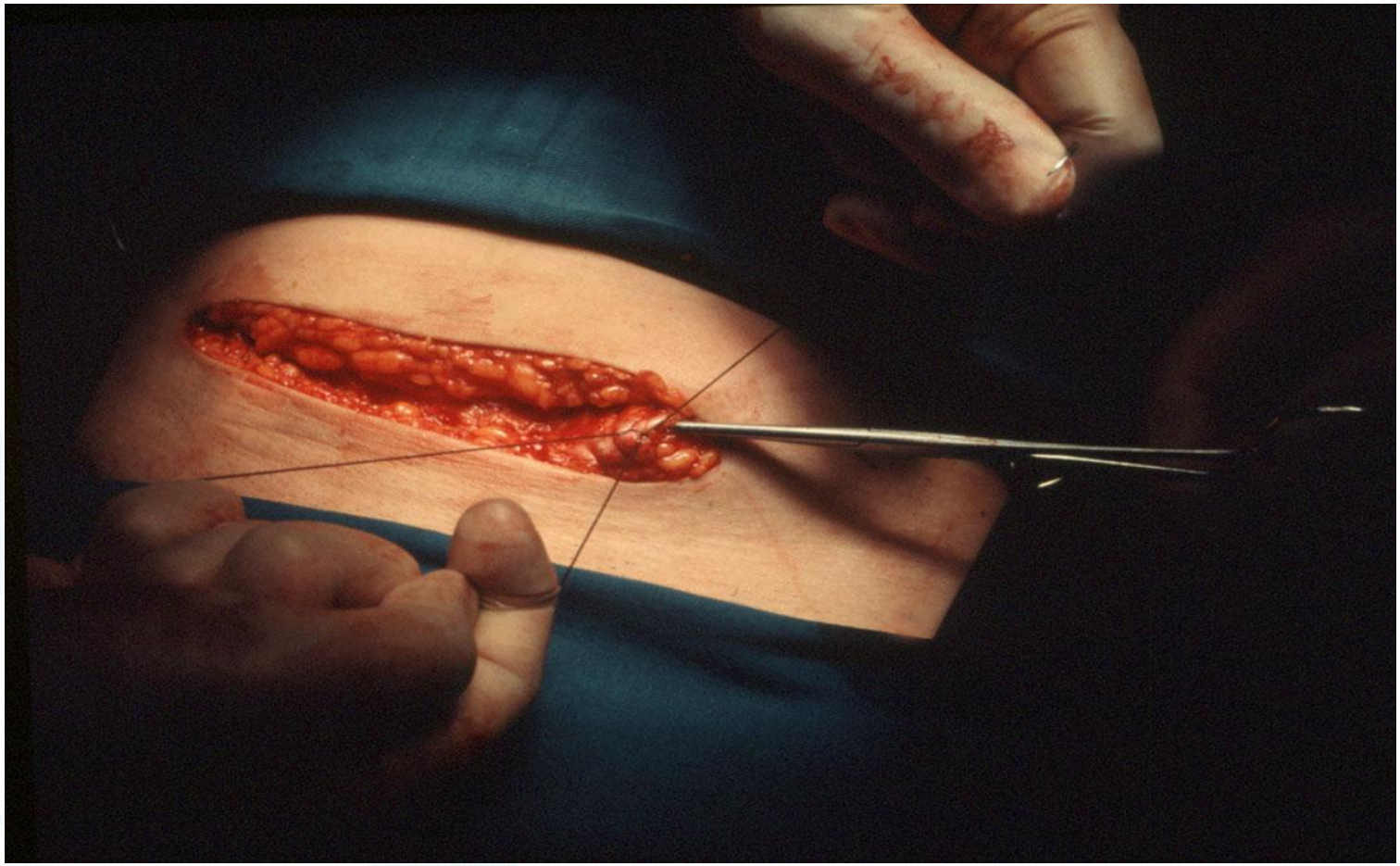
Stark M, Hoyme UB, Stubert B,Kieback D, Di Renzo GC, J Matern Fetal Neonatal Med (2008) 21(8):513-6.

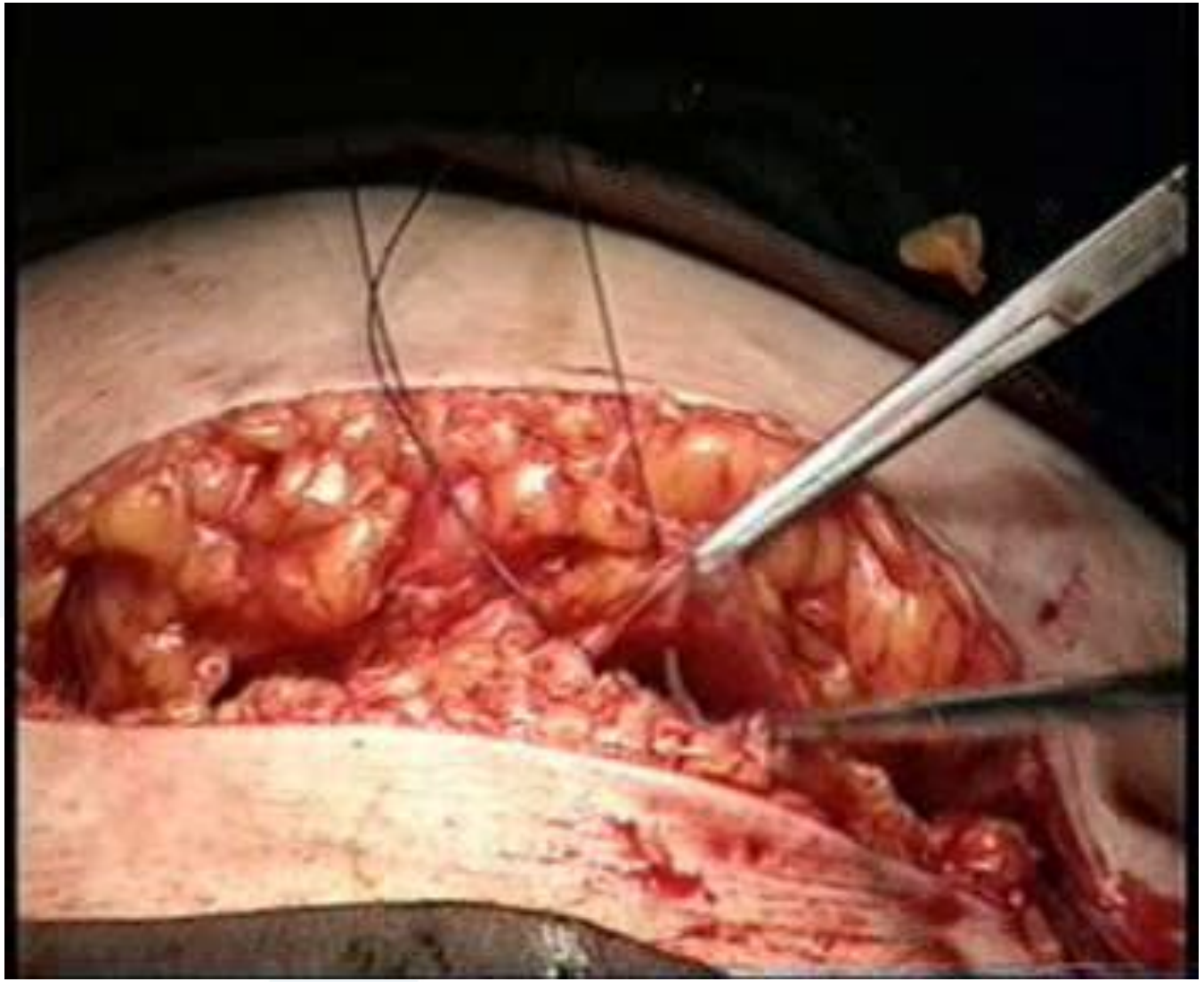






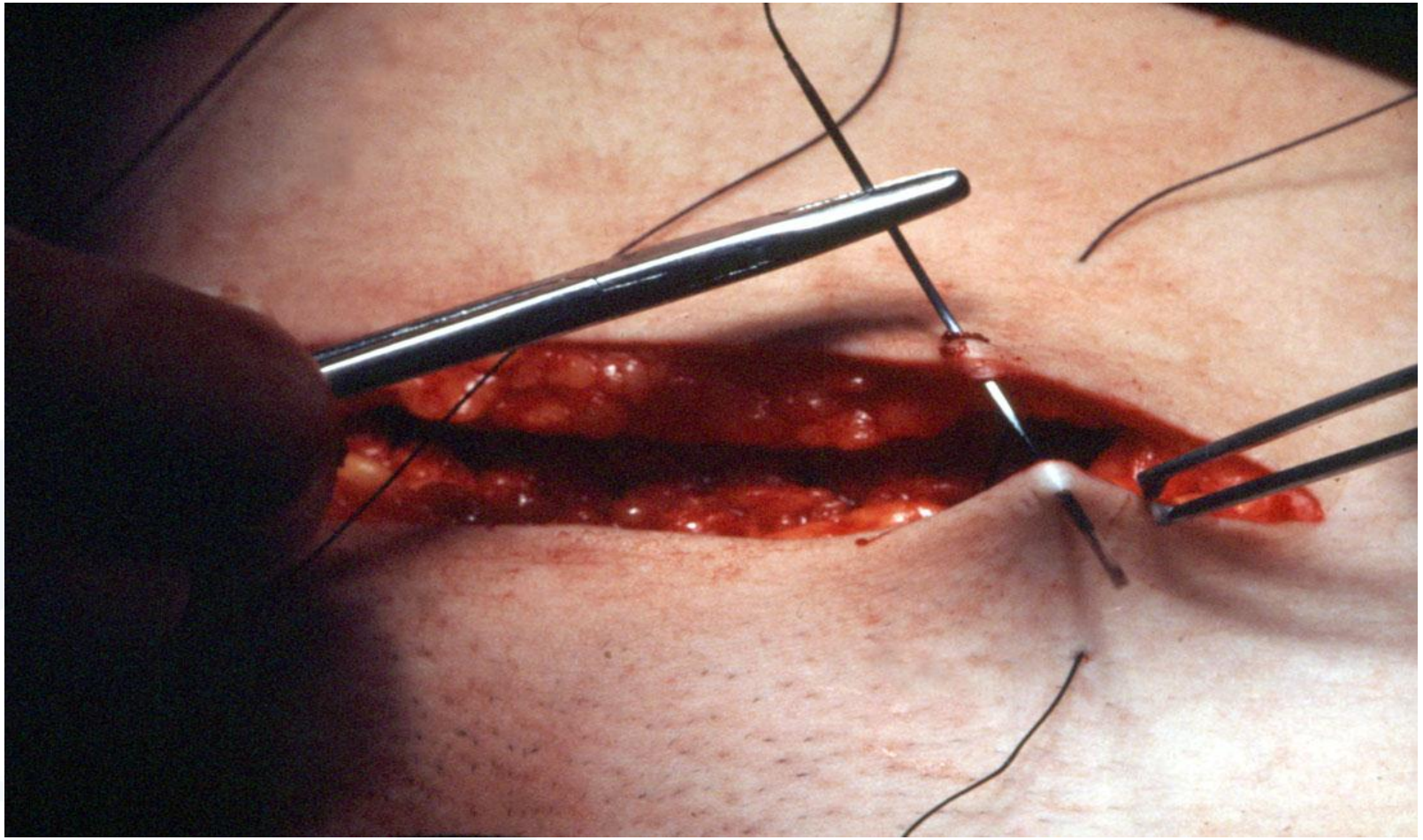


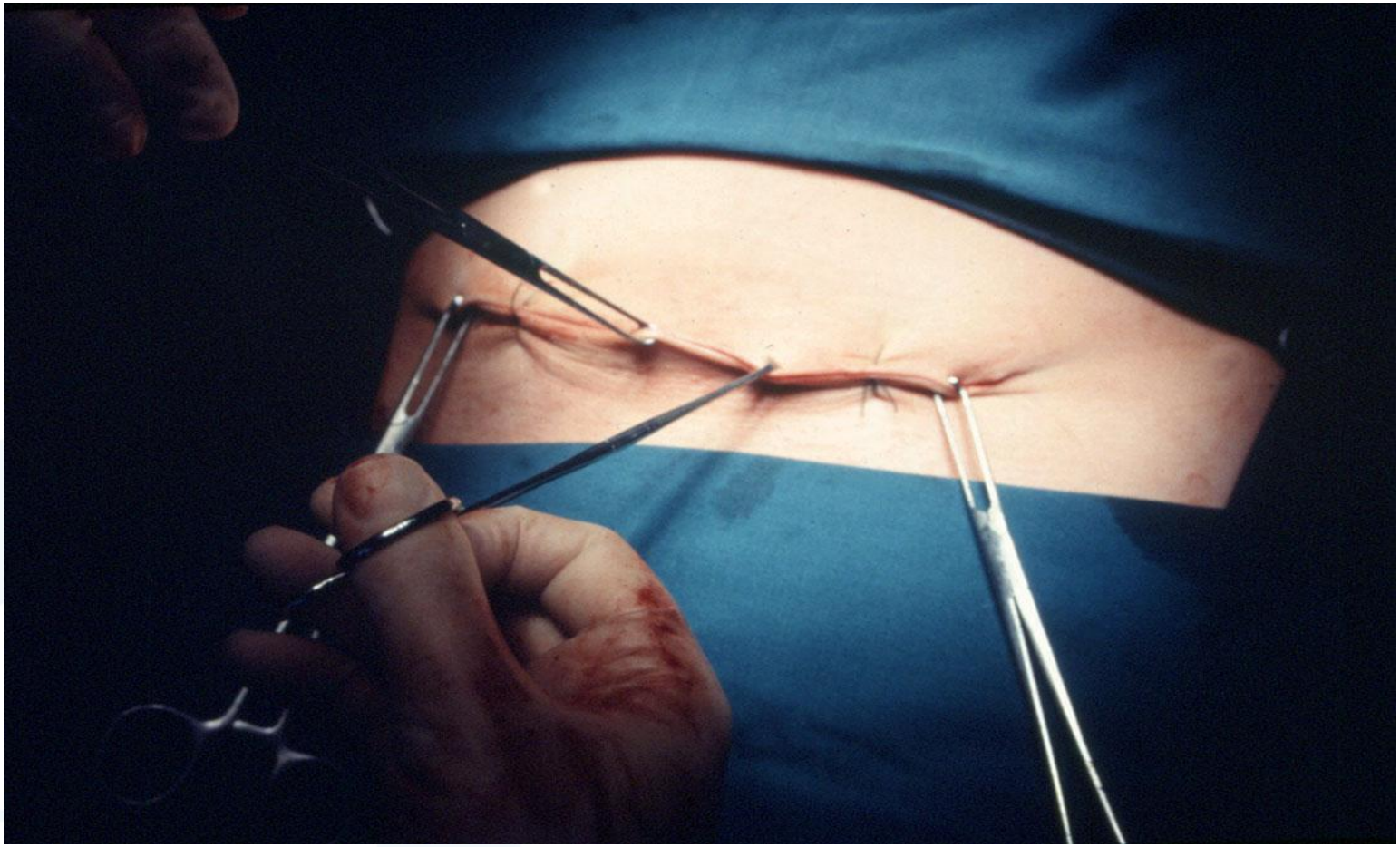


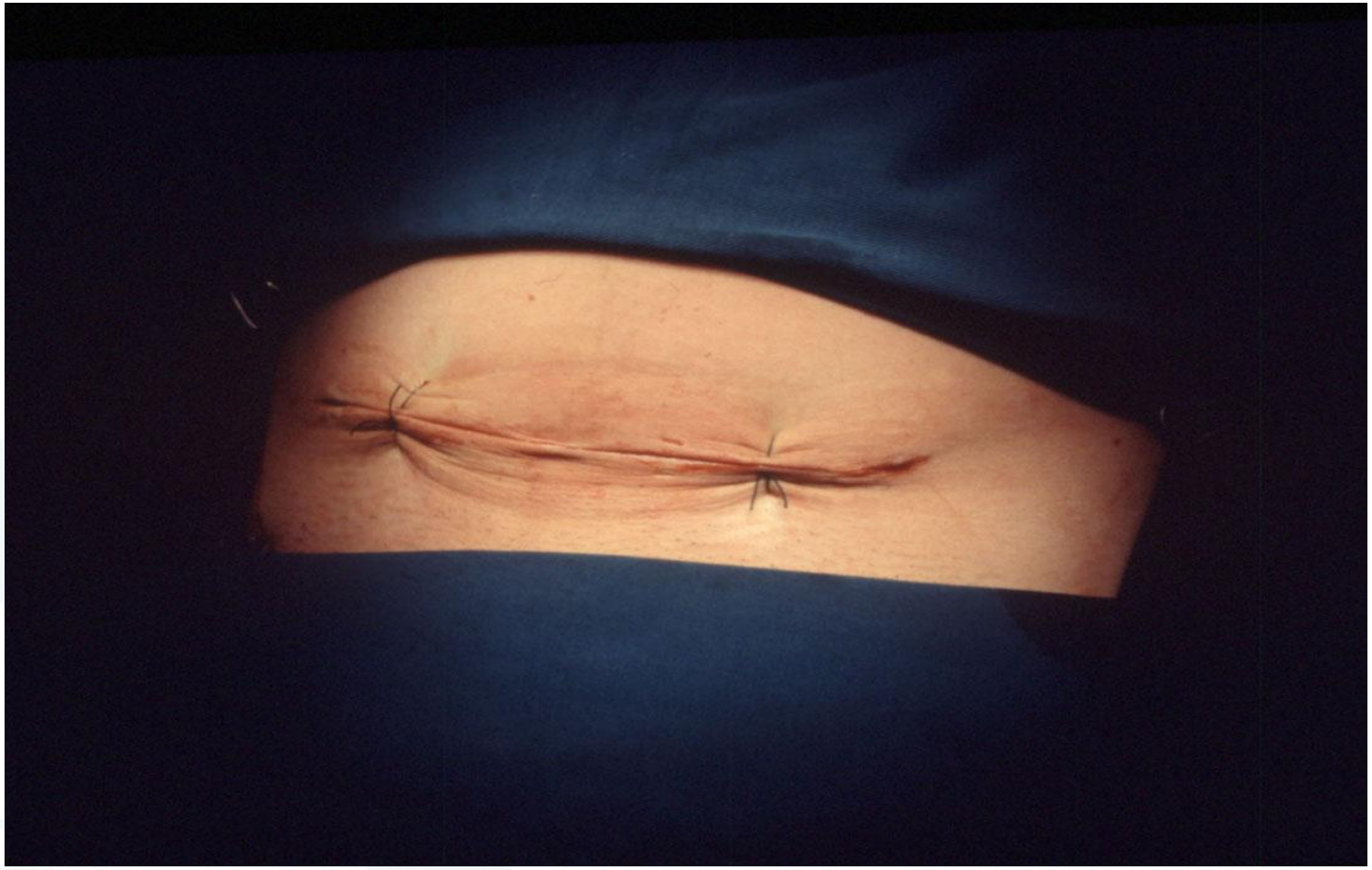


WIDELY SPACED SKIN SUTURES CAUSES...

- less seromas
- less hematomas
- therefore less post-operative pain and fever







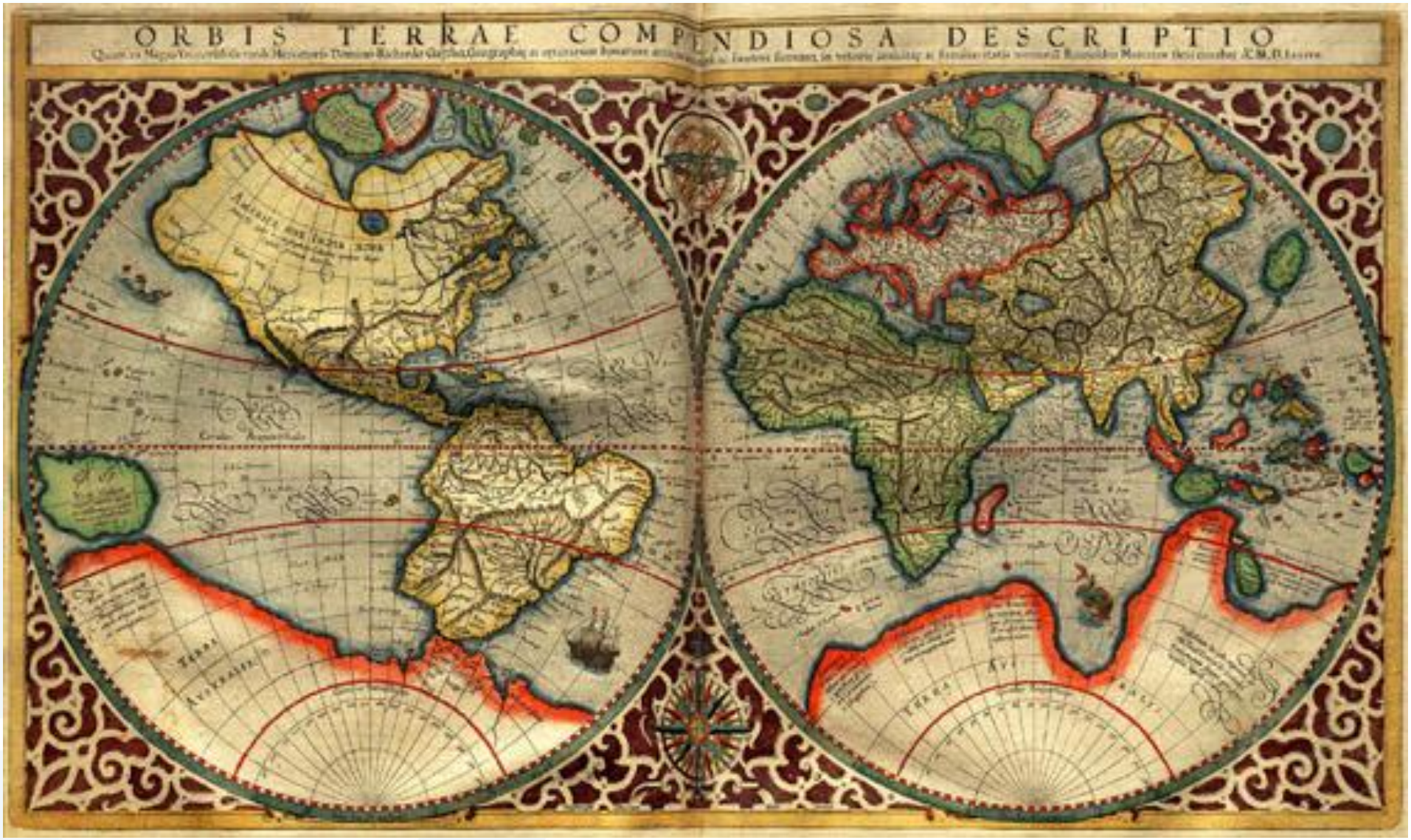
Cesarean section, techniques and skin suture materials

Following Caesarean section according to Stark, skin suture with 2-OCA glue has the advantage of **greater patient compliance**.

Intradermal suturing is **less costly,** and **cosmetic outcome** similar to intradermal or clips.

Croce P, Frigoli A, Perotti D, Di Mario M. Minerva Ginecol. 2007 Dec; 59(6): 595-9.

- The Misgav Ladach Caesarean Section was introduced in 1994 during the Montréal FIGO World Congress.
- Then, printed material and videos of this method were distributed by the University of Uppsala (Unit for International Child Health – ICH) in more than 100 countries

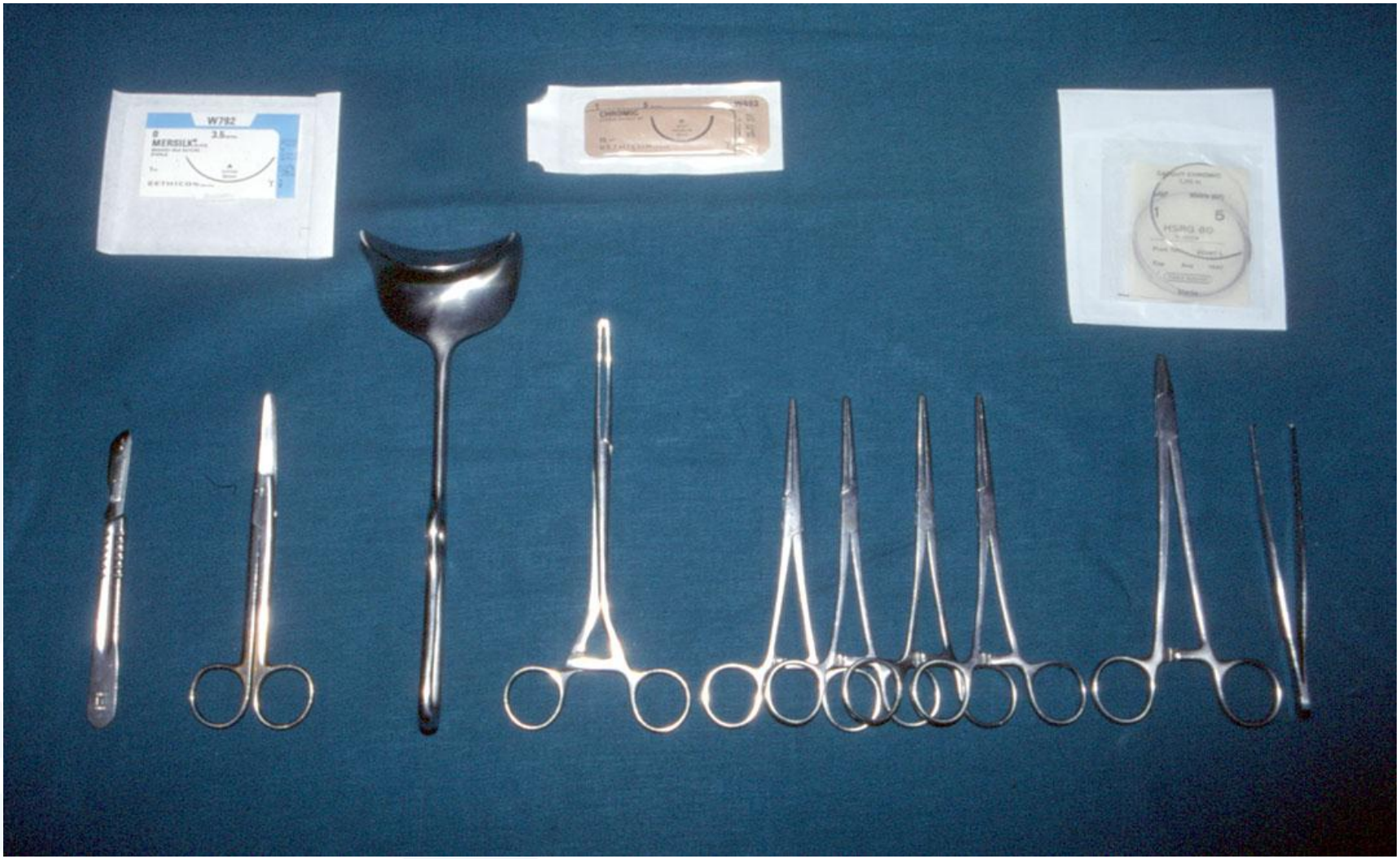

ORBIS TERRAE COMPENDIOSA DESCRIPTIO

- Lectures and surgical courses were held by medical staff members of the Misgav Ladach Hospital and the NESA in 37 countries
- There was very good acceptance, due to…

Immediate postoperative oral hydration after caesarean section

„It is concluded that immediate postoperative oral rehydration had no harmful effect upon peristalsis post-caesarean section.“

Guedj P, Eldor J, Stark M Asia Oceania J Obstet Gynaecol. 1991 Jun; 17(2): 125-9.


W792
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THE MISGAV LADACH METHODE FOR CESAREAN SECTION COMPARED TO THE PFANNENSTIEL METHOD

	Misgav Ladach	Traditional	p
Duration of operation (min)	12.5	26	< 0.001
Estimated blood-loss (ml)	448	608	0.017
Dosage of analgetics (injections)	4.2	5.4	0.017
Average Hospital Stay (days)	4	4	N.S.

Darj E, Nordström ML. Acta Obstet Gynecol Scand 1999; 78: 37-41

STUDY ON MODIFICATION OF THE MISGAV LADACH METHOD FOR CESAREAN SECTION

	Misgav Ladach	Traditional	Significance
No. of cases	57	56	
Average delivery time (min)	3.6	5.7	$P < 0.05$
Median operating time (min)	27.5	28.3	$P < 0.05$
Average blood loss (ml)	128 ± 35	212 ± 147	$P < 0.05$

Li, M, Zou L, Zhu J. J Tongji Med Univ 2001; 21 (1): 75-77

POST-OPERATIVE COURSE, COMPLICATIONS AND ANTIBIOTICS GIVEN, BY CESAREAN SECTION METHOD

	Stark n	Traditional n	Significance x^2	p
Post-operative course				
Normal / complicated	133/36	132/38	0.055	0.815
Complications				
Wound infection and / or Febrile illness	27	29	0.072	0.788
Wound infection only	5	13	3.148	0.076
Febrile illness only	1	6	-	0.121*
Wound infection and Febrile illness	21	10	4.318	0.311
Antibiotics				
Given intra-operatively	10	24	6.418	0.011
Given post-operatively	5	8	0.702	0.402
Antibiotics given intra and/or post-operatively†	14	29	5.901	0.015

* Fisher`s exact test (2-sided)

† One patient in the ML group and three in the LMI group were treated both intra and post-operatively with antibiotics.

Björklund K, et al. British Journal Obst Gyn 2000; 107 (2): 209-216

POST-OPERATIVE MOBILIZATION AND DISCHARGE OF PATIENTS WITH OR WITHOUT POSTOPERATIVE COMPLICATIONS, BY CESAREAN SECTION METHOD

Post-operative course	Stark Mean (SD)	Traditional Mean (SD)	Mean difference	95% CI
Uncomplicated				
Mobilization (h)	26.1 (6.6)	42.8 (10.5)	-16.7	-18.4; -14.6
Discharge (days)	5.7 (0.9)	6.6 (0.9)	-0.9	-1.1; -0.7
Complicated				
Mobilization (h)	33.5 (14.1)	47.0 (14.2)	-13.5	-20.0; -6.9
Discharge (days)	8.3 (2.0)	8.7 (1.9)	-0.4	-1.3; -0.54

Björklund K, et al. British Journal Obst Gyn 2000; 107 (2): 209-216

	Stark C/S (n = 100)	Traditional C/S (n = 100)	p
Duration of operation (min)	27.2 ± 5.7	50.7 ± 7.9	0.001
Estimated blood-loss (ml)	510.5 ± 338.1	479.5 ± 310.9	N.S.
Average hospital stay (days)	5.2 ± 0.6	7.3 ± 1.0	0.001
Febrile morbidity (%)	9	13	N.S.
Dosage of pain killers	0.52	1.17	
Dehiscence of wound (%)	2	1	N.S.
Infection at operation Site (%)	6	8	N.S.

Federici D, et al. Int J Gynaecol Obstet 1997; 57 (3): 273-279

COMPARISON OF TWO CESAREAN TECHNIQUES: CLASSIC VS. MISGAV LADACH

	Misgav Ladach	Traditional	Significance
No. of cases	200	200	
Average delivery time (min)	5.26	6.20	P < 0.05
Median operating time (min)	36.36	54.38	P < 0.05
Direct operation cost (caculated in €)	75	92	P < 0.05

Moreira P, et al. J Gynecol Obstet Reprod (Paris) 2002; 31 (6): 572 – 576

PROSPECTIVE, RANDOMIZED, COMPARATIVE STUDY OF MISGAV LADACH VS. TRADITIONAL CESAREAN SECTION

	Misgav Ladach	Traditional	Significance
No.	80	80	
Median operating time (min)	20.4 (SD 6.1)	30.4 (SD 6.1)	P < 0.001
No. of Pethidine Amp.	1.3 (SD 0.6)	1.9 (SD 0.7)	P < 0.001
No. of Tablets of Ibuprofen	15.1 (SD 2.0)	16.4 (SD 1.8)	P < 0.001
Visual analogue Scale Score	3.0 (SD 1.5)	4.9 (SD 2.0)	P < 0.01

Ansaloni L, et al. World J Surgery 2001; 25 (9): 1164-1172

Modified Misgav Ladach Method for Cesarean Section: Clinical Experience

	Misgav Ladach	Traditional	Significance
No.	217	153	
Febrile morbidity (%)	2.30	4.57	P = 0.001
Wound infection (%)	0.92	1.96	P = 0.01
Operation time (min.)	26.24	39.41	P < 0.001
Anemia (%)	3.68	7.84	P = 0.001

Kulas T, Habek D, Karsa M, Bobic-Vukovic M, Gynecol Obstet Invest 2008; 14; 65 (4): 222-226

- Intrathecal fentanyl, sufentanil, or placebo combined with hyperbaric mepivacaine 2 % for parturients undergoing Elective Cesarean delivery

- 2 % hyperbaric Mepivacaine is a reasonable alternative to long-acting bupivacaine in Misgav Ladach Cesarean Sections due to the short operation time.

Meininger D, et al. Anesth Analg 2003; 96 (3): 852-858
Goethe-University Hospital, Frankfurt and the Mayo Clinic, Rochester.

Techniques for caesarean section
(Comparison of ML and its modifications to traditional CS)

- **Less blood loss** (five trials, 481 women; weighted mean difference (WMD) -64.45 ml; 95% confidence interval (CI) -91.34 to -37.56 ml);
- **Shorter operating time** (five trials, 581 women; WMD -18.65; 95% CI -24.84 to -12.45 minutes);
- **Postoperatively**, **reduced time to oral intake** (five trials, 481 women; WMD -3.92; 95% CI -7.13 to -0.71 hours)
- **Less fever** (eight trials, 1412 women; relative risk (RR) 0.47; 95% CI 0.28 to 0.81);

Hofmeyr G, Mathai M, Shah A, Novikova N
Cochrane Database Syst Rev. 2008 Jan 23;(1):CD004662.

Techniques for caesarean section
(Comparison of ML and its modifications to traditional CS)

- **Shorter duration of postoperative pain** (two comparisons from one trial, 172 women; WMD -14.18 hours; 95% CI -18.31 to -10.04 hours);
- **Fewer analgesic injections** (two trials, 151 women; WMD -0.92; 95% CI -1.20 to -0.63);
- **Shorter time from skin incision to birth of the baby** (five trials, 575 women; WMD -3.84 minutes; 95% CI -5.41 to -2.27 minutes).

Hofmeyr G, Mathai M, Shah A, Novikova N
Cochrane Database Syst Rev. 2008 Jan 23;(1):CD004662.

Contemporary OB/GYN
June 1998

Clinical Dialogue

The Misgav Ladach method of cesarean section

The Misgav Ladach method is a minimalist and critical approach to the traditional cesarean section technique. Dr. Stark developed it by comparing different approaches to the surgical steps in C/S, such as the Joel-Cohen method with the Pfannenstiel incision, closure of the uterus with one layer versus two layers, and closure of the peritoneum versus leaving it open. In this interview, he describes some of these modifications.
—Ronald A. Chez, MD

Chez: How does the Joel-Cohen technique differ from the Pfannenstiel incision?

Stark: The Pfannenstiel incision is based on an anatomical approach, where each layer is opened separately, regardless of its structural entity. It is placed low on the abdomen, where the fascia is attached to the muscle and the longitudinal structures, such as blood vessels, have very little lateral sway.

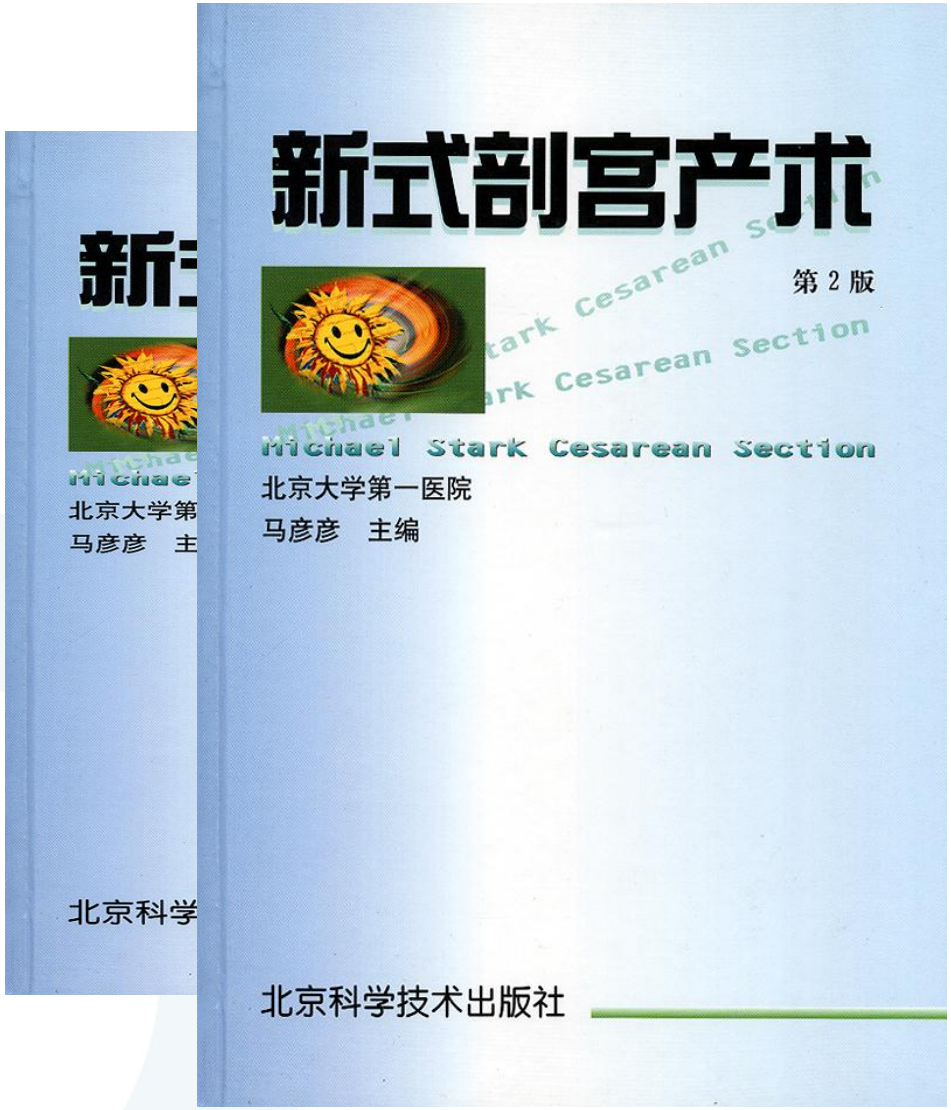
The Joel-Cohen incision is more compatible with anatomical macrostructures and is therefore more functionally sound. Also, it is

cutting only through the cutis, where there are only small vessels (Figure 1). It is placed about an inch below an imaginary line connecting the spinae iliacae anterior superior. The size necessary depends on the thickness

Ronald A. Chez, MD

Michael Stark, MD

of the abdominal wall and the size of the baby.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Der Kaiserschnitt
Indikationen – Hintergründe –
Operatives Management der
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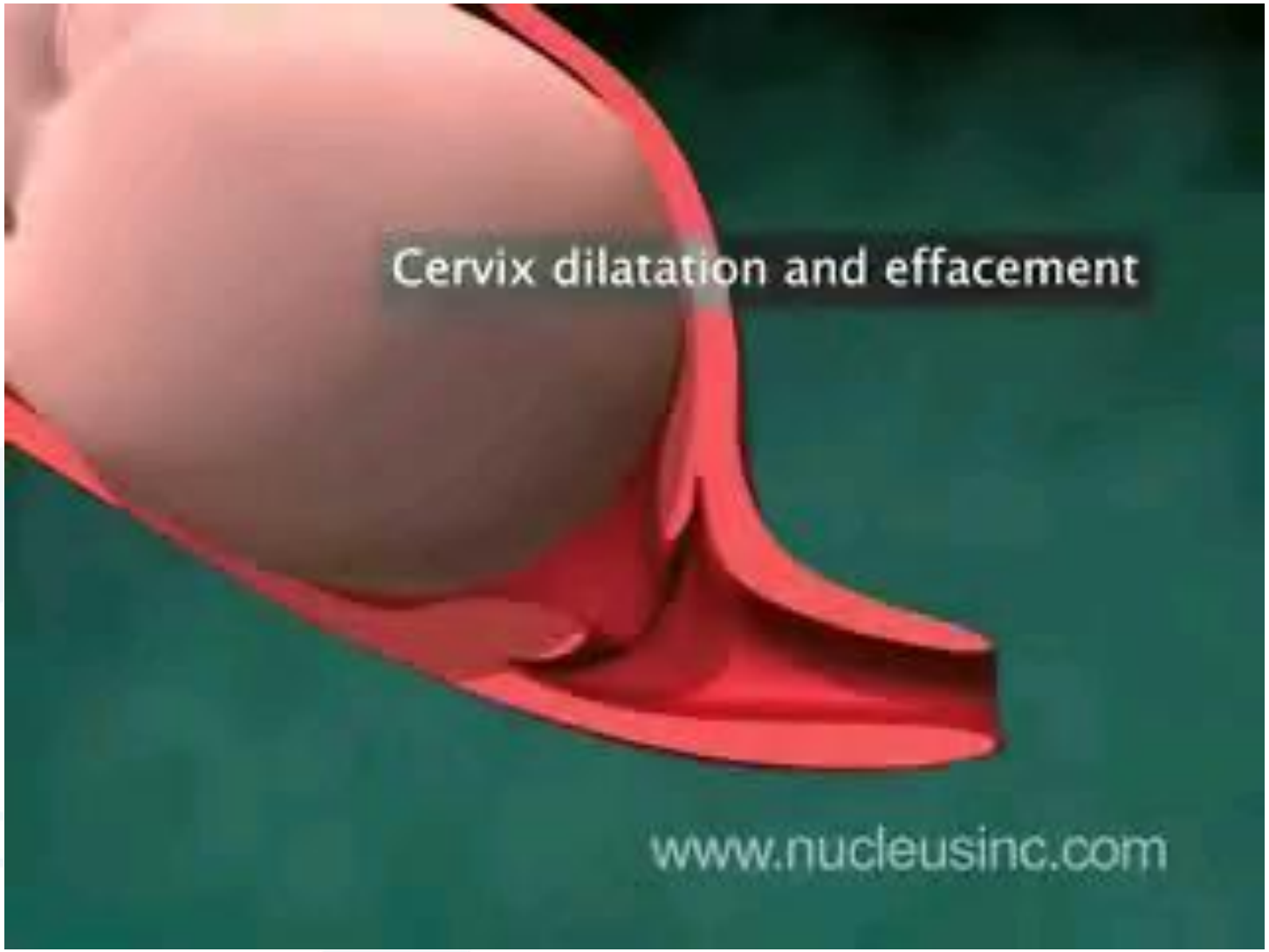
Cervix dilatation and effacement
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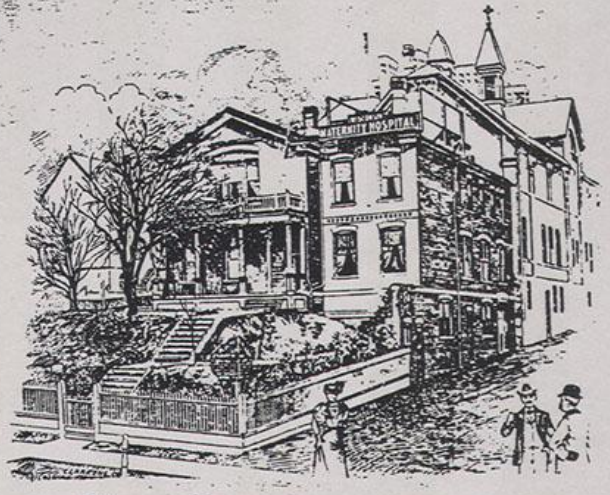
Appendix A



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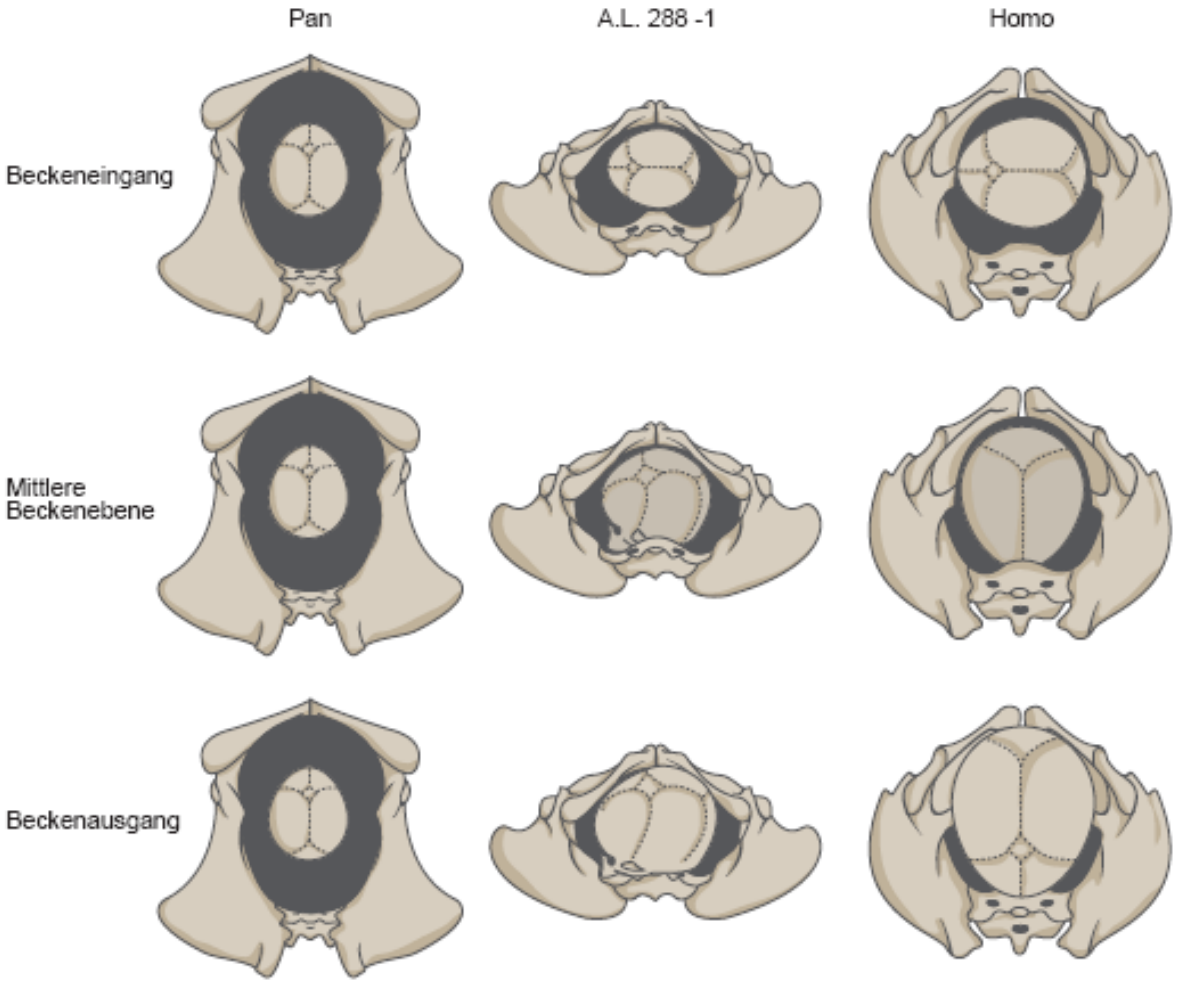
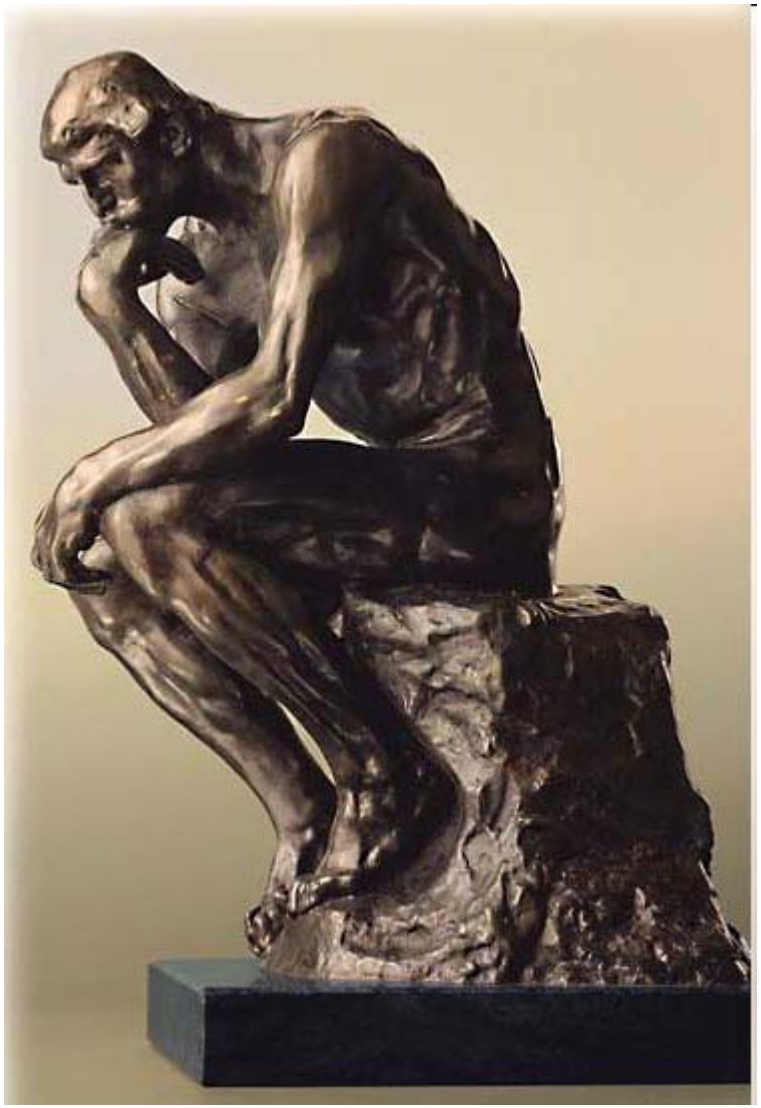
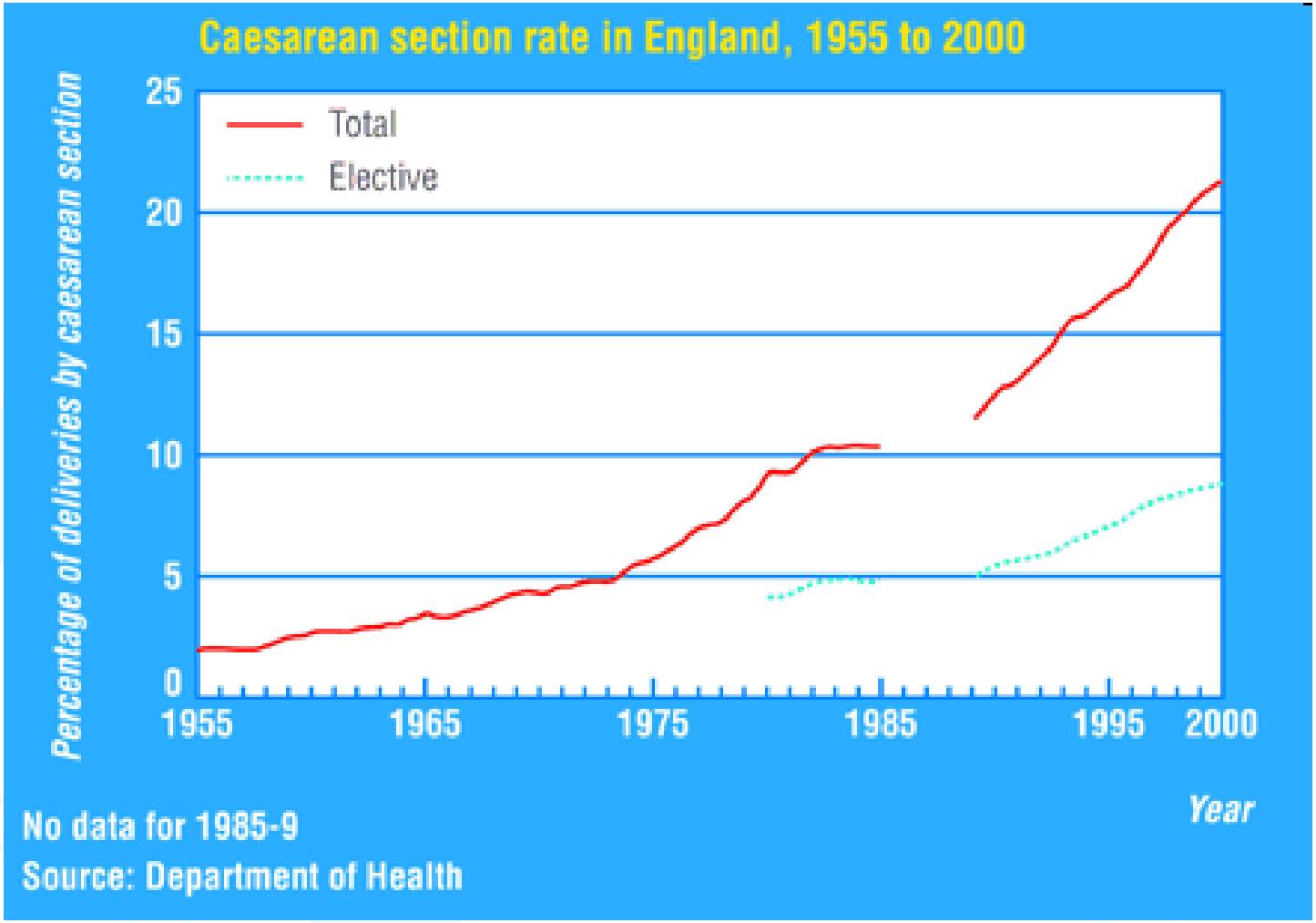
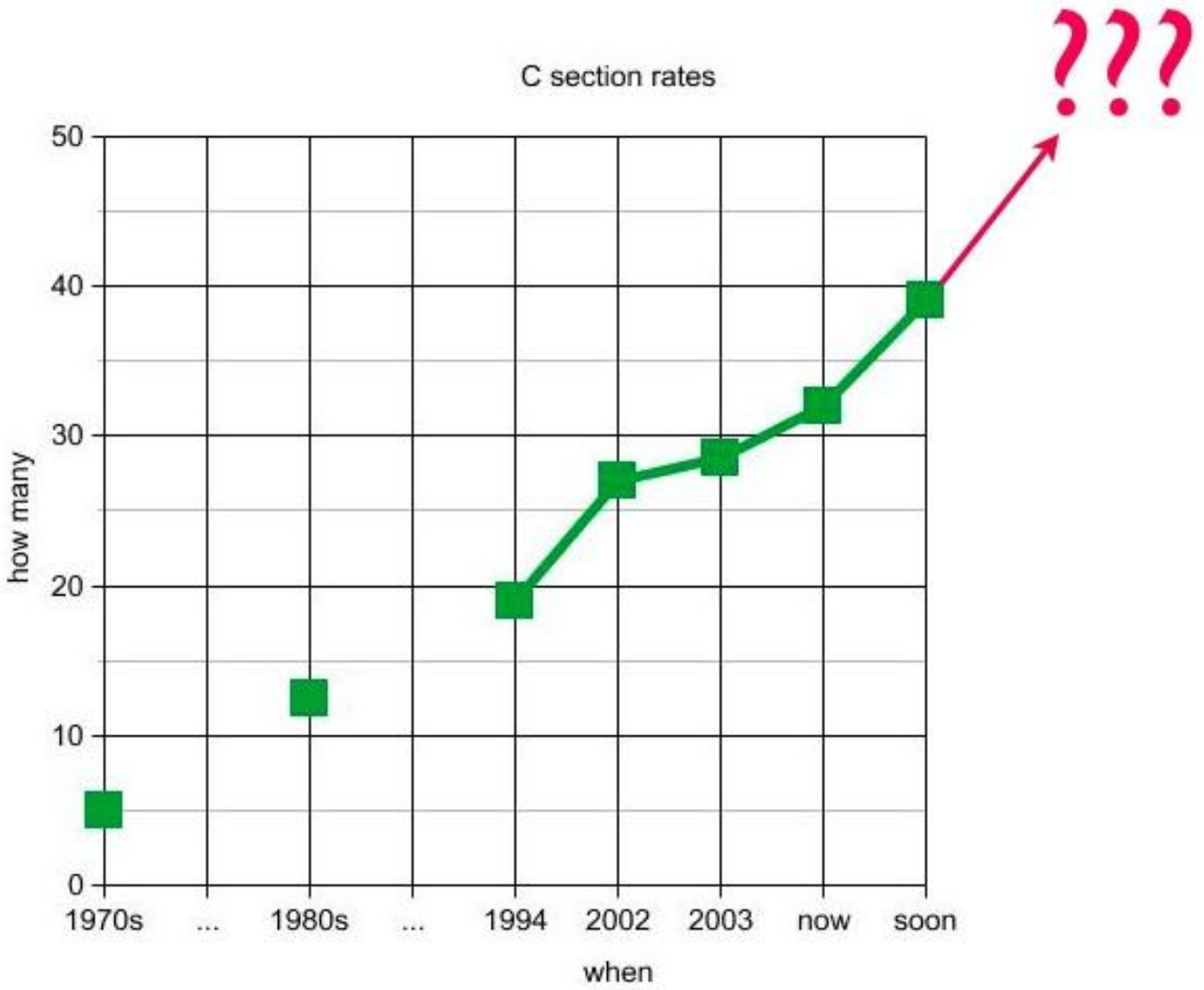


Abb. 2.3 Vergleich der Geburtsmechanismen beim Schimpansen *(Pan)*, *Australopithecus* (A.L. 288-1) und einem modernen Menschen *(Homo)*. Das Diagramm zeigt den Durchtritt des neonatalen Kopfes durch den Geburtskanal aus dem Blickwinkel einer Hebamme oder eines Geburtshelfers. In jeder Zeichnung werden das mütterliche Becken und der neonatale Kopf von unten gezeigt, mit dem Sakrum am unteren Bildrand und der Symphyse am Oberrand [modifiziert nach Tague und Lovejoy 1986].

VS.




Caesarean section rate in England, 1955 to 2000
Percentage of deliveries by caesarean section
25
20
15
10
5
0
Total
Elective
1955
1965
1975
1985
1995
2000
Year
No data for 1985-9
Source: Department of Health

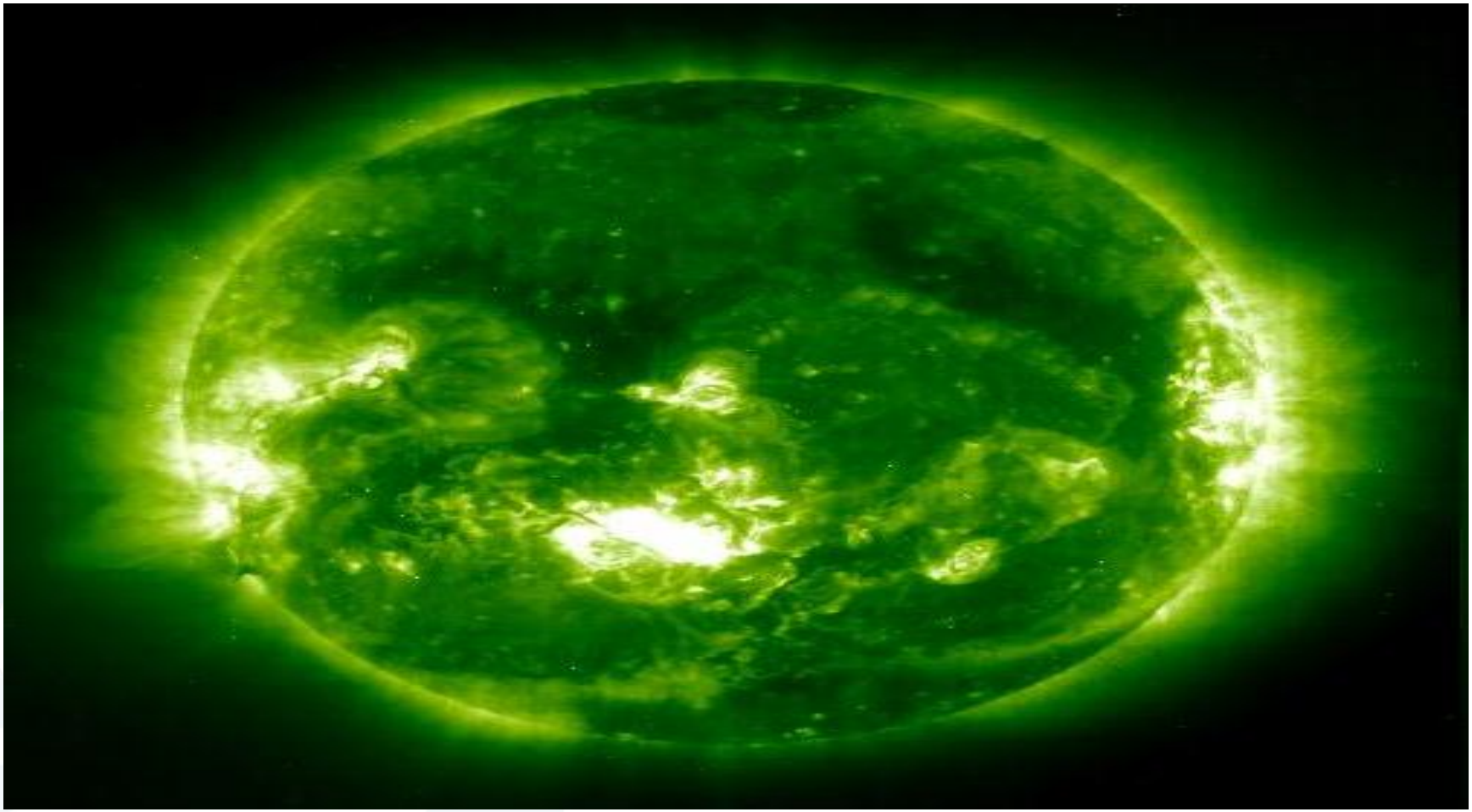

C section rates
???
50
40
30
20
10
0
how many
1970s
...
1980s
...
1994
2002
2003
now
soon
when

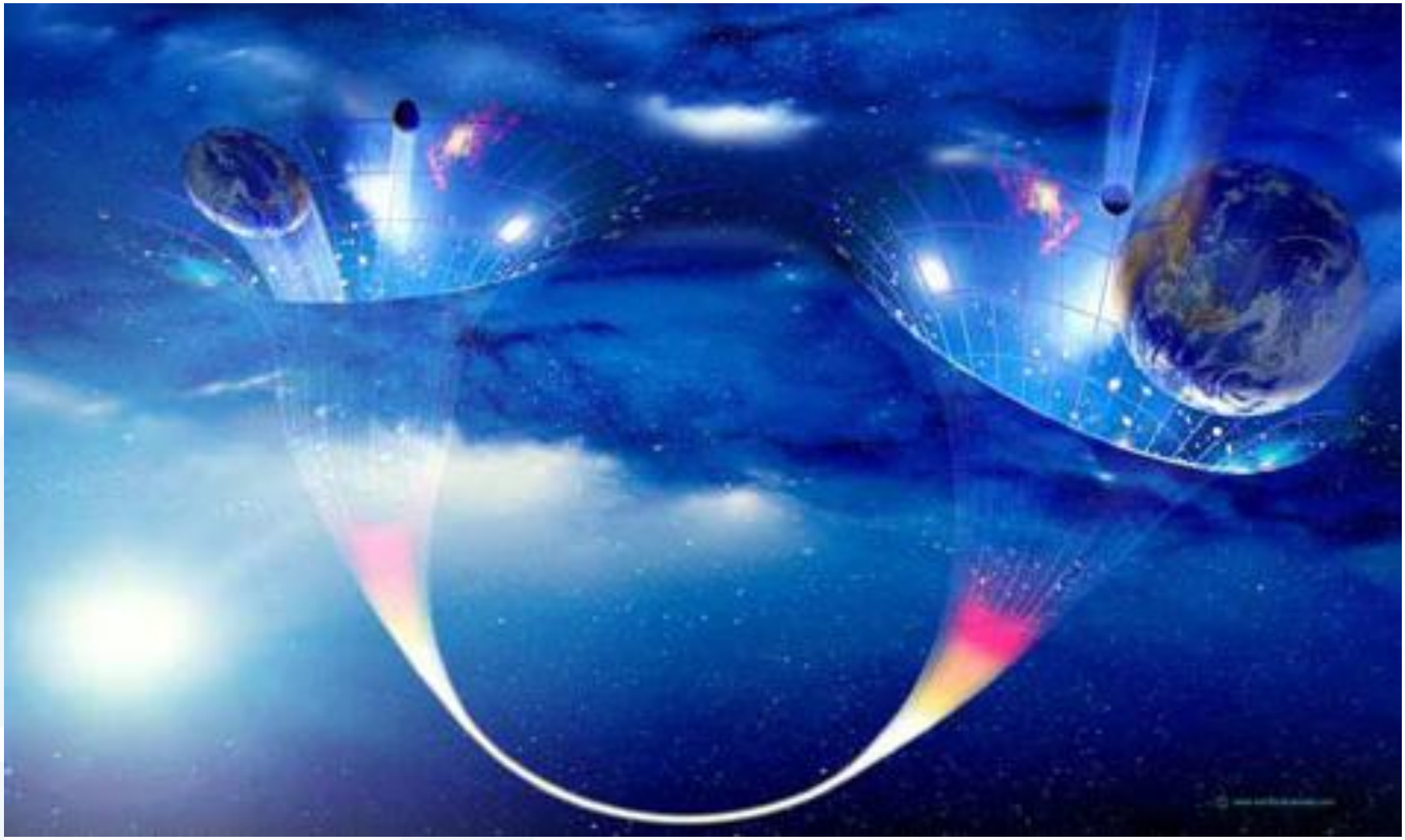
KAPITEL 27

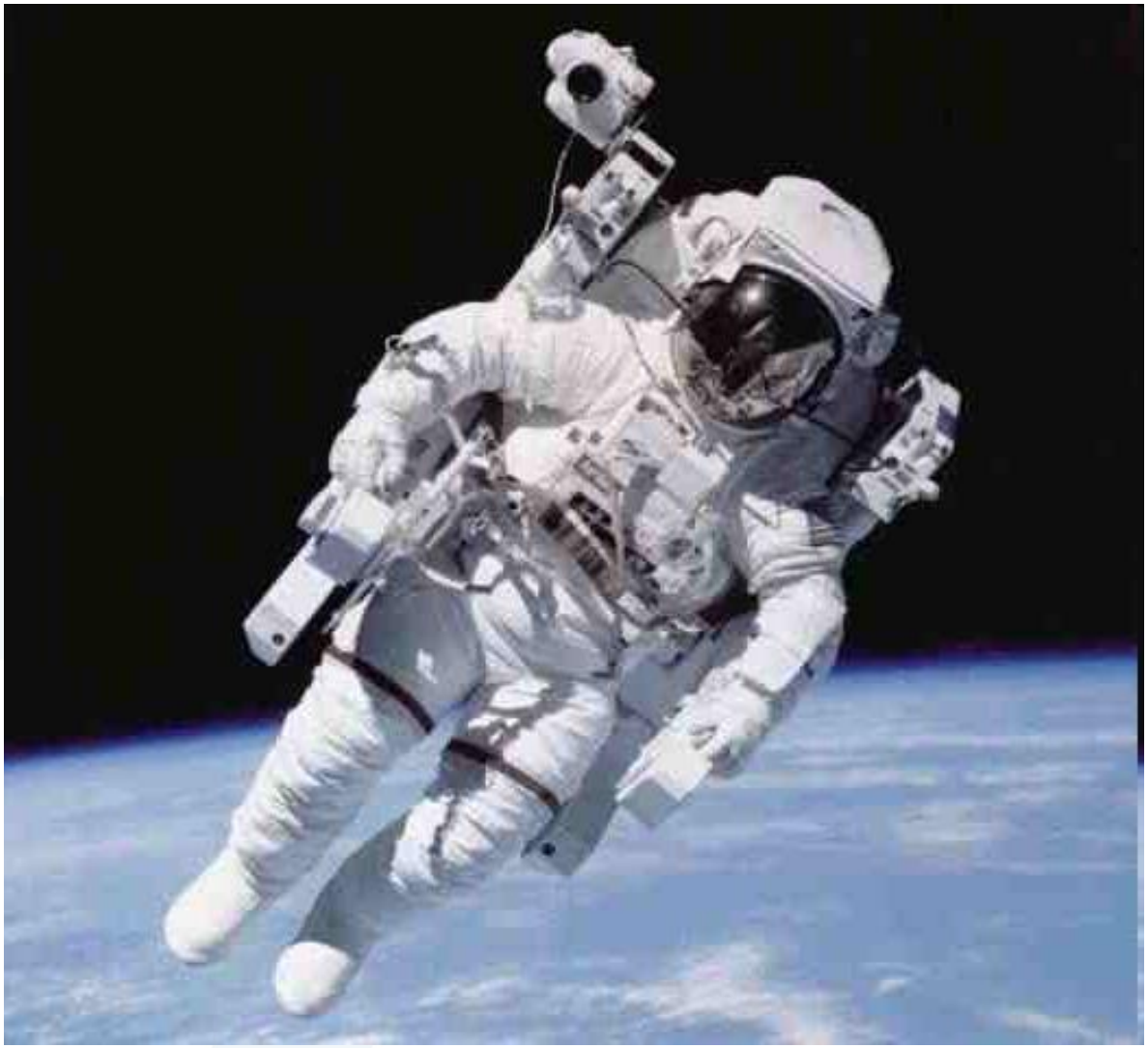
Michel Odent

Wie steht es um die Zukunft einer durch Kaiserschnitt entbundenen Zivilisation?

What will the future of a civilization delivered by c-section look like?







Thank you for your attention.

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