

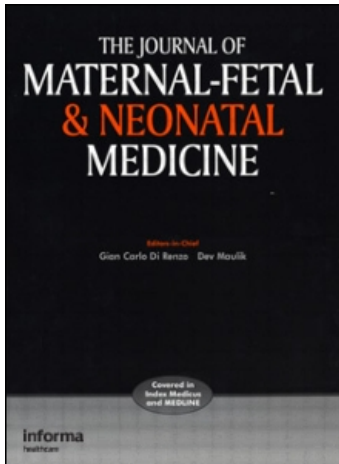
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### Post-cesarean adhesions-are they a unique entity?

Michael Stark <sup>a</sup>; Udo B. Hoyme <sup>b</sup>; Bernd Stubert <sup>c</sup>; Dirk Kieback <sup>d</sup>; Gian Carlo di Renzo <sup>e</sup>

<sup>a</sup> The New European Surgical Academy (NESA), Berlin, Germany <sup>b</sup> HELIOS Hospital Erfurt, Germany <sup>c</sup> HELIOS Hospital Schkeuditz, Germany <sup>d</sup> HELIOS Hospital Aue, Germany <sup>e</sup> The New European Surgical Academy (NESA) and the University Hospital Monteluca, Perugia, Italy

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## Post-cesarean adhesions – are they a unique entity?

MICHAEL STARK<sup>1</sup>, UDO B. HOYME<sup>2</sup>, BERND STUBERT<sup>3</sup>, DIRK KIEBACK<sup>4</sup>, & GIAN CARLO DI RENZO<sup>5</sup>

<sup>1</sup>The New European Surgical Academy (NESA), Berlin, Germany, <sup>2</sup>HELIOS Hospital Erfurt, Germany, <sup>3</sup>HELIOS Hospital Schkeuditz, Germany, <sup>4</sup>HELIOS Hospital Aue, Germany, and <sup>5</sup>The New European Surgical Academy (NESA) and the University Hospital Monteluce, Perugia, Italy

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### Abstract

**Objective.** The connection between adhesions and post-operative symptoms is well established. Adhesions are found in nearly half of the women at the time of their repeat cesarean section. For the first time a prospective pilot study has been done in order to evaluate the clinical significance of post-cesarean adhesions.

**Study design.** Fifty women who underwent cesarean section in their first pregnancy were interviewed prior to their repeat operation regarding their symptoms after the first surgery. The clinical history was correlated with the findings during the second intervention.

**Results.** No correlation was found between the clinical symptoms and the operative findings regarding abdominal pains, urinary symptoms, dyspareunia, or dysmenorrhea. Surprisingly, although non-significant, women with adhesions reported fewer postoperative gastrointestinal symptoms than the women with no adhesions.

**Conclusion.** More studies will have to be done, but the analysis of this pilot study supports the hypothesis that adhesions following cesarean section are a unique entity.

**Keywords:** Adhesions, cesarean section

### Introduction

Postoperative adhesions may cause small bowel obstruction, infertility, and pain and sometimes require repeat procedures [1]. Adhesions account for more than 40% of all intestinal obstructions, and 60–70% of those involving the small bowel [2].

In repeat cesarean sections adhesions were found in 46% of women, and this rate increased with the number of repeat cesareans [3].

A direct correlation was found between chronic abdominal pain and previous cesarean section [4]. Correlations between different surgical steps and the occurrence of adhesions, such as suturing the peritoneum or leaving it open, have already been published [5–8]. No prospective clinical study however has been done to correlate the existence and severity of post-cesarean section adhesions with the clinical symptoms involved.

Adhesions following cesarean section might be a unique entity, different from adhesions following other abdominal operations. The amniotic fluid has

been shown to prevent intra-abdominal adhesions as well as adhesions in different surgical sites [9,10]. The special hormonal state of the mother may influence the creation and severity of adhesions [11].

A prospective double-blind pilot study was conducted in order to find out if, following cesarean section, a correlation can be shown between clinical symptoms and the operative findings during the repeat intervention. The null-hypothesis examined by this study was that adhesions after cesarean section are not different from adhesions after other interventions.

### Materials and methods

Fifty women who were scheduled for a second cesarean section between June and December 2006 in hospitals belonging to the German HELIOS Hospital group were interviewed prior to their next operation. The interviews were done between 1 and 14 days before the repeat cesarean section. The women were asked about short- and long-lasting

symptoms following the first operation (with the range from mild to intense pain, and with a stratification of duration of < 1 month, 1–3 months, 3–6 months, and symptoms lasting until the present time).

The study was prospective and double-blind. Physicians other than the obstetricians performing the operation carried out the interviews, and the surgeon was unaware of the results of the questionnaire. The local ethical committee approved the study.

The questions covered demographic data, ethnic origin, and medical history. After the operation, the surgeon filled out the case report form (CRF) with an adhesion score of 0 to 3 according to the adhesion scoring system of Bristow and Montz [12] (Table I).

All details were stored in Excel tables and the clinical history was compared to the existence and grade of adhesions, and evaluated with the statistical software package SPSS 14, using the Pearson's correlation coefficient.

## Results

The average age of the 50 women included in this study was 32 years (range 23–43 years). The ethnic background of the women is shown in Table II. At the time of interview, the average gestational age of the women was 39 weeks (range 35–41 weeks). The average time between the two operations was 4.5 years (range 1.5–12.5 years) (Table II).

Adhesions were found in 19 out of the 50 women included in the study (38%). Nine out of 24 women (38%) who reported long lasting abdominal pains for up to 6 months after the previous cesarean section had adhesions. Adhesions were found in 10 out of 26 women (38%) who had had no abdominal pains after the previous operation. No correlation was found ( $-0.009$ ) and there was no significant coherence between the occurrence of adhesions and abdominal pains after the previous cesarean section.

Adhesions were found in two out of eight women who reported long lasting chronic constipation or other gastrointestinal symptoms after the previous operation. By contrast, 40% of the women who had had no constipation or other gastrointestinal symptoms after the previous operation had adhesions

(17/42 women). No correlation was found ( $-0.093$ ) and there was no significant coherence between the occurrence of adhesions and chronic constipation or other gastrointestinal symptoms after the previous operation in this group.

Dyspareunia at least for 3 months, non-existing before the first operation, was reported by 55% of the women who had adhesions after the previous cesarean section (6/11 women), but was also reported in 33% of the women who had no adhesions (13/39 women). No correlation was found (0.167) and there was no significant coherence between the occurrence of adhesions and dyspareunia after the previous operation.

Of the women who reported dysmenorrhea non-existing before the previous cesarean section, 44% had adhesions (7/16 women). Adhesions were found also in 35% of the women who had no dysmenorrhea (12/34 women). No correlation was found (0.060) and there was no significant coherence between the occurrence of adhesions and dysmenorrhea after the first cesarean section (Table III).

In none of the groups examined was there any correlation between the severity and quantity of the adhesions (41% had adhesion grade 1, 22% adhesion grade 2, and 41% adhesion grade 3 (Table I) and the severity of the symptoms.

## Discussion

Most abdominal operations have today been replaced by endoscopic procedures [13]. Cesarean section will remain one of the only future open abdominal operations, hence the importance of understanding its outcome concerning adhesions and their clinical relevance.

Adhesions following abdominal operations like gallbladder operations, gastric operations, or colectomies are known to cause symptoms and complications such as abdominal pains [14,15], constipation, gastroenterological symptoms, and ileus [16,17]. Therefore, many methods have been tried in order to prevent postoperative adhesions. These include membranes [15], statins [15], films [1,18], different solutions [1,19,20], keeping tissues wet, and modifications of surgical techniques. It has been shown that when abdominal swabs are avoided, fewer adhesions occur [21]. Leaving the peritoneum open after gynecological and surgical operation has been proved to cause fewer adhesions, although this assumption has recently been challenged [5,6,8,22].

Adhesions following cesarean section seem to be a unique entity due to the specific hormonal conditions existing at the end of the pregnancy [11] and the spillage of amniotic fluids [9,15,23], which is believed to prevent their formation.

Table I. Adhesion system (Bristow).

Adhesion grade	Definition
Grade 0	No adhesions
Grade 1	Avascular: Easily lysed and failing to bleed
Grade 2	Vascular: Easily lysed, but bleeding at time of lysis
Grade 3	Thick: Requiring extensive sharp surgical dissection

Table II. The women's ethnic background.

Eurasian	39 (78%)
Caucasian	6 (12%)
Asian	2 (4%)
No information	3 (6%)
Average age (years)	32 (23–43)
Average week of the gestation at time of interview	39 (35–41)
Average time between the two cesarean sections (years)	4.5 (1.5–12.5)

Table III. Postoperative symptoms.

	<i>n</i>	Adhesions
<i>Long lasting abdominal pains after the previous cesarean section</i>		
Yes	24	9 (38%)
No	26	10 (38%)
		<i>p</i> = NS
<i>Long lasting chronic constipation or other gastrointestinal symptoms after the previous cesarean section</i>		
Yes	8	2 (25%)
No	42	17 (40%)
		<i>p</i> = NS
<i>Dyspareunia after the previous cesarean section</i>		
Yes	11	6 (55%)
No	39	13 (33%)
		<i>p</i> = NS
<i>Dysmenorrhea after the previous cesarean section</i>		
Yes	16	7 (44%)
No	34	12 (35%)
		<i>p</i> = NS

NS, not significant.

The cesarean section is performed in the lower abdomen. The incision of the abdominal wall is mostly transverse, and the hysterotomy is done in the lower segment. After the operation it takes a couple of weeks until complete involution occurs. In the first postoperative days, the size of the uterus prevents a direct contact between the incision site and the intestines. Therefore, most of the post-cesarean adhesions are found in the lower abdomen between the uterus, bladder, and omentum.

No significant correlation was found between the existence and non-existence, grade and severity of the adhesions and the clinical symptoms reported by the women prior to their second operation. Moreover, it was paradoxically shown that women with adhesions had fewer gastrointestinal symptoms, although this observation failed to reach statistical significance.

Based on these data we reject the null-hypothesis and therefore believe that the analysis supports the hypothesis that adhesions following cesarean section are a unique entity.

More prospective studies are necessary in order to expand on this trial.

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### References

1. Tingstedt B, Isaksson K, Andersson E, Andersson R. Prevention of abdominal adhesions – present state and what's beyond the horizon? *Eur Surg Res* 2007;39:259–268.
2. Ellis H. The clinical significance of adhesions: Focus on intestinal obstruction. *Eur J Surg Suppl* 1997;(577):5–9.
3. Morales KJ, Gordon MC, Bates GW Jr. Postcesarean delivery adhesions associated with delayed delivery of infant. *Am J Obstet Gynecol* 2007;196:461.e1–6.
4. Almeida EC, Nogueira AA, Candido dos Reis FJ, Rosa e Silva JC. Cesarean section as a cause of chronic pelvic pain. *Int J Gynaecol Obstet* 2002;79:101–104.
5. Lyell DJ, Caughey AB, Hu E, Daniels K. Peritoneal closure at primary cesarean delivery and adhesions. *Obstet Gynecol* 2005;106:275–280.
6. Yiyang Z, Qunxi C, Weiling W. Closure vs. nonclosure of the peritoneum at cesarean delivery. *Int J Gynaecol Obstet* 2006;94:103–107.
7. Zareian Z, Zareian P. Non-closure versus closure of peritoneum during cesarean section: A randomized study. *Eur J Obstet Gynecol Reprod Biol* 2006;128:267–269.
8. Mocanaşu C, Anton E, Chirilă R. Peritoneal suture vs. non-suture at caesarean section. *Rev Med Chir Soc Med Nat Iasi* 2005;109:810–812.
9. Golan A, Stolik O, Wexler S, Niv D, Ber A, David MP. The effect of amniotic fluid on intraperitoneal adhesion formation – an experimental study. *Int J Fertil* 1991;36:317–320.
10. Hellebrekers BW, Trimpos-Kemper TC, Trimpos JB, Emeis JJ, Kooistra T. Use of fibrinolytic agents in the prevention of postoperative adhesion formation. *Fertil Steril* 2000;74:203–212.
11. Wiczak HP, Grow DR, Adams LA, O'Shea DL, Reece MT. Pelvic adhesions contain sex steroid receptors and produce angiogenesis growth factors. *Fertil Steril* 1998;69:511–516.
12. Bristow RE, Montz FJ. Prevention of adhesion formation after radical oophorectomy using a sodium hyaluronate-carboxymethylcellulose (HA-CMC) barrier. *Gynecol Oncol* 2005;99:301–308.
13. Goh P, Tekant Y, Krishnan SM. Future developments in high-technology abdominal surgery: Ultrasound, stereo imaging, robotics. *Baillieres Clin Gastroenterol* 1993;7:961–987.
14. Vrijland WW, Jeekel J, van Geldorp HJ, Swank DJ, Bonjer HJ. Abdominal adhesions: Intestinal obstruction, pain, and infertility. *Surg Endosc* 2003;17:1017–1022.
15. van der Wal JB, Jeekel J. The use of statins in postoperative adhesion prevention. *Ann Surg* 2007;245:185–186.
16. Kuremu RT, Jumbi G. Adhesive intestinal obstruction. *East Afr Med J* 2006;83:333–336.
17. Plusczyk T, Bolli M, Schilling M. Ileus disease. *Chirurg* 2006;77:898–903.

18. Ait Menguellet S, Collinet P, Cosson M, Mariette C, Triboulet JP, Vinatier D. Interest in agents for adhesion prevention after gynecologic surgery. *Gynecol Obstet Fertil* 2007;35:290–296.
19. diZerega GS. Contemporary adhesion prevention. *Fertil Steril* 1994;61:219–235.
20. Maleckas A, Daubaras V, Vaitkus V, Aniuliene A, Dirzinauskas E, Rakauskas M, Pundzius J. Increased post-operative peritoneal adhesion formation after the treatment of experimental peritonitis with chlorhexidine. *Langenbecks Arch Surg* 2004;389:256–260.
21. Down RH, Whitehead R, Watts JM. Why do surgical packs cause peritoneal adhesions? *Aust N Z J Surg* 1980;50:83–85.
22. Komoto Y, Shimoya K, Shimizu T, Kimura T, Hayashi S, Temma-Asano K, Kanagawa T, Fukuda H, Murata Y. Prospective study of non-closure or closure of the peritoneum at cesarean delivery in 124 women: Impact of prior peritoneal closure at primary cesarean on the interval time between first cesarean section and the next pregnancy and significant adhesion at second cesarean. *J Obstet Gynaecol Res* 2006;32:396–402.
23. Ozgenel GY, Samli B, Ozcan M. Effects of human amniotic fluid on peritendinous adhesion formation and tendon healing after flexor tendon surgery in rabbits. *J Hand Surg [Am]* 2001;26:332–339.