



Impact of antibacterial sutures on development of postpartum septic complications.

Diana Andzane^{1,2,3,4}, Anna Miskova^{1,3,4}, Antra Krone¹, Dace Rezeberga^{1,2,3}

1 Riga Maternity Hospital, Riga, Latvia. 2 Gynaecology Clinic, Riga East Clinical University Hospital, Riga, Latvia. 3 Department of Obstetrics and Gynecology, Rīga Stradiņš University, Riga, Latvia. 4 Department of Clinical Skills and Medical Technologies, Rīga Stradiņš University, Riga, Latvia.



Introduction

A Caesarean section is the most common surgical procedure performed in women, [1] and is also the most significant post-partum risk factor for infection. [2] The caesarean section increases the incidence of endometritis and wound infection to 16-17% [3] and increases infection-related mortality by 25 times. [4] Antibacterial sutures are widely researched in multiple sectors of surgery – colorectal, gastrointestinal, cardiovascular surgery, orthopaedics, and paediatric surgery, where their efficiency in the reduction of wound infections has been confirmed. [5,6,7] However, these surgical sutures practically have not been researched in obstetrics. Is the antiseptic effect of antibacterial sutures sufficient to affect the development of infection after Caesarean section as well?

Aim of the study

The aim of this study was to investigate the effect of antibacterial sutures, on the risk of postpartum septic complications.

Methods

A prospective study was done at Riga Maternity Hospital from 2018 to 2021. There were 174 patients undergoing Category 2, 3, or 4 caesarean section were included in the study. Chorioamnionitis was an exclusion criterion and 9 patients conformed to this criterion. These patients developed chorioamnionitis after inclusion in the study and were prescribed antibacterial therapy for at least three days after childbirth. Therefore they were excluded from the study. Thus, 165 patients continued participation in the study, and were subject to observation and analysis. 67 patients participated in the antibacterial group. Their uterus and aponeurosis were sutured with triclosan-coated polyglactin 910 sutures during surgery, and the other layers – with uncoated polyglactin 910 sutures. The control group consisted of 98 patients in whom polyglactin 910 sutures without coating were used to suture the uterus and the layers of the anterior abdominal wall. Patient preparation for surgery and postoperative care were the same for both study groups, following local medical protocols. On the third and the fourth post-surgical day, the concentration of C-reactive protein (CRP) in the blood plasma, blood haemoglobin level and WBC count were determined in all patients. After the discharge, the patients were contacted on the phone after the 30th post-surgical day. Communication and data collection process was successful for 146 (88.5%) women. Chi-square and Fisher exact test is used for statistical analysis of nonparametric data and independent two-sample t-test for parametric data. Prior to the beginning of the study, permission was obtained from the RSU Research Ethics Committee.

Table 1. Characteristics of the study population.

Parameter	Antibacterial group (n=67)		Control group (n=98)		p value
	n	%	n	%	
Maternal age, years±SD	31.4±5.4		32.7±5.2		0.133
BMI, kg/m ²	25.5±5.7		24.4±5.2		0.205
BMI ≥30 kg/m ²	13	19.4	16	16.3	0.61
Smoking	2	3	4	4.1	1
Gestational diabetes	11	16.4	14	14.3	0.708
Nulliparous	36	53.7	50	51.0	0.732
Multiparous	31	46.3	48	49.0	
Gestation age, weeks	39.5±2.0		39.7±2.0		0.613
Preterm delivery	4	6	5	5.1	1
Positive group B streptococcus	13	19.4	10	10.2	0.235
In-labor caesarean section	32	47.8	45	45.9	0.816
Cesarean section in the second stage of labor	4	6	9	9.2	0.452
Duration of labor ≥12 h	9	13.4	9	9.3	0.403
Rupture of membranes before caesarean section	35	52.2	59	60.2	0.31
Number of vaginal examinations	2.9±3.1		3.2±3.1		0.59
Vaginal exams ≥5	24	35.8	31	31.6	0.575

SD – standard deviation; BMI – body mass index.

Table 3. Parameters of the post-caesarean period.

Variable	Antibacterial group (n=67)		Control group (n=98)		p value
	n	%	n	%	
CRP, mg/L	64.4±40.9		68.2±39.1		0.544
Leukocytes, 10 ³ /mm ³	10.0±2.8		9.3±2.2		0.07
Postoperative hemoglobin, g/dL	11.3±1.2		11.1±1.3		0.323
Postoperative hemoglobin <10,5 g/dL	15	22.4	34	34.7	0.089
Postpartum ultrasound	30	44.8	42	42.9	0.807
Duration of hospitalization after caesarean section, days	4.9±2.1		4.7±1.5		0.47

CRP – C reactive protein.

Table 2. Characteristics of the cesarean sections.

Factor	Antibacterial group (n=67)		Control group (n=98)		p value
	n	%	n	%	
Operation time, minutes±SD	37.2±10.7		36.2±9.9		0.539
Duration of cesarean section ≥ 1 h	3	4.5	2	2	0.397
Blood loss, ml	579.9±134.6		585.7±149.4		0.797
Blood loss ≥ 1000 ml	4	6	5	5.1	1
Closure of subcutaneous layer	53	79.1	60	61.2	0.015
Instrumental revision of the uterine cavity	11	16.4	12	12.2	0.447
Additional manipulations during C-section	9	13.4	8	8.2	0.274
Emergency cesarean section	39	58.2	71	72.4	0.057

Table 4. Septic outcomes in the post-caesarean period.

Outcomes	Antibacterial group		Control group		p value
	n	%	n	%	
In hospital	n=67		n=98		-
Endometritis	7	10.4	7	7.1	0.454
Wound infection	1	1.5	1	1	1
All septic complications	8	11.9	8	8.2	0.421
At home	n=63		n=83		-
Endometritis	3	4.9	0	0	0.08
Wound infection	3	4.9	2	2.5	0.451
Contacting a health care institution	8	13.3	6	7.6	0.266
Re-admission	1	1.6	2	2.5	1
Total	n=63		n=83		-
Endometritis	8	11.7	7	8.4	0.401
Wound infection	4	6.3	3	3.6	0.444
Number of women with septic complications	10	15.9	10	12	0.506

References

1. Martin JA, Hamilton BE, Osterman MJ. Births in the United States, 2015. NCHS Data Brief. 2016 Sep;(258):1-8.
2. Poggi SH. Postpartum Hemorrhage & the Abnormal Puerperium. In: DeCherney AH, Nathan L, Laufer N, Roman AS. eds. CURRENT Diagnosis & Treatment: Obstetrics & Gynecology, 12e. McGraw Hill; 2019.
3. Kawakita T, Iqbal SN, Landy HJ, Huang JC, Fries M. Reducing Cesarean Delivery Surgical Site Infections: A Resident-Driven Quality Initiative. Obstet Gynecol. 2019 Feb;133(2):282-288.
4. Taylor M, Pillarisetty LS. Endometritis. 2022 May 8. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan–.
5. Ahmed I, Boulton AJ, Rizvi S, Carlos W, Dickenson E, Smith NA, Reed M. The use of triclosan-coated sutures to prevent surgical site infections: a systematic review and meta-analysis of the literature. BMJ Open. 2019 Sep 3;9(9):e029727.
6. Ruiz-Tovar J, Alonso N, Ochagavía A, Arroyo A, Llaveró C. Effect of the Abdominal Fascial Closure with Triclosan-Coated Sutures in Fecal Peritonitis, on Surgical Site Infection, and Evisceration: A Retrospective Multi-Center Study. Surg Infect (Larchmt). 2018 Jan;19(1):61-64.
7. Dosedla E, Richnavsky J, Turcsanyiova Z, Ballova Z, Calda P. The Application of Antibacterial Triclosan-Coated Polyglactin 910 Suture versus Conventional Polyglactin 910 Suture in Abdominal Hysterectomy: A Comparison of Selected Postoperative Complications. Actual Gyn. 2020;12:65-69.

Results

The patients of the investigation and control group were compared in accordance with the parameters that characterise general status, history, pregnancy and labor. No statistically significant difference between the groups was found in accordance with any of the parameters. The comparison has been reflected in Table 1. The distribution of antibacterial and control group patients by category of Caesarean section did not differ statistically significantly. In both groups a second category Caesarean section was performed in almost one half of the patients. The Antibacterial and control group did not differ in terms of operation time, blood loss, frequency of instrumental revision of the uterus, while in the antibacterial group, the subcutaneous suturing was performed more frequently (see Table 2). The frequency of uterine peritonisation or suturing of visceral peritoneum, suturing of parietal peritoneum and rectus abdominis muscle was equal in both groups. The post-surgical period did not differ between the groups (see Table 3). Septic outcomes of post-Caesarean section surgery were known to all patients by the date of their discharge. After discharge, septic outcomes were known and were only calculated for the patients, with whom successful post-discharge communication was established - 63 patients of the antibacterial group and 83 patients of the control group. Septic complications that developed in the patients, who were included in the study were endometritis, wound infection and sepsis. None of the patients were diagnosed with an infection of other localization, for instance, pneumonia, urinary tract infection, mastitis, etc. The frequency of development of septic complications in the antibacterial and control group was similar both in the clinic, as well as at home after discharge. All septic outcomes in the post-surgical period are reflected in Table 4. Among all wound infections, five were superficial and two - deep.

Conclusion

The use of antibacterial sutures during Caesarean section does not affect the frequency of post-partum endometritis and surgical wound infections (septic complications). Extensive randomized research is required in the population of Caesarean section patients to confirm the finding of this study.