

# Antibiotic prophylaxis and inflammatory complications after Cesarean section

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## Abstract

**Introduction:** Gynaecological and obstetric surgeries are high risk operations for the development of postoperative inflammatory complications due to the proximity of the genitourinary tract. The aim of this study was to compare the frequency of inflammatory complications in emergency or elective cases of caesarean sections as well as the frequency of complications related to the method of surgical treatment used.

**Methods:** We analyzed inflammatory complications in 450 caesarean sections, which developed in a one-year period from June 1<sup>st</sup>, 2000. to June 1<sup>st</sup> 2001. Patients were grouped according to the method of the surgery, and on emergency or elective case. Misgav Ladach or Dorfler surgical methods were used.

**Results:** The most common inflammatory complication was wound infection and the most common risk factors for inflammatory complications were premature rupture of membranes and anemia.

**Conclusions:** Long term use of one antibiotic was the most commonly implemented form of antibiotic prophylaxis.

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*Keywords: antibiotic prophylaxis, inflammatory complications, Caesarean section*

## Introduction

Gynaecological and obstetric surgeries are high risk operations for the development of postoperative inflammatory complications due to the proximity of the genitourinary tract. The possibility of developing a postoperative infection after a caesarean section ranges from 30% to 85% without prophylactic use of antibiotics, and up to 19% with the use of antibiotic prophylaxis (ABP) (1). Postoperative wound infections have an enormous impact on the patient quality of life and to the contribution of the financial costs of patient's care. The potential consequences of such postoperative wounds range from increased pain and care of an open wound to sepsis and even death. In the United States each year approximately

one million patients suffer from such infection which extending the average hospitalization for a week thus increasing the cost of hospitalization by 20%. In short, this adds an additional cost of 1.5 billion dollars in healthcare annually (2). Antibiotic prophylaxis (ABP) is the application of antibiotics in patients without the presence of infection in order to prevent postoperative complications and infections (3). Inflammatory complications during elective caesarean section while using ABP were rarer (1.9 times), which of course justifies the use of ABP with elective caesarean section (4). The most common inflammatory complications after caesarean section include: endometritis, urinary tract infections, infections in the operative incision and peritonitis (5). The aim of this study was to compare the frequency of inflammatory complications in emergency or elective cases of caesarean sections as well as the frequency of complications related to the method of surgical treatment used.

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## Methods

### Samples and Procedures

We analyzed inflammatory complications in 450 caesarean sections, which developed in a one-year period from from June 1<sup>st</sup>, 2000. to June 1<sup>st</sup> 2001. in the Department of Gynaecology, Perinatology and Neonatology of the Cantonal Hospital in Zenica. Caesarean sections are divided according to the method of the surgery, and on emergency and elective (Table 1) The table clearly shows that 85% of the caesarean sections were performed as an emergency-surgery shortly after the patient's admission to the hospital. These are mainly the under-prepared patients (often there is no baseline data or lab findings). During all of the surgeries ABP were used -380 cases (84.4%) repeatedly one antibiotic, 49 (11%) cases repeated with more than one antibiotic in 21 (4.6%) case of a single antibiotic.

### Statistical analysis

Data is expressed as mean  $\pm$  SD. Comparison of means between two groups was made by using

**TABLE 1.** Frequency of types and ways of performing of Caesarean sections

Type of surgery	EMERGENCY	ELECTIVE	TOTAL
Misgav Ladach (ML)	129 (28.66 %)	18 (4 %)	147 (32.66 %)
Dorfler (D)	253 (56.22 %)	50 (11.1 %)	303 (67.32 %)
TOTAL	382 (84.88 %)	68 (15.12 %)	450 (100 %)

two-sample *t* tests. X<sup>2</sup> analysis was used to compare frequencies between groups. *p*<0.05 was considered significant.

## Results

Inflammatory complications developed in 25 (5.5%) cases, without regards to which ABP was applied. The most common inflammatory complication was wound infection: 21 cases (84%, ie 4.6% of all cases). Other inflammatory complications were very rare: endometritis in 2 cases (0.66%) and peritonitis in 2 cases (0.66%) (Table 2). The most common risk factors for inflammatory complications were premature rupture of membranes (RVP) (40.6%) and anemia (18.5%). Other risk factors were the average of all caesarean sections, without much variation in the methods applied. It is also important to emphasize that the time duration from labour up to the point of making the decision to perform the caesarean section was on average 5.8 hours (Table 3). The most common risk factors in developed inflammatory complications were anemia and RVP, anemia in 59.2% and RVP in 40.7%. Anemia and RVP were the most common finding in wound infection, which is the most common inflammatory complication (Table 4). Also, it is significant to note the duration of labour to the decision to perform a caesarean section, an average of 10.6 hours for all cases who developed inflammatory complications. In particular, the prolonged average duration of labour for ML: 18 hours, wound infections: 14 hours, which is about 3 times longer than the average of all C-sections.

**TABLE 2.** Inflammatory complications after Caesarean section

	Th./number of drugs	Endom.	UI	Inc. I	Sepsis	Tromboph.	Peritonitis
ML (147)	Profylaxes						
	One			7			1
	Two			2			
D (303)	Three						
	Profylaxes						
	One	1		12			1
	Two	1					
	Three						
	Total	2	0	21	0	0	2

(Endom.=endometritis, UI=uroinfection, Inc. I=incision infection, Trombo.=trombophlebitis)

**TABLE 3.** Risk factors for inflammatory complications after Caesarean section

Risk factors	Dorfler (303)	Misgav Ladach – 147	Total – 450
Anemia	71 (23,4%)	13 (8.8 %)	84 (18.5%)
RVP	134 (44,2%)	49 (33.3 %)	183 (40.66%)
The average number of examinations	2.5	3.58	2,87
The average duration of hospitalization	3.2 days	2,65 days	3.0 days
The average duration of labor	5.5 h	6.3 h	5.8 h
The average number of ASC	0.71	0.95	0,79

(RVP= premature rupture of membranes, ASC=amnioscopy)

**TABLE 4.** Common risk factors in developed inflammatory complications

Risk factors	DORFLER –16 (5,2%)				MISGAV LADACH-11(7,48)				Total
	Ileus	Endomet.	Inc. I.	Perit	Ileus	Endomet.	Infec. r.	Perit.	
Anemia	1 (6.2)	1 (6.2)	1 (6.2)				6 (54.5)		16 (59)
RVP			5 (31)	5 (31)	1 (9.4)		4 (36.3)		11 (41)
The average duration of hospitalization	1.8 days				1.9 days				3.1 days
The average duration of labour	5.6 h, for incision infection 4.1 hour				18 h, for incision infection 14 hour				10.6 h
The average number of ASC	Average 0,93.				Average 0.8				0.9

(ASC=amnioscopy, RVP= premature rupture of membranes, Prit.=peritonitis, Endomet.=endometritis, Inc. I.=incision infection)

## Discussion

In our study inflammatory complications developed in 25 (5.5%) cases, without regards to which ABP was applied. The most common inflammatory complication was wound infection: 21 cases (84%). Other inflammatory complications were very rare: endometritis in 2 cases (0.66%) and peritonitis in 2 cases (0.66%). With the use of ABP of a single dose of antibiotics we had no inflammatory complications, but unfortunately this was the least common form of ABP (4.6%). Other studies have shown, infection occurs in up to 50% without the use of ABP and while during the use of ABP it appears in only 3% of cases (6,7,8). It is more common in emergency caesarean sections in relation to planned surgery, which contributes to quick, sometimes superficial abdominal wall preparation as in previous vaginal examinations after the rupture of the membranes. Complications of emergency surgery occur in ap-

proximately 25-50% of surgical patients, despite improvement of surgical techniques, anaesthesia, compensation for biochemical and electrolyte disorders, blood infusion, antibiotic therapy, and other modern methods of treatment and care.

## Conclusion

In order to bring the inflammatory complications to a minimum it is indicated to reduce risk: to reduce the number of emergency operations, increase the number of elective surgeries, lower the number of anemia and RVP (the most common risk factors) and to reduce the length of confinement to a decision for surgery. In all cases, except in those with high-risk for the development of inflammatory complications, ABP with a single dose of antibiotic should be used.

## Competing interests

Authors declare no conflict of interest.

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