

## Bacterial Vaginosis and Its Relation to Caesarean Wound Infection

Rafaat Ramdan Alkady <sup>1,\*</sup> M.B.B.Ch, Emad Abdelrahman Eltemamy <sup>1</sup> MD,

Ahmed Taha Abdelfattah <sup>1</sup> MD and, Wael Refaat Haplas <sup>2</sup> MD.

Obstetrics &  
Gynecology

### \*Corresponding Author:

Rafaat Ramdan Alkady

[Rafaat\\_alkady@hotmail.com](mailto:Rafaat_alkady@hotmail.com)

Received for publication January 31, 2022; Accepted August 31, 2022; Published online August 31, 2022.

doi: 10.21608/aimj.2022.110045.1715

**Citation:** Rafaat R. , Emad A. and Ahmed T. et al .Bacterial Vaginosis and Its Relation to Caesarean Wound Infection. AIMJ. 2022; Vol.3-Issue8 : 94-97.

<sup>1</sup>Obstetrics and Gynecology Department, Faculty of Medicine, Al-Azhar University Cairo, Egypt.

<sup>2</sup>Clinical Pathology Department, Faculty of Medicine, Al-Azhar University Cairo, Egypt.

### ABSTRACT

**Background:** Bacterial vaginosis (BV) is a prevalent female condition, with roughly one-third of females aged 14 to 49 screening positive for BV. BV is found in a comparable percentage of postmenopausal females.

**Aim of the work:** To investigate the relation between the bacterial vaginosis and caesarean wound infection.

**Patients and methods:** This is a prospective research that was performed on a total of 200 pregnant women prepared for elective emergency caesarean section and was conducted in the Obstetrics & Gynecology department, Al-Materia Teaching Hospital, Cairo, Egypt, to study if intermediate or definite phases of BV represent hazard factors for postsurgical wound infection following caesarean section starting from October 2020 to August 2021.

**Results:** Cesarean wound infection was significantly more frequent among bacterial vaginosis group related to the control. The identification of BV associated organisms like *G. vaginalis* from individuals experiencing post-hysterectomy cuff infections further supports the link between BV and postsurgical infections. Also, Cesarean wound infection occurred before discharge in 56.8% of patients in bacterial vaginosis group.

**Conclusion:** Bacterial vaginosis is a serious public health issue that is particularly common in women who are pregnant and is linked to surgical site infection. Screening women for BV before they have a caesarean section may be a safe and cost-effective way to decrease postsurgical infections.

**Keywords:** Bacterial Vaginosis; Caesarean Wound Infection.

**Disclosure:** The authors have no financial interest to declare in relation to the content of this article. The Article Processing Charge was paid for by the authors.

**Authorship:** All authors have a substantial contribution to the article.

**Copyright:** The Authors published by Al-Azhar University, Faculty of Medicine, Cairo, Egypt. Users have the right to read, download, copy, distribute, print, search, or link to the full texts of articles under the following conditions: Creative Commons Attribution-Share Alike 4.0 International Public License (CC BY-SA 4.0).

### INTRODUCTION

Bacterial vaginosis (BV) is a prevalent female condition, with roughly one-third of females aged 14 to 49 screening positive for BV. BV is found in a comparable percentage of postmenopausal females. <sup>1</sup>

BV is the most common cause of vaginal secretions or malodor among women seeking care; however, the majority of females with BV are asymptomatic. Aside from the discomfort, BV is linked to a number of negative consequences. Untreated BV is linked to subsequent sexually transmitted infections (STIs). STIs related to BV infection include *Trichomonas vaginalis*, *Chlamydia trachomatis*, *Neisseria gonorrhoeae*, and herpes simplex virus infection. <sup>2</sup>

When it comes to pregnancy, BV was linked to a higher likelihood of developing intrapartum chorioamnionitis, a known risk factor for postpartum endometritis. BV has also been linked to post-caesarean endometritis, with BV microorganisms being isolated in the endometrial cavities of such

women. <sup>3</sup> Presurgical intravaginal metronidazole gel administration minimizes the chances of post-caesarean endometritis by 58 % in women who underwent caesarean birth <sup>4</sup>.

In women who have had an early pregnancy terminated, presurgical BV therapy can lower the risk of infection. In one study, women who had presurgical BV had a 6-fold increased incidence of postorbital endometritis. <sup>5</sup> In randomized controlled studies of women who had BV after having first-trimester abortions, women who had metronidazole or clindamycin prior to surgery had rates of infection that were 3-to 4-fold less. Perioperative metronidazole therapy was also reported to be an efficient choice for women having BV who are having an abortion, reducing the risk of postprocedural upper genital tract infections by about half. <sup>6</sup>

Preoperative BV treatment must focus on efficacy, adherence, and, in some patients, therapy length. One of the traditional benefits of single-dose treatment is

that patients' adherence is nearly guaranteed. Preoperative BV therapy has the additional benefit of treating BV as soon as possible before a scheduled operation date.<sup>1</sup>

The purpose of the research was to examine the relationship between bacterial vaginosis and caesarean wound infection.

### PATIENTS AND METHODS

This is a prospective research that was performed on a total of 200 pregnant women prepared for elective emergency cesarean section and was conducted in the Obstetrics & Gynecology department, Al-Materia Teaching Hospital, Cairo, Egypt, to study if intermediate or definite phases of BV represent hazard factors for postsurgical wound infection following caesarean section starting from October 2020 to August 2021.

Pregnant women with the following criteria were included in the study scheduled to undergo elective cesarean section and age between 22 and 35 years. While patients with medical disorder e.g., Diabetes.... etc., twins and history of treatment of bacterial vaginosis or vaginal therapy were excluded from the study.

The study involved 200 women who were pregnant and were split into two groups: Group I: included 100 pregnant with positive bacterial vaginosis and Group II: included 100 pregnant with negative bacterial vaginosis.

Study procedure: All patients in this research gave their informed consent and were submitted to a thorough clinical examination that included a full history as well as general, abdominal, and pelvic exams. History taking: including (personal history, age, obstetric history, medical history, surgical history, past history and family history). Clinical exams include general, abdominal, and pelvic exams. Investigations: including (labs; CBC, blood group, liver and kidney functions, coagulation profile & imaging; 2D obstetric ultrasound).

Prior to surgery, vaginal cultures have been acquired for pregnant women having a caesarean section. To maintain confidentiality, every patient has only been

identified using a code. Vaginal swabs have been rolled onto glass slides right away by making vaginal smears, which have been Gram-stained and scored using the Nugent technique.

The Nugent approach involved scoring the general character of the vaginal flora by examining bacterial morphotypes under a microscope. Nugent scores vary from 0 to 10, depending on the predominance of three bacterial morphotypes, which approximately correlate to *Lactobacillus*, *G. vaginalis* or *Mobiluncus*, and *Bacteroides*.

The amount of long rod-shaped Gram-positive bacilli has been rated 0-4, with 0 indicating a large number of *Lactobacillus*; small Gram negative and Gram-variable rods and coccobacilli (*Bacteroides* and *G. vaginalis*) have been rated 0-4, with 4 indicating the greatest recorded quantity of such bacteria; and curved rods (for example, *Mobiluncus* spp.) are rated 0-2, with 2 indicating the greatest recorded numbers. All swabs have been rolled by the same technician, and all slides have been stained and scored by the same technician, to guarantee consistency in the vaginal fluid amount on every slide, as well as Gram-staining and Nugent scoring. Cesarean section wound followed after operation to identify of the sepsis of the wound. Septic wound was render to culture and sensitivity to identify the causative organism and proper treatment.

Statistical analysis: IBM SPSS statistics (Statistical Package for Social Sciences) software version 22.0, IBM Corp., Chicago, USA, 2013, has been employed to code, tabulate, and statistically analyze the obtained data. Following checking for normality with the Shapiro-Wilk test, quantitative normally distributed data is reported as mean±SD (standard deviation), and if the data is normally distributed, it is then compared using an independent t-test. Qualitative data is expressed as numbers and percentages for variables with small anticipated quantities, and the Chi-square test and Fisher's exact test are employed to compare them. If the P value was less than 0.050, it was considered significant; otherwise, it was considered non-significant. Relative Rate= Bacterial vaginosis Rate / Control Rate.

### RESULTS

Variables		Bacterial vaginosis (N=100)	Control (N=100)	P-value
Age (years)	Mean±SD	27.8±2.9	27.9±3.0	#0.736
	Range	22.0–35.0	22.0–35.0	
BMI (kg/m <sup>2</sup> )	Mean±SD	28.8±2.8	29.3±2.5	#0.155
	Range	21.3–35.7	24.0–36.4	
Parity	Nulli	23 (23.0%)	26 (26.0%)	#0.622
	Multi	77 (77.0%)	74 (74.0%)	
Previous caesarean section, (n, %)		38 (38.0%)	42 (42.0%)	#0.564
GA (weeks)	Mean±SD	39.8±0.7	39.8±0.7	#0.919
	Range	38.0–41.0	38.0–41.0	

BMI: Body mass index. GA: Gestational age. ^Independent t-test. #Chi square test

**Table 1:** Characteristics of the studied groups' demographics

Table (1) reveals that there were no significant differences in age, BMI, parity, previous caesarean section, or gestational age across the groups studied.

Variables		Bacterial vaginosis (N=100)	Control (N=100)	P-value
Indication (n, %)	Elective	79 (79.0%)	73 (73.0%)	#0.321
	Emergency	21 (21.0%)	27 (27.0%)	
Duration (minutes)	Mean±SD	48.9±4.7	48.1±4.6	#0.217
	Range	38.0–58.0	39.0–60.0	
Blood loss (mL)	Mean±SD	565.4±62.5	569.8±60.3	#0.541
	Range	460.0–770.0	400.0–690.0	

^Independent t-test. #Chi square test

**Table 2:** Characteristics of the studied groups' operations

Table (2) reveals that there are no statistically significant differences between the studied groups in terms of operation indication, duration and blood loss.

Infection	Bacterial vaginosis (N=100)	Control (N=100)	#P-value	RR (95% CI)
Present	37 (37.0%)	14 (14.0%)	<0.001*	2.64
Absent	63 (63.0%)	86 (86.0%)		(1.53–4.58)

#Chi square test. \*Significant. RR: Relative rate. CI: Confidence interval.

**Table 3:** Cesarean wound infection in the study groups

Table (3) demonstrates that cesarean wound infection was significantly more frequent in the bacterial vaginosis group.

Time	Bacterial vaginosis (N=37)	Control (N=14)	P-value	RR (95% CI)
≤ 7 days	21 (56.8%)	3 (21.4%)	0.024*	2.65
> 7 days	16 (43.2%)	11 (78.6%)		(0.93–7.51)

#Chi square test. \*Significant. RR: Relative rate. CI: Confidence interval.

**Table 4:** Cesarean wound infection time among the studied groups

Table (4) shows that cesarean wound infection within one week was significantly more frequent among bacterial vaginosis group.

Readmission	Bacterial vaginosis (N=100)	Control (N=100)	§P-value	RR (95% CI)
Present	8 (8.0%)	1 (1.0%)	0.035*	8.00
Absent	92 (92.0%)	99 (99.0%)		(1.02–62.79)

§Fisher's Exact test. \*Significant. RR: Relative rate. CI: Confidence interval.

**Table (5):** Readmission due to cesarean wound infection in the study groups

Table (5) demonstrates that readmission due to cesarean wound infection was significantly more frequent among bacterial vaginosis group.

## DISCUSSION

The goal of this research was to look into the relationship between bacterial vaginosis and caesarean wound infection.

This prospective clinical study was conducted at Obstetrics & Gynecology department, Al-Materia Teaching Hospital, Cairo, Egypt from October 2020 till August 2021 and performed on total 200 pregnant women who were prepared for elective Cesarean Section.

During this study, 230 patients have been evaluated for eligibility, and 200 patients have been accepted (100 in each group). Ten patients have been omitted from the study because they did not meet the inclusion criteria, and 20 patients declined to participate.

Finally, the study relied on data from 200 pregnant women who were prepared for elective cesarean section, divided into two groups.

The current study revealed no significant differences between the analyzed groups in terms of age, BMI, parity, previous cesarean section, and gestational age (p values = 0.736, 0.155, 0.622, 0.564, 0.919), respectively.

Our results revealed no significant differences between the analyzed groups in terms of operation indication, duration, and blood loss (p values = 0.321, 0.217, and 0.541, respectively).

Our results revealed that Cesarean wound infection was significantly more frequent among bacterial vaginosis group related to the control (p value <0.001).

Different studies were done to screen for and correlate BV with surgical site infections; some of them agree with our findings, while others disagree.

These results are consistent with previous studies. In a study involving 134 patients who had undergone abdominal hysterectomy, Soper (2019)<sup>1</sup> found that the vaginal-cuff cellulitis rate or abscess had been significantly greater in women having presurgical BV compared to women who did not have BV (34% versus 11%).

Isolation of BV associated organisms like *G. vaginalis* from women having post-hysterectomy cuff infections further supports the link between BV and postsurgical infections<sup>1</sup>.

Soper (2019)<sup>1</sup> discovered that metronidazole therapy prior to surgery resulted in a significantly lower vaginal-cuff infection rate and the duration of hospitalization in women who had BV and had

hysterectomy (0% versus 36%;  $P < .05$ ) compared to those who did not receive BV therapy.

To avoid perinatal complications, Kulkarni and Wagh (2020)<sup>7</sup> conducted an observational study to investigate the incidence of BV in women who are pregnant at an antenatal clinic, which involved 246 pregnant women during the second and third trimesters.

According to Kulkarni and Wagh (2020)<sup>(7)</sup>, BV was linked to a higher risk of preterm labour as well as premature membrane rupture. Consequently, pregnant women are at high risk for postoperative surgical site infection.

According to Hay (2017)<sup>8</sup>, women suffering from bacterial vaginosis who have an elective pregnancy termination are at an increased risk of endometritis as well as pelvic inflammatory illness, which may be present in almost 30% of such women.

Our results revealed that Cesarean wound infection occurred before discharge in 56.8% of patients in bacterial vaginosis group (p value =0.024).

Consequently, Readmission due to cesarean wound infection was significantly more frequent among bacterial vaginosis group (p value=0.035).

However, our study had strong point of follow-up the patients postoperatively regarding the time of surgical site infection and incidence of readmission than Soper (2019)<sup>1</sup> and Hay (2017)<sup>8</sup> which did not assess the time of surgical site infection and incidence of readmission.

Taking into account the same findings that link BV to intrapartum chorioamnionitis and post-cesarean endometritis, Jacobsson et al. (2012)<sup>9</sup> revealed that BV screening at the 35 to 37-week group B streptococcus culture visits, as well as managing women with BV, ought to be considered.

However, this study showed that preoperative screening and treatment of BV before elective CS seems to be promising method for decreasing postoperative surgical site infections.

This study's strong points include its prospective research design, patient inclusion, and the fact that no patients were lost to follow-up postoperatively. It is the first study to link bacterial vaginosis to a specific type of surgical site infection, cesarean wound infection.

The study's shortcomings are worth mentioning, including the study's smaller sample size compared to earlier studies, not being a multicentric study as Kulkarni and Wagh (2020)<sup>(7)</sup> involved a total of 246

patients. Another limitation is the lack of a link between BV and unfavorable pregnancy results, specifically premature birth and neonatal sepsis.

## CONCLUSION

Bacterial vaginosis is a serious public health issue that is particularly common in women who are pregnant and is linked to surgical site infection. Screening women for BV before they have a caesarean section may be a safe and cost-effective way to decrease postsurgical infections.

Conflict of interest : none

## REFERENCES

1. Soper DE. Bacterial vaginosis and surgical site infections. *Am J Obstet Gynecol.* 2020; 222(3):219-23.
2. Bautista CT, Wurapa EK, Sateren WB, Morris SM, Hollingsworth BP and Sanchez JL Association of bacterial vaginosis with chlamydia and gonorrhea among women in the U.S. Army. *Am J Prev Med.* 2017; 52:632-9.
3. Newton ER, Piper J and Peairs W, Bacterial vaginosis and intraamniotic infection. *Am J Obstet Gynecol.*1997; 176:672-7.
4. Pitt C, Sanchez-Ramos L and Kaunitz AM, Adjunctive intravaginal metronidazole for the prevention of post-cesarean endometritis: a randomized controlled trial. *Obstet Gynecol.*2001; 98:745-50.
5. Hamark B and Forssman L, Postabortal endometritis in chlamydia-negative women association with preoperative clinical signs of infection. *Gynecol Obstet Invest.*1991; 31:102-5.
6. Carlsson I, Breeding K and Larsson PG, Complications related to induced abortion: a combined retrospective and longitudinal follow-up study. *BMC Womens Health.*2018; 18:158.
7. Kulkarni P and Wagh G, Prevalence of bacterial vaginosis in pregnant women and its association with adverse perinatal outcomes. *Indian Journal of Obstetrics and Gynecology Research.*2020; 7: 187-92.
8. Hay P. Bacterial vaginosis. *F1000Res.*2017; 6:1761.
9. Jacobsson B, Pernevi P, Chidekel L and Jörgen Platz-Christensen J, Bacterial vaginosis in early pregnancy may predispose for preterm birth and postpartum endometritis. *Acta Obstet Gynecol Scand.*2012; 81:1006-10.