

DETERMINANTS OF POST-CAESAREAN WOUND INFECTION AT THE UNIVERSITY COLLEGE HOSPITAL IBADAN NIGERIA

***IO Morhason-Bello, *A Oladokun,**BO Adedokun, *KA Obisesan, *OA Ojengbede, *OO Okuyemi**
*Departments of *Obstetrics & Gynaecology, University College Hospital, Ibadan, and *Epidemiology,
Medical Statistics and Environmental Health, College of Medicine, University of Ibadan, Ibadan, Nigeria.*

ABSTRACT

Objective: To determine the risk factors that predispose patients to post-caesarean wound infection at a tertiary health institution in a developing country.

Method: It was an observational study of all women that had caesarean (elective and emergency) delivery between July and September, 2004. The outcome of their post-caesarean wound was assessed. Statistical analysis (Bivariate and logistic regression) of the identified risk factors in patients who developed wound infection was performed at a 95% level of confidence.

Result: The post-caesarean wound infection rate was 16.2%. The identified risk factors were lower educational status, multiple pelvic examination, offensive liquor at surgery and patients that are unbooked. Following logistic regression, women with up to primary school were 20 times more likely than those with secondary education and above to develop wound infection (95% CIOR = 1.8 to 250.0)

Conclusion: The outcome showed that the identified determinants of post-caesarean wound infection were comparable with earlier reports. Women with lower educational status are more at risk in this study. Therefore, these women need special attention to reduce the risk.

Key Words: Caesarean Section, Wound Infection, Risk Factors, Determinants. (Accepted 21 January 2008)

INTRODUCTION

Although caesarean section has become an increasingly safe and common surgical procedure^{1,2}, but it is still associated with significant morbidity and mortality¹. Maternal mortality after caesarean section has been estimated to be between 5.81 and 6.1 per 100,000 procedures^{3,4}. About 20% to 50% of these deaths are attributable to caesarean delivery including anaesthesia with the remainder being the result of the complication that led to the procedure¹. Generally, post caesarean section complications are similar to those observed from any laparotomy apart from endomyometritis¹. These include; wound infection, thromboembolism, damage to contiguous structures i.e. bladder (0.3%)⁵, ureters (0.1%)⁵ and bowels (0.1%)⁶.

Postoperative wound infection, despite the discovery of penicillin in 1940s remains a recognizable complication of caesarean section due to its potentially contaminated nature^{1,7}. Post caesarean wound infection rate varies across localities and countries. An incidence of 2 - 7% was reported in USA⁸, 2-15% in UK² and up to 24% was reported in Africa⁹. However, a rate of 3 - 7% was

reported in a hospital based study at Obafemi Awolowo University Teaching Hospital by Fasubaa et al in 2000¹⁰.

Several risk factors have been identified that predispose patients to post caesarean wound infection. These include prolonged labour, prolonged rupture of membranes, multiple vaginal examination during labour, emergency intrapartum surgery, amnionitis or previous meconium passage and duration of surgery- especially when more than 1 hour.^{2,9,11,12} Medical conditions such as diabetes mellitus, sickle cell disease, obesity and anaemia have also been shown to be associated with wound infection.^{2,13,14,15} Other risk factors include patients on prolonged corticosteroid therapy, immunosuppression, low socioeconomic status and abdominal wall haematoma.¹⁴ Perioperative antibiotic use has been proven to prevent wound infection even among patients with the highest risk.^{16,17}

The following measures could be undertaken to reduce the wound infection rates. They are proper preoperative skin preparation and maintenance of aseptic technique throughout the surgery, judicious use of perioperative antibiotics, ensuring haemostasis especially around the wound edges and control of diabetes mellitus. Some factors however are not easy

Correspondence: Dr IO Morhason-Bello
E-Mail: onembello@yahoo.co.uk

to correct prior to surgery e.g. Obesity.¹⁴ Prevention of wound infection using the above measures is necessary to avoid associated morbidities such as thrombophlebitis, incisional hernia, pelvic adhesion and its attendant complications. Psychological upsets and economical problems suffered by the patients due to their prolonged hospital stay are also avoided.^{10,13} The objective of this study was to determine the risk factors associated with post caesarean section wound infection.

MATERIALS AND METHODS

This was an observational study, which was carried out between 1st of July 2004 to 30th of September, 2004 at University College Hospital, Ibadan. The hospital is a tertiary/teaching centre located in the capital of Oyo state.

All the patients that had caesarean section (elective and emergency) during the study period were recruited and they were followed from labour ward into the lying ward till their discharge. All the patients had prophylactic antibiotic.

Relevant information from all the patients' medical records including the recognisable risk factors to wound infection was retrieved. Some of this information was clarified by interviewing the patients. Also, their wounds were examined at least 48 hourly till discharge for any evidence of infection. All the treatment offered to those that developed wound infections were recorded.

The data collected were entered into SPSS 11 statistical package. The initial analysis was by generation of frequency tables and further analysis involved cross tabulation to explore statistical relationships between the wound infection and the risk factors. The observed relationships were subjected to Chi square test and the level of statistical significance was set at 0.05. Logistic regression analysis was carried out to identify significant predictors and 95% confidence intervals for odds ratios were computed.

RESULTS

During the study period, 74 patients had caesarean section done out of 256 deliveries giving a caesarean rate of 28.9%. The mean age of the women who had caesarean section was 30.2yrs (SD=6.3) with about half in the age group 26 to 30 years. The study participants were predominantly traders (43.2%). About 46% of the patients had tertiary education while 6.8% had no formal education. Multiparous women constituted about half of the patients and 56.8% were unbooked (Table 1).

Emergency caesarean section was performed for 82.4 percent of patients who had abdominal delivery. Most surgeries were performed by senior residents

(79.7%) while about 9.5% and 10.8% were performed by consultants and junior residents respectively.

Of the patients who had caesarean section, about 16.2% had post operative wound infection.

Educational status was significantly associated with wound infection ($p < 0.001$) with patients with lower educational status being at a higher risk. Other socio-demographic characteristics were not significantly related (Table 2). Frequency of pelvic examinations ($p = 0.008$), liquor state at surgery ($p < 0.001$) and booking status ($p=0.048$) were significantly associated with wound infection. All the patients who developed wound infection had emergency caesarean section. Other clinical variables such as duration of labour, duration of surgery, interval between membrane rupture and surgery, estimated blood loss and post-operative haematocrit were not significant (Table 3).

Table 1: **Socio-Demographic and Clinical Characteristics of Patients That Had Caesarean Section (N = 74)**

VARIABLES	PERCENTAGES (%)
Age (years)	
• 15 – 24	10.9
• 25 – 29	48.6
• 30 – 34	27.0
• 35 – 44	13.6
Educational status	
▪ None	6.8
▪ Primary	28.9
▪ Secondary	18.9
▪ Tertiary	45.9
Occupation	
• Trader	43.2
• Civil servant	20.3
• Artisans	12.2
• Professional	12.2
• Housewife	8.1
• Student	4.0
Booking status	
▪ Booked	56.8
▪ Unbooked	43.2
Parity	
• Nulliparous	47.2
• 1 – 4	50.0
• > 4	2.8
Duration of labour (Hours)	
▪ <12hours	24.3
▪ 12 – 24	16.2
▪ >24	24.3
▪ Not in labour	35.1
Length of membrane rupture (Hours)	
• Intact	40.5
• < 12	14.9
• 12 – 24	28.4
• > 24	21.6
Type of caesarean section	
▪ Emergency	82.4
▪ Elective	17.6

All the patients with medical diseases (two had sickle cell diseases, 3 had diabetes mellitus and the remaining 3 were hypertensive) had elective caesarean delivery and they had no infection. Logistic regression analysis was carried out using predictor variables significant at 10% on bivariate analysis. This revealed a significant relationship between educational status and wound infection. Women with primary school as the highest

educational level were about 20 times more likely than those with at least secondary education (95% CI OR = 1.8 250.0) to develop post operative wound infection. Booking status, frequency of pelvic examinations and state of liquor at surgery were however not significant (Table 4).

Table 2: **Bivariate Relationships of Post Caesarean Section Wound Infection and Sociodemographic Variables**

Variables	% of subgroup with wound infection(n in category)	P value	Level of significance
Age			
• 15 – 29	15.9(44)	0.760	NS
• 30 – 39	13.3(30)		
Occupation			
▪ Traders	21.9(32) 9.5(42)	0.139	NS
▪ Others			
Educational status			
• Primary or less	38.5(26)	<0.001*	S
• Secondary+	2.1(48)		
Religion			
▪ Islam	21.7(23)	0.264*	NS
▪ Christianity	11.8(51)		
Parity			
• None	17.1(35)	0.634	NS
• = 1	13.2(38)		

*Fisher's exact test used for test of hypothesis

** S Significant at 5% ; NS- Not significant

Table 4: **Logistic Regression of Wound Infection on Patient's Characteristics**

Variable	β	Odds Ratio (β)	95% CI for OR
Educational Status* (up to Primary vs =Secondary)	3.02	20.41	1.78 – 250.00
Booking Status Booked vs Unbooked	0.24	1.28	0.20 – 8.33
Pelvic examinations > 2 vs = 2	1.20	3.33	0.51 – 21.72
State of liquor stale and offensive vs Clear and fresh	1.46	4.29	0.66 – 28.04

* Significant variable

Table 3: **Bivariate Relationships of Post Caesarean Section Wound Infection and Clinical Variables**

Variables	% Of Subgroup With Wound Infection	P Value	Level Of Significance**
Duration of labour			
• <24 hours	10.0(30)		
• 24 hours and above	18.2(44)	0.508*	NS
Duration of membrane rupture			
▪ <24 hours	13.8(29)	1.000*	NS
▪ 24 hours and above	15.6(45)		
Number of pelvic examinations			
• 2 or less	4.9(41)	0.008*	S
• 3+	28.1(32)		
State of liquor at surgery			
▪ Clear	0.0(43)	<0.001*	S
▪ Meconium stained	35.5(31)		
Booking status			
• Booked	7.1(42)	0.048*	S
• Unbooked	25.0(32)		
Type of caesarean section			
▪ Elective CS	0.0(13)	0.194*	NS
▪ Emergency CS	18.0(61)		
Duration of the surgery			
• < 1 hour	8.3(36)	0.124	NS
• > 1 hour	21.1(38)		
Estimated blood loss			
▪ < 500mls	8.6(35)	0.149	NS
▪ 500 – 750mls	20.5(39)		
Post operative haematocrit			
• < 25	26.7(15)	0.219*	NS
• ≥ 25	11.9(59)		

*Fisher's exact test used for test of hypothesis

** S Significant at 5%; NS- Not significant

DISCUSSION

Post caesarean wound infection is a common complication worldwide with varied incidence from one centre to the other¹. From this study, the post operative wound infection rate was 16.2 percent. This rate of wound infection is higher when compared with USA and UK figures but, lower than some Indian and Ethiopian hospitals that reported 24% and 27.1% respectively.^{1,2,9} This might be due to the higher rate of emergency caesarean section (82.4%) performed in our hospital. This observation correlates well with earlier reports which suggested that patients delivered by emergency caesarean section experience more postnatal complications such as febrile morbidity, urinary tract infection, and wound infection etc.¹⁸

Planned caesarean section confer negligible risk for wound infection as suggested by Hawrylyshn et al.¹¹ Similarly, none of the patients that had elective caesarean in this study developed wound infection. This may be due to the fact that these patients are usually optimized prior to surgery.

From our study, lower educational status, multiple pelvic examinations, meconium stained liquor and unbooked status were associated with higher risk of wound infection. These findings are consistent with earlier observations made by other workers.^{2,11,12,14}

Of the identified risk factors in our study, educational status was the only independent variable that influences the risk of post caesarean wound infection on logistic regression analysis. Educational status has been shown to be a fair reflection of social status of women. Previous reports have demonstrated association between low social status and postpartum morbidities including wound infection¹⁹.

Corosu et al reported significant associations between higher blood loss, post operative haematocrit of less than 30%, duration of surgery of more than 60 minutes and post caesarean wound infection, but all these were not found to be significant in our study²⁰.

The reason why these variables were not significant in this study may be due to the sample size. In addition, the type of caesarean (elective or

emergency) section was difficult to analyse as all the emergencies were performed at night by the residents and also, the dexterity of the individual surgeon was hard to be subjected to statistical analysis.

Post caesarean wound infection rate is still high in Nigeria like other developing countries. The various determinants identified in this study were comparable to earlier studies. Women with primary education or less are more predisposed to post caesarean wound infection. It is therefore imperative that efforts should be concentrated on preventing identified factors in our facilities so as to drastically reduce the rate of wound infection. In addition, women with lower educational status should be given special attention to further reduce their risk. Enlightening the public especially women about the benefit of booking for antenatal care in hospital is also an essential precautionary measure²¹.

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