PREVALENCE AND PATTERN OF POST CAESAREAN SECTION WOUND SEPSIS AT THE UNIVERSITY OF PORT HARCOURT TEACHING HOSPITAL: A 5 YEAR REVIEW

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ABSTRACT

Background:

Caesarean section is one of the most common surgical procedures in obstetrics. It remains a safe way of birth yet it is associated with maternal and perinatal morbidity and mortality including wound infection. Post caesarean section wound infection is an important cause of physical, psychological, and socio-economic trauma.

Material and Methods:

This was a five-year retrospective study of case records of 51 women managed with wound infection following caesarean sections at the University of Port Harcourt Teaching Hospital. Statistical analysis of results was done using Microsoft Excel® 2017 statistical software. The level of statistical significance was set at P-value <0.05 at 95% confidence interval.

Results:

The mean age of patients was 29.68 ± 4.88 (S.D) years and the mean parity was 1.43 ± 1.34. The prevalence of wound infection was 1.99%. Some identified risk factors were emergency caesarean section, prolonged labour, cephalopelvic disproportion and post-operative anaemia. Most of the surgeries were done by senior residents, lasted for more than 1 hour and mean blood loss during caesarean section was 1.03 ± 0.80 (S.D) litres. The majority 16 (31.37%) of the wound swab specimen yielded Staphylococcus aureus and ceftriaxone was the most commonly used sensitive antibiotic. All the patients stayed in the hospital for more than seven days.

Conclusion:

The pattern of the risk factors, micro-organisms cultured from wounds, antibiotics used and complications like a prolonged hospital stay identified in this study, highlights the need to promote effective measures to prevent and manage wound infections.

Keywords:

Caesarean section, Wound infection, Port Harcourt.

INTRODUCTION

Caesarean section (CS) is one of the most common surgical procedures in obstetrics and it involves the delivery of the fetus, placenta and membranes through a surgical incision made on the anterior abdominal wall and uterus after the age of fetal viability.[1]

The rates of births by caesarean section are on the increase worldwide but vary from region to region.[2] Even though the prevalence of caesarean section in a population-based cross-sectional study in Nigeria was 2.1% mainly due to unmet needs in the bulk of rural centres, the rates were high in various secondary and tertiary centres.[3] In a multicentre study in Nigeria the caesarean section rate was 10.4%, while in Sokoto and Port Harcourt tertiary centre recorded caesarean section rates were 11.3% and 30.3% respectively.[4–6]

A surgical site infection (SSI) is defined by the Centers for Disease Control and Prevention (CDC) criteria, as an infection that occurs within 30 days after a surgical procedure. It is further divided into superficial incisional primary and secondary SSIs, deep incisional primary and secondary SSIs and organ/space SSIs if involving structures deeper than muscle and fascia space.[7] The global estimates of surgical site infections (SSI) are from 0.5–15%.[8]

Caesarean section wound infections represent a substantial burden of SSIs on the health system and the prevention of such infections should be a healthcare priority in developing countries like Nigeria.[9] It is also a major burden to the economy as prolonged hospital stay is almost inevitable with caesarean sections complicated by wound sepsis.[9]

The overall rate of infection following caesarean section is likely to be significantly higher than generally estimated due to undocumented mild cases. Post caesarean section wound sepsis rate varies across localities and countries with benchmark incidence quoted from Royal College of Obstetricians and Gynaecologists (RCOG) Green-top guidelines of 6.4%.[10] Generally post caesarean infection rates in some centres in Africa range between 7.1% and 19% and in Nigeria between 9% and 16.2%.[11]

Several risk factors have been shown to predispose patients to post caesarean section wound infections. These include emergency caesarean section, prolonged rupture of membranes, prolonged labour, multiple vaginal examinations during labour, emergency intrapartum surgery, chorioamnionitis, heavy meconium stained liquor and prolonged surgery.[12–14] Also co-morbidities like diabetes mellitus, Human Immunodeficiency Virus (HIV) infection, sickle cell disease, obesity and anaemia are also known risks for wound sepsis.[12]

Many wound infections start by contamination, from the skin, vaginal flora or nosocomial infection. In many centres in Nigeria, Staphylococcus aureus is the most common organism isolated from both non-surgical, surgical and post caesarean section wound infection.[15,16]Other important common causes of post caesarean section surgical site infection include Escherichia coli, Enterococcus faecalis, Proteus mirabilis and Pseudomonas species.[17] This difference in the spectrum of aetiologic organisms suggest that the practice of prophylactic antibiotics may fail to prevent infection of the caesarean section wound when the wrong agent is used or the right agent is used incorrectly.[9]

With rising rates of caesarean section, especially in tertiary health centres like the University of Port Harcourt Teaching Hospital, there is a need

to observe the pattern of post caesarean section wound sepsis. This is not only targeted at determining the incidence over the years but also to identify the pattern of risk factors, commonly isolated organisms commonly used antibiotics and complications associated with wound sepsis following caesarean section at the University of Port Harcourt Teaching Hospital.

MATERIALS AND METHODS

STUDY SITE

The study was carried out at the Obstetric Unit of the University of Port Harcourt Teaching Hospital in Rivers State by reviewing the records from January 1, 2015, to December 31, 2019. The hospital is an 882-bed hospital located at East-West road in Obio-Akpor local government area of Rivers state South-South, Nigeria.

Averages of 1,500 deliveries are conducted annually. The complex has a total of 169 beds, with 30 beds in the antenatal ward, 80 beds in the postnatal ward, 13 beds in the first stage room, 4 beds in the second stage room, and 8 beds in the private/semi-private rooms. It also has two operating theatres in the labour ward. There are five units and each unit has four consultant obstetricians, five specialist senior registrars and four registrars.

The case records of patients are documented in their case files, registered in admission/discharge books in the ward and preserved in the central library of the records department of the hospital when they are discharged.

METHOD

The maternity records of all patients that were delivered in the University of Port Harcourt Teaching Hospital from 1st January 2015 to 31st December 2019 were reviewed. All patients that were delivered by caesarean section who had wound sepsis were identified from the postnatal ward and unbooked lying-in ward records. Their case files were retrieved from the medical records department.

Cases were reviewed in detail concerning their socio-demographic characteristics, type of CS, duration of the labour, duration of rupture of membranes, duration of surgery, blood loss, post-operative packed cell volume, organism isolated from wound swab microscopy culture and sensitivity (MCS), duration of postoperative hospital stay and other outcomes of management.

STATISTICAL ANALYSIS

Data analysis was done with Microsoft Excel 2017 software. Means, standard deviation and chi-square test of statistical significance were carried out as appropriate. The values of the qualitative variables were expressed in percentage of the total. Statistical significance was set at $p < 0.05$.

RESULTS

A total of 7365 deliveries occurred during the period under review; 1st January 2015 to 31st December 2019, with a total of 3616 caesarean section deliveries. Of this number of caesarean sections 72 had post caesarean section wound sepsis, thus its incidence was 1.99%. A total of 51 case folders were retrieved and analyzed, giving a retrieval rate of 70.83%.

The age of the patients ranged from 20-40 with a mean age of 29.68 ± 4.88 (S.D) years. The mean parity was 1.43 ± 1.34 (S.D) with a range of 1-4. Table 1 shows the sociodemographic characteristics of the study group. The majority of the patients with post caesarean section wound sepsis belonged to the age group 25-29 (39.22%), para 1 (64.71%) and were unbooked

(64.71%) or booked referrals (15.69%). Of all the patients 37 (72.55%) had a secondary level of education and 16 (31.37%) were businesswomen. Figure 1 shows the booking status and parity of patients.

Most of the patients 49 (96.08%) had an emergency caesarean section, 33 (64.71%) were primary caesarean sections, while 18 (35.29%) and 9 (17.65%) had a caesarean section for cephalopelvic disproportion and prolonged obstructed labour. The common range of duration of surgery was 1.5 – 2 hours (29.41%) with a mean duration of 1.42 ± 0.63 (S.D) hours. The mean blood loss during caesarean section was 1.03 ± 0.80 (S.D) litres, while the mean pre-operative and post-operative PCV were 29.53 ± 7.67 (S.D) % and 27.90 ± 4.16 (S.D) % respectively. Thirty-five (68.63%) of the caesarean sections were performed by senior residents, while 4 (7.84%) were performed by consultants. Table 2 shows the different risk factors identified for post caesarean section wound sepsis.

The most common organisms grown on the culture of wound swap were Staphylococcus aureus (31.37%), Escherichia coli (29.41%) and Klebsiella spp (25.49%), while ceftriaxone (41.18%) was the most commonly used empirical antibiotics. Among the patients in this study group 31 (60.78%), 33 (64.71%) had a blood transfusion, 4 (7.84%) had surgical re-exploration, while 41(80.39%) and 38 (74.51%) had neither a medical co-morbidity nor intra-operative complication respectively. Among the patients, 44 (86.27%) had live births and 7 (13.73%) had stillbirths.

Most of the patients (37.25%) had a range of hospital stay of 14-20 days and the mean duration of hospital stay was 19.75 ± 8.98 (S.D) years. Table 3 shows the pattern of bacteria cultured, drug sensitivity and complications associated with post caesarean section wound sepsis.

Statistical analysis (Table 4) show a significant risk between the unbooked status of patients with anaemia and blood transfusion with p values of 0.010 and 0.005.

TABLES AND FIGURES

Table 1

Variable	Frequency (N=51)	Percentage (%)
Age Range		
20-24	7	13.73
25-29	20	39.22
30-34	17	33.33
35-40	7	13.73
Level of Education		
Primary	4	7.84
Secondary	37	72.55
Tertiary	10	19.61
Occupation		
Artisan	11	21.57

Business	16	31.37
Civil servant	2	3.92
Housewife	17	33.33
Professional	2	3.92
Student	3	5.88
Total	51	100.00

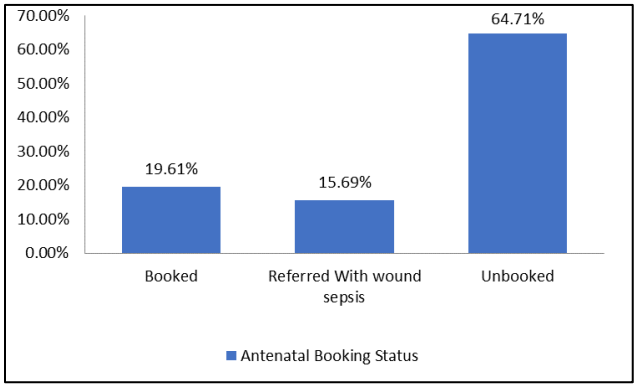

Figure 1.1

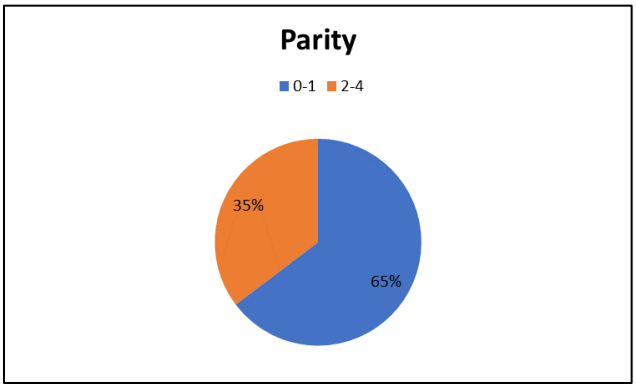

Figure 1.2

Table 2
Risk factors for Wound Sepsis

Variable	Frequency (N=51)	Percentage (%)
In labour before Caesarean Section		
No	13	25.49
Yes	38	74.51
Duration of Labour before Caesarean section(Hours)		
0-11	18	35.29
12-23	16	31.37
24-35	11	21.57
36-48	6	11.76
Duration of Rupture of membranes(Hours)		
0-23	25	49.02
24-47	18	35.29
48-71	3	5.88
72-95	3	5.88
120-144	2	3.92
Class of Caesarean Section		
Elective	2	3.92
Emergency	49	96.08

Type of Surgery		
Primary CS	33	64.71
Repeat CS	12	23.53
Caesarean hysterectomy	6	11.76
Indications for Caesarean Section		
Abruptio Placenta	5	9.80
Cord prolapsed	2	3.92
Cephalopelvic Disproportion	18	35.29
Eclampsia	2	3.92
Feta distress	5	9.80
Major Degree Placenta Previa	2	3.92
Prolonged Obstructed labour	9	17.65
Ruptured Uterus	6	11.76
Two previous CS with pre-eclampsia	2	3.92
Duration of Surgery (Hours)		
0.5-1	15	29.41
1-1.5	7	13.73
1.5-2	15	29.41
2-2.5	10	19.61
2.5-3	4	7.84
Pre-operative PCV		
10-19	8	15.69
20-29	14	27.45
30-39	26	50.98
40-49	3	5.88
Post-operative PCV		
20-29	31	60.78
30-39	20	39.22
Cadre of Surgeon		
Consultant	4	7.84
Junior Resident	6	11.76
Medical officer	6	11.76
Senior Resident	35	68.63
Total	51	100.00

Table 3
Management and Complications

Variable	Frequency (N=51)	Percentage (%)
Organisms isolated on Wound MCS		
Staphylococcus aureus	16	31.37
Klebsiella	13	25.49
Proteaus Mirabilis	2	3.92
Pseudomonas	2	3.92
No growth	3	5.88
Common Empirical Antibiotics Used		
Amikacin	2	3.92
Augumentin	3	5.88
Ceftazidime	2	3.92
Ceftriaxone	21	41.18
Clindamycin	8	15.69
Gentamicin	5	9.80
Levofloxacin	2	3.92
Meropenem	3	5.88
Ofloxacin	5	9.80
Blood transfusion		
No	18	35.29
Yes	33	64.71
Surgical Re-exploration		
No	47	92.16
Yes	4	7.84
Medical Co-Morbidity		
HIV infection	4	7.84
Hypertensive disease in pregnancy	6	11.76
None	41	80.39
Anaemia		
No	20	39.22
Yes	31	60.78
Fetal Outcome		
Live birth	44	86.27
Stillbirth	7	13.73
Duration of hospital stay (Days)		
7-13	14	27.45
14-20	19	37.25
21-27	9	17.65
28-34	2	3.92

35-41	7	13.73
Total	51	100.00

Table 4: Relationship between booking Status, anaemia and risk of blood transfusion using the chi-square test of statistical significance.

Anaemia

Variable	*Yes N=31 n(%)*	*No N=20 n(%)*	*Total N=51 n(%)*	*Chi2*	*P Value*
Booked	2(20)	8(80.0)	10(19.6)		
Booked referral	8(100)	0(0.0)	8(15.7)		
Unbooked	21(63.6)	12(36.4)	33(64.7)		
				9.11	0.01

Risk of blood transfusion

Variable	*Yes N=33 n(%)*	*No N=18 n(%)*	*Total N=51 n(%)*	*Chi2*	*P Value*
Booked	2(20)	8(80.0)	10(19.6)		
Booked referral	8(100)	0(0.0)	8(15.7)		
Unbooked	23(69.7)	10(30.3)	33(64.7)		
				10.65	0.05

DISCUSSION

The incidence of post caesarean section wound sepsis in this study was 1.99%, this was less than that in a similar prospective study done at UPTH in 2015 and even lower than the post caesarean section wound infection rates of 9.1%, 9.3%, and 16.2%, which were found in kano Lagos and Ibadan respectively.[9,12,18,19]This lesser prevalence in this study is related to a large number of cases and caesarean section with lesser case-finding rates associated with this retrospective study.

Although caesarean wound infection rates ranging from 10.3% to 15.6% were found in a narrative review in sub-Saharan Africa, the prevalence in this study was also less than this finding but similar to findings in other studies in the United Kingdom and the United States.[10,12,20] This low prevalence is not surprising as a recent retrospective study at the UPTH on puerperal

sepsis which identified caesarean section and its complications as one of its risk factors had a low prevalence of puerperal sepsis of 1.7%.[21]

In this study most of the patients were aged between 25-29 years and the mean age was 29.69 ± 4.89 (S.D) years, most had secondary (72.55%), tertiary (19.61%) level of education, were businesswomen (31.37%), housewives (33.33%), unbooked (64.71%) and had low parity; Para 0-1 (64.71%). This was quite similar to findings in local studies in Nigeria.[18,19,22]

Also, 74.51% of patients were in labour before caesarean section, mean duration of labour was 17.27 ±14.93 (S.D) hours, the mean duration of rupture of membranes was 26.22 ± 30.36 (S.D) hours, 96.08% of the caesarean sections were emergencies, indications for surgery were mostly cephalopelvic disproportion (35.29%), prolonged obstructed labour (17.65%), mean duration of surgery was 1.42 ± 0.63 (S.D) hours and most of the surgeries were performed by senior residents (68.63%). This pattern of risk factors was similar to what was found in studies done in Port Harcourt, Ibadan and the Gambia, West Africa.[12,18,23]

Also, the mean estimated blood loss was 1.03 ± 0.81 (S.D) litres, 60.78% of the patients had anaemia in the post-operative period. These are also risk factors associated with the development of post caesarean section wound sepsis as seen in studies done in Nigeria.[12,15,18,22]

This study showed a significant association between unbooked status and risk of anaemia and blood transfusion in patients who developed post caesarean section wound sepsis. This is likely due to prolonged labour, rupture of membranes and the fact that most of the patients had an emergency caesarean section.

There was no significant association between the lengths of operation or cadre of the surgeon and this was due likely to most of the surgeries being carried out by senior obstetricians like seen in a previous similar study in Port Harcourt, as poor surgical skills and prolonged operating time are said to be risk factors for wound infection.18 Other features like the risk of surgical re-exploration and stillbirth occurred but were low.

The results of microbiological studies done in the management of these patients showed Staphylococcus aureus (31.37%), Escherichia coli (29.41%) and Klebsiella sp (25.49%) as common micro-organism cultured and ceftriaxone(41.18%) were the most commonly used sensitive antibiotics. This was not so different from findings in Calabar, Ife, Port Harcourt and Abakaliki, even though this has been associated with contamination of samples.[15,17,18,24]

Although most of the patients in this study did not have medical co-morbidities (80.39%), prolonged hospital stay (100% spent more than 7 days on admission) was the most common complication among them. This was also found in many studies reviewed.[9,10,18–20,25]

CONCLUSION

Post caesarean section wound sepsis is a complication following caesarean section that can be of concern to the surgeon, the patient and the hospital community. This study has shown a pattern that identified emergency caesarean section, unbooked status, labour, rupture of membranes and anaemia as factors associated with wound infection, while prolonged hospital stay remains a troubling complication.

Encouraging antenatal care and supervised hospital deliveries for all patients with periodic reviews of this nature can help keep track of the

trend of the outcome of caesarean sections and post-operative wound sepsis, with the intent of improving care for a better outcome.

STUDY LIMITATIONS

Poor case-note documentation resulted in incomplete data, undermining the statistical power of the study. Additionally, it was not possible to assess undocumented risk factors and the lack of proper documentation of post-discharge diagnosis in the ward records means that our reported prevalence could have been higher and likely to be an underestimate.

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