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Original Research Article

To estimate the incidence, etiology and risk factors of wound infections in women who undergoes cesarean section at Kilpauk Medical College Hospital: a prospective study

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ABSTRACT

Background: Wound infections following caesarean section (or) gynaecologic surgery is a common complication that accounts for significant extension of hospital stays.

Methods: This is a prospective analytical study, conducted in the department of obstetrics and gynaecology, kilpauk medical college, Chennai from January 2013 to November 2013. All cases who underwent caesarean section were included in the study. Analysis was done in the form of percentages and proportions and represented as tables where necessary.

Results: A total of 700 cases were analysed. The incidence of wound infections after caesarean section in this study was 8.14%. Study confirms that risk factors like anemia, chorioamnionitis; PROM, obstructed labour, preeclampsia, increased surgical time, increase BMI poses risk for wound complications. Whereas chorioamnionitis (66%) and obstructed labour (66%) showed increased risk for wound complications.

Conclusions: Correcting malnutrition, anemia, stabilizing diabetes and eradicating all infection such as urinary tract infection, proper preparation of skin, proper surgeons scrubbing and using proper surgical technique can decrease the risk of postoperative wound infection.

Keywords: Caesarean section, Surgery, Wound infection

INTRODUCTION

Wound complications following caesarean section or gynecologic surgery is a common complication that accounts for significant extension of hospital stays and adds considerable cost to hospital bills.¹

The infection rate following caesarean delivery ranges from 3 to 15% with an average of about 6%. But, when prophylactic antimicrobial was given the incidence was less than 2%.²

Before the mid-19th century, postoperatively patients

developed irritative fever, purulent discharge from their incisions, sepsis and rarely death.³

The Surveillance of SSIs brings about the awareness to the present day modern surgeon about the proper use of prophylactic and therapeutic antibiotics and strict aseptic technique and adequate monitoring and support with novel surgical and pharmacological as well as non-pharmacological aids.

Many a studies have been conducted regarding the SSIs under the guidelines provided by CDC. With the current knowledge of SSIs and their attributable risks, under the

guidelines of CDC a clinical study of wound infection following caesarean section occurring in Kilpauk Medical College, Chennai has been undertaken to analyse the risks involved. Objectives of present study are:

- To find the incidence of wound infections after caesarean section.
- To study the association of risk factors in post caesarean wound infections like anemia, hypertension, diabetes, chorioamnionitis, PROM, obstructed labour, BMI, socioeconomic status, duration of surgery and type of skin incision.
- To evaluate important factors in the prevention of post caesarean wound infection.

METHODS

It is a prospective study carried out at Kilpauk Medical College Hospital, Chennai from January 2013 to November 2013 with sample size of 700 patients who underwent lower segment caesarean section.

Various risk factors like BMI, anemia, hypertension, DM, PROM, chorioamnionitis, obstructed labour were taken into consideration. Operative characteristics like duration of the procedure, type of abdominal incision, skin closure and their influence on wound complication was studied.

In post-operative period patients were monitored for signs of development of wound infection such as rise of temperature, nature of discharge from operative site, wound erythema and induration. Bacteriological studies were carried in wound infected cases. Wound complication were managed appropriately by using antibiotics, daily dressing or surgical resuturing.

Inclusion criteria

All women delivered by caesarean section.

Exclusion criteria

All women who delivered vaginally.

RESULTS

Among 700 cases, 57 cases developed wound infections which accounted for 8.14% (Table 1).

Table 1: Incidence of wound infections.

Complications	No. of cases	%
Wound infection	57	8.14
No wound infection	643	91.86
Total no of cases	700	100

Commonest type of wound infection was superficial wound infection (56.14%). None of the patients developed fascial dehiscence or hematoma (Table 2) 87.5% of the

wound infections were seen in patients aged 31-35 years and 50% were seen >35 years (Table 3).

Table 2: Type of wound infection.

Complications	No. of cases	Percent
Superficial wound Infection	32	56.14
Superficial wound breakdown	25	43.85

Table 3: Wound infections with reference to age.

Age (years)	Total no. of cases	Wound infection		%of wound infection
		Yes	No	
≤20	69	2	67	2.89
21-25	434	14	420	3.2
26-30	163	12	151	7.36
31-35	32	28	4	87.5
>35	2	1	1	50
Total	700	57	643	100

According to pearson chi-square test, p-value is 0.047, statistically significant.

Table 4: Wound infections with reference to the type of caesarean section.

Type	Total no. of cases	Wound infection		%
		Yes	No	
Elective	82	4	78	4.8
Emergency	618	53	565	8.6
Total	700	57	643	

According to pearson chi-square value is 0.382 and p value is 0.826, statistically in significant.

It is clearly shown that wound infection is more common in emergency LSCS (8.6%) (Table 4). The various risk factors which contribute to the wound infections are anaemia (16.2%), hypertension (10.2%), DM (10.8%), obstructed labour (66%), chorioamnionitis (66%) and PROM (25.3%) (Table 5).

Staph aureus and *E. coli* are the commonly obtained organisms (Table 6). *Staph aureus* is highly sensitive to Gentamycin and *E. coli* sensitive to Amikacin. Out of 57 cases, 25 cases were managed by resuturing, 32 cases were managed by daily dressing and antibiotics (Table 7). Of the 700 cases, 1 out of 30 from socioeconomic status class 3 (3.3%), 9 out of 361 from socioeconomic status class 4 (2.5%) and 47 out of 309 from socioeconomic status class 5 (15.2%) developed wound infection. It is clearly shown that wound infection is common in low socioeconomic status. Of the 700 cases, 303 were primi and 397 were multi. 32 (10.6%) cases of primi and 25 (6.3%) cases of the multi developed wound infection. PrimiPara is more prone for wound infection. Obese and morbidly obese are more prone for infection. Wound infections are common in pfannensteil incision. 8.2% of the patients developed

wound infection with pfanneinsteil incision compared to 7.7% with midline vertical incision.

Table 5: Wound infections with reference to patient characteristics.

Characteristics	Total no. of cases	Wound infection		% of wound infection	Pearson chi square value	P value
		Yes	No			
Anaemia	111	18	93	16.2	11.495	0.001
Hypertension	127	13	114	10.2	0.909	0.216
Diabetes mellitus	93	10	83	10.8	0.977	0.211
PROM	95	24	71	26.3	43.112	0.000
Obstructed labour	6	4	2	66.7	27.712	0.000
Chorioamnionitis	3	2	1	66	13.796	0.000

When the duration of operation was more than 60 minutes, 71.4% of women developed wound infection as compared to 33.3% and 6.6% with the duration of operation between 45-60 min and less than 45 minutes respectively. As the duration of surgery increases, wound infection rate increases.

Table 6: Commonly obtained organisms.

Organism	No. of cases
<i>Staphylococcus</i>	18
<i>E. coli</i>	10
<i>Pseudomonas</i>	6
<i>Klebsiella</i>	9
<i>Enterobacter</i>	4
No growth	10

Out of 686 patients with subcuticular suture 56 (8.2%) had wound infections whereas 1 out of 14 (7.1%) with mattress suture developed wound infection. Wound infection is more common in subcuticular suture. 52% of the women who received antibiotics for more than 7 days developed wound infection, whereas in patients who received antibiotics for 4-7 days and 3 days, wound infection were 5% and 0% respectively. The average hospital stay for women with no complication was 7 days. In those who had wound infections, 15 patients stayed for >9 days and 3 patients stayed for >15 days. Thus wound infection increased the hospital stay by an average of 7 days.

Table 7: Management of wound infections.

Management	No. of cases
Resuturing	25
Daily dressing and antibiotics	32
Total	57

DISCUSSION

The current study was done with 700 patients with both elective and emergency LSCS during January 2013-November 2013 at Kilpauk Medical College, Chennai.

The wound infection rates after caesarean section vary from 2.8-26.8% reported in literature, the incidence of wound infection in present study was 8.14%. The study conducted by Mahale AR et al showed an incidence of 8.6%.⁴ In a study conducted by Tran TS et al the overall rate of post operative infection was 12.4% which was reported in prospective study of 1319 caesarean which was comparable to our study.

In a study by Mahale AR elective and emergency caesarean section did not show difference in overall wound infection rate, but in their study wound gaps were relatively more in Emergency LSCS, whereas in the present study incidence of wound infections in elective LSCS was 4.8% which is less compared to emergency LSCS (8.6%)

The incidence of wound infections in various risk factors like anemia (16.2%), Hypertensive (10.25%), DM (10.8%), obstructed labour (66%), chorioamnionitis (66%), PROM (25%) where comparable with the similar results obtained by Mahale AR study which showed chorioamnionitis (60%), obstructed labour (76%), PROM (20.8%) and anemia (22%).⁴ In the present study Obstructed labor (66%), Chorioamnionitis (66%), significantly increased the wound complication rate. In comparison with other variables which were similar to the results given by Mahale AR.⁴

In Study conducted by Takoude TC et al supports the clinical observation that DM is a risk factor for wound complications.⁵ Wound healing is compromised due to poor blood supply, neuropathy and altered immune function.⁵ They reported that DM is associated with 2.5-fold increase (18%) in wound complications after caesarean section. The present study showed 10.8% of wound complication rate in patient with diabetes. In a Study by Tran TS et al reported that obesity is a risk factor for wound infections.⁶ The risk of infection doubled for every five-unit increment of BMI because of poor vascularity of adipose tissue and dead space formation.⁵ In the current study it can be seen that the rate of wound infection was high in obese patients. The rate of wound

infections was 33% in morbidly obese patients (BMI>40) and single patient in our study who was obese (BMI>30) developed wound infection.

The present study showed 8.2% of wound infection with pfannenstiell incision, 7.7% with midline vertical incision, where as in a study reported by Mahale AR showed wound infection rate was statistically more in midline (17.17%) than in other type of incisions like pfannenstiell (14.28%), para median (5.10%) and Joel Cohen (Misghav ladach) (7.48%).⁴

In the study by Mahale AR the average hospital stay for woman with no wound complication was 6 days, woman who had wound complication stayed for 14.01 days. The average hospital stay increased by 7 days in wound complicated cases. In the present study the average duration of hospital stay for women with no wound complications was 7 days and women with wound complications stayed for more than 15 days which increased by 8 days. Tran TS et al also reported that caesareans that lasted longer than 1 hr had 2.4 times the risk of postoperative infection.⁵ In the present study 72% of patients had wound infections, when the duration of operation was >1hr compared to 33% and 6.6% whose duration of operation was between 45-60 min and less than 45 min respectively. Tran TS et al also showed that longer the duration of operation increases the risk of postoperative wound infections.⁶

The most common bacteria isolated in current study was staphylococcus aureus, the other isolates obtained were *Pseudomonas Spp.*, *Esch coli*, *Klebsiella*, *Enterobacter Spp.*, few patients did not have any bacterial isolates. Many others observed similar findings. In a study by Martens et al the most common pathogens cultured from infected caesarean wounds are *Staphylococcus aureus*, *Esherichia coli* and *Proteus mirabilis*. In another study by Roberts et al identified the most prominent pathogens as cervico vaginal flora such as ureaplasma species and mycoplasma species.⁷

On the other hand others have noted milder infections caused by gram-negative organism such as *E. coli* and *Proteus Spp.* However, this is not true for suppurated wounds, particularly those caused by *Staphylococcus aureus* and *Pseudomonas aeruginosa* where a violent local inflammation and tissue destruction occur. The most common type of wound infection found in our study was superficial wound infection.

CONCLUSION

- Caesarean section has become one of the commonest surgical procedures in obstetric practice. The incidence of wound infections after caesarean section in this study was 8.14%.
- Study confirms that risk factors like anemia, chorioamnionitis, PROM, obstructed labour,

preeclampsia, increased surgical time, increase BMI poses risk for wound infections. Whereas chorioamnionitis (66%) and obstructed labour (66%) showed increased risk for wound infections.

- Wound infections increased the duration of the hospital stay, which again increased the extra financial burden both to the patients and the Hospital. The commonest organism isolated was staphylococcus aureus.
- Superficial wound infection was the commonest wound complication which was treated by daily dressing and antibiotics.
- Correcting malnutrition, anemia, stabilizing diabetes and eradicating all infection such as urinary tract infection, proper preparation of skin, proper surgeons scrubbing, and using proper surgical technique can decrease the risk of post-operative abdominal wound infection.
- Knowledge of these risk factors would help the obstetrician in avoiding these complications and help to decrease the maternal morbidity post operatively.
- Based on the sensitivity pattern of different isolates of bacteria, an empiric antibiotic therapy in post caesarean infection can be implemented.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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