Original Research Article

A critical review of post-operative caesarean section sepsis - A retrospective study

K. Bhavani[1], S. Prasanthi[2], Y. Jyothsna[2*], I. Vani[3], N. Uma[4]

[1]Assistant Professor, [2]Postgraduate, [3]Associate Professor, [4]Professor
Dept. of Obstetrics and Gynecology, AMC, KGH, Visakhapatnam, Andhra Pradesh, India
[*]Corresponding author email: **dr.jyothsna1988@gmail.com**

International Archives of Integrated Medicine, Vol. 4, Issue 11, November, 2017.

Available online at http://iaimjournal.com/
ISSN: 2394-0026 (P) **ISSN: 2394-0034 (O)**
Received on: 25-10-2017 **Accepted on:**03-11-2017
Source of support: Nil **Conflict of interest:** None declared.
How to cite this article: K. Bhavani, S. Prasanthi, Y. Jyothsna, I. Vani, N. Uma. A critical review of post-operative caesarean section sepsis - A retrospective study. IAIM, 2017; 4(11): 153-159.

Abstract

Background: Caesarean section (CS) wound infections represent a substantial burden to the health system and the prevention of such infections should be a healthcare priority in developing countries.
Aim and objectives: Prospective study aimed to evaluate all postoperative wound sepsis or fever cases at KGH, VSP during 6 months period of time January and June 2017.
Materials and methods: All postoperative cases with wound sepsis were evaluated. Detailed clinical data, investigations, bacteriological evaluation, sensitivity to antibiotics noted.
Results: A total no of 1000 cases with postoperative sepsis in a 6months period of time was followed and results were analyzed.
Conclusion: All postoperative cases with wound sepsis and fever were analyzed for etiological factors, associated co morbid factors and their sensitivity to antibiotics noted.

Key words

SSI, Sepsis, Organism, Sensitivity, Antibiotics.

Introduction

Caesarean section (CS) wound infections represent a substantial burden to the health system and the prevention of such infections should be a healthcare priority in developing countries [5]. The global estimates of surgical site infections (SSI) are from 0.5–15%. The risk factors observed for CS wound infections are obesity, diabetes, immunosuppressive disorders, a previous Caesarean delivery, certain medications like steroids, the lack of pre-incision antimicrobial care, lengthy labour and surgery.

The abdominal wound complicating CS should be minimized through strict preventative measures, such as antisepsis, preoperative preparation, a reduction in the duration of surgery, a reduction in blood loss, the use of absorbable sutures and avoiding cross infection. Antimicrobial prophylaxis is effective in reducing the incidence of postoperative wound infections as it reduces the risk of resident bacteria overcoming the immune system in the immediate postoperative period [6]. Centers for Disease Control and Prevention (CDC) state that SSI should be suspected within 30 days of a surgical procedure if at least one of the following symptoms are present: localized swelling, with or without purulent discharge from the wound, pain or tenderness, redness, malodour or fever. Incidence of the SSI in a tertiary care center like KGH Visakhapatnam is high in view of the following reasons: High catchment area, almost 4 districts and few areas from Odisha were nearby from which cases were referred, All cases were reported in a terminal stage and after meddling for few hours, Most of the referral cases will have any of the co morbid factors who are more prone get SSI.

Aim

This study aimed at observing most common organisms involved in most of the SSI and most common antibiotic found to be sensitive following SSI swab preparation and antibiotic usage according to the culture sensitivity, misuse of antibiotics can be prevented. Injudicious use antibiotic can be prevented. Antibiotic usage after the culture sensitivity report is advised. So that resistance towards most of the antibiotics can be prevented [21]. Deaths due to SSI followed by postpartum sepsis can be prevented by close monitoring with all those having SSI, daily dressings, proper antibiotic usage, timely management.

Materials and methods

Inclusion criteria

Infections occurring within 30 days of the surgery which involved the skin, subcutaneous tissues and the fascia and muscle layers of the incision site [2].

Exclusion criteria

Patients who were already presented to the department with sepsis were excluded [3].

All patients who underwent lower segment caesarean section were received good postoperative care in postoperative ward, i.e. vitals monitoring-TPR charting daily, antibiotic prophylaxis was given prior to the incision and injectables were continued till 3rd day postpartum, followed by oral antibiotics for 5-7 days. Broad spectrum antibiotics were used commonly like cephalosporins (inj. ceftriaxone 1 gm IV BD, tab. cefixim 200 mg BD). On 4th postoperative day for every patient wound visualized and examined for any discharge and signs of inflammation like induration, redness, malodour, fever. Those with prior comorbid factors like obesity, hypertension, diabetes, PROM, etc. wound examined on 3rd postoperative day. Those with wound discharge were noted, swabs for culture sensitivity were sent on the same day. those with pus discharge ill looking, impending wound dehiscence were started with another broad spectrum antibiotic, usually reported sensitive in culture sensitivity reports (e.g.- cefperazone with sulbactum, piperacillin with tazobactum). All wounds with the discharge and signs of inflammations were daily examined and daily dressings done. Strict vitals chart monitoring were done daily. Culture sensitivity reports were collected on every third day and antibiotic was changed according to the given report. Those wounds with dehiscence were resutured after good granulation tissue observed. Both culture-positive and -negative cases were included in the study. Where the culture was positive, an antibiotic sensitivity tests of the organism was carried out using standard microbiology techniques. The wound swabs of the culture-negative cases yielded no organism growth of any kind after 3 sub cultures.

Data collected included details of the wound infections, any organisms grown in the cultures,

the drug sensitivity of those organisms as well as the risk factors contributing to infections, like obesity, premature rupture of the membranes (PROM), prolonged labour and comorbid medical conditions like diabetes, hypertension and anemia.

Results

A total number of 1000 post-operative cases of lower segment caesarian section where followed in a 6 months duration from January to June 2017 in which 135 post-operative wound sepsis cases where obtained, followed and results analyzed.

The association between wound infections and parity was not significant. Women with diabetes were three times more likely to develop wound infections and the association between diabetes and wound infections was significant. Incidence of SSI in a tertiary hospital like KGH found to be 13.5% (**Table – 1 to 4**).

Table - 1: SSI incidence in elective vs emergency cases.

Type of LSCS	Number	Percentage (%)
Elective	10	7.4 %
Emergency	125	92.5 %

Table - 2: Most common organisms obtained in culture sensitivity.

Microorganisms isolated	Number	%
No organisms obtained	40	29.6
Staphylococcus aureus	27	21.1
MRSA	3	0.9
Klebsiella	25	18.5
Escherichia coli	25	18.5
Pseudomonas	15	11.1

Discussion

Developing SSI is a traumatic experience [2]. SSI reported to be the third most common type of nosocomial infection, accounting for 14–16%. CS surgery has a 5–20 times higher risk of postpartum infection as compared to vaginal deliveries, mainly with regards to wound infections, endometritis, pelvic peritonitis or pelvic abscesses. Wound infections are still regarded as the most common nosocomial infections in patients undergoing surgery [7].

Table - 3: Most common antibiotic sensitivity for the organisms obtained in culture sensitivity report that obtained on 3rd day.

Micro Organisms	Most sensitive antibiotics
Staphylococcus aureus	Azithromycin, Ofloxacin, Tobramycin
MRSA	Cefoperazone + Sulbactum, Tetracycline
Ecoli	Piperacillin + Tazobactem, Tetracyclin, Tobramycin
Klebsiella	cefoperazone + Sulbactum, Piperacilin + Tazobactem
Pseudomonas	Piperacilin + Tazobactem, Imipenam

Table - 4: Co-morbid factors which are responsible for most of the SSI were listed out.

Risk Factors	Number	%
Severe Preclampsia	18	22.2
Premature Rupture of Membranes	15	18.5
Meconium Stained Liquour	9	11.1
Gestational Diabetes Mellitus	3	3.7
Intra uterine demise	3	3.7
Post Caessarian Pregnant in labour with Scar tenderness (allowed for VBAC but failed)	15	18.5
Post Caesarian pregnant with Contracted Pelvis (elective cases)	10	8

Present scenario at KGH

The most common pathogens were S. aureus, Pseudomonas aeruginosa and E. coli, as was also observed in the current study [9]. Staphylococcus is the most common cause of nosocomial infections and is often the cause of postsurgical wound infections; the Gram-positive cocci are often found living on the skin and in the nose [14]. In this study of 1000 cases incidence of SSI found to be 13.5% Even though the annual number of CS procedures at KGH Hospital has consistently risen, the rate of wound infection has remained more or less constant [16]. This may be due to high compliance among the

infection control team and medical personnel in the hospital regarding its infection control rules and policies. These include hand-washing, the use of alcohol rubs5, avoiding cross-infection by restricting visitors and routine education among health workers regarding infection control measures [10].

Effect of co-morbid factors

Obesity

Obesity is a major and rapidly growing health problem [21]. The incidence of infections in patients who are obese with a BMI of 30 or more is higher than that of the general population [22]. This is due to the poor penetration of antibiotics into the skin because of the avascularity of adipose tissue [4]. Moreover, obesity places greater mechanical stress on the wound and thus delays healing [10]. We observed that being overweight with a BMI >35 was a major risk factor for infection compared with cases who had a BMI 18.5–25 (OR 3.7, 95% confidence interval [23]. This was also observed in the current study as the rate of wound infections was 18 (8.53%) in women with BMI >35 as compared to 7 (3.18%) with normal body weight.

Vertical incision vs Transverse incision

Vertical incisions, which have to be used for overweight or obese patients, are more likely to lead to complications than the typical transverse incisions [20]. Women should be encouraged to eat healthily, have a well-balanced diet and take adequate exercise to avoid the risks of SSI associated with obesity [19].

Gestational Diabetes

The incidence of infections in patients with gestational diabetes, either controlled by dietor insulin, was significantly higher, than among the non-diabetic patients. In other studies, the incidence of wound infections was noted to be six times higher in diabetic patients. Uncontrolled blood glucose levels increase the infection rate and impair wound healing as it enables the leukocytes to control the harmful proliferation of bacteria [18].

Prolonged labour

Prolonged labour, after a full trial of vaginal delivery, was observed in 20 (9.47%) cases of wound infections in the current study [25]. Frequent vaginal examinations may be a contributory factor for the increased infection rate in such cases. Most infections in the female genital area or the gastrointestinal tract can contaminate the normally sterile amniotic fluid.

PROM

An associated risk factor [7], PROM increases the risk of chorioamnionitis as the protective effect of the intact fetal membranes is lost. The culture reports in such cases showed polymicrobial growth of both Gram-positive and Gram-negative organisms [12]. Only three (1.42%) cultures showed extended-spectrum beta-lactamase-producing E. coli resistant to quinolones and aminoglycosides [11]. Such infections were controlled with carbapenems (cefperazone with sulbactum and piperacillin with tazobactum) [15]. The length of time between the rupture of the membranes and surgical intervention influences the CS wound infection rate as once the membranes have ruptured, the amniotic fluid is no longer sterile and may act as a transport medium, allowing bacteria to come into contact with any uterine and/ or skin incisions.

Morbidity

CS wound infection increases maternal morbidity and prolongs hospital stays [2]. In KGH Hospital, women undergoing CS are routinely discharged on the 7^{th} post-operative day after suture removal. However, women suffering SSI stayed in the hospital for an average of 10-15 days [14]. Most of the women developing wound infections following discharge returned 6–10 days later, with complaints of fever, pain, and wound discharge and redness.

Preventive measures

To avoid any infections from Staphylococcus bacteria [1], it is important to implement regular hand-washing and ensure that wounds are kept covered with clean, dry bandages until they are

fully healed, recommended collaboration with a microbiologist and wound-care practitioners, and patient education on personal hygiene to help control wound infections [3]. Measures should be taken in the pre-, intra- and postoperative phases to reduce the risk of infection. In the preoperative phase, certain measures can be beneficial—for example, bathing on the day of the surgery, avoiding the unnecessary shaving of hair, the use of electric clippers, the proper sterilization of instruments, antibiotic prophylaxis and patient-specific theatre-wear [2]. Additionally, hand-washing, the antiseptic preparation of the surgical site and the use of appropriate staff theatre-wear should be encouraged. Intra operative infection prevention can be aided by one of the latest practices worldwide which is the use of monofilament sutures [6]. The use of subcuticular sutures buried in the wound is also very unlikely to cause infection. Postoperative wound infection can be greatly reduced and controlled by rigorous surgical techniques.16 Furthermore, covering surgical incisions with an interactive dressing able to absorb exudates, placed so as to ease pain and to ensure that they remain in place for a minimum of 48 hours after the operation, is another practice to avoid wound infections [22].

Patient education

The frequency of CS wound infections can be prevented by educational programmes designed to raise public and clinical awareness [16]. Modifiable risk factors like BMI and associated co morbid medical problems, such as diabetes and hypertension, should be closely monitored and controlled in the pre-pregnancy period [22]. Some of the cases with wound infections in the current study were noted to have poor personal hygiene. Standards of personal hygiene, such as bathing every day, are culture-dependent and may also differ according to the individual patient. Women opting for a CS for non-medical reasons should be informed about the risks of SSI as a complication.

Conclusion

Incidence and risk factors from prospective SSI surveillance can be reported simultaneously for the Obstetric and Gynecological surgeries and can be part of routine practice in resource-constrained settings. The incidence of SSI was lower for Obstetric surgeries compared to Gynecological surgeries. The study identified multiple risk factors for SSI for Obstetric and Gynecological surgeries in a tertiary rural hospital in India. Some of the risk factors identified are amendable through interventions. Thus, the multiple risk factors identified in the present study can be helpful for SSI risk stratification and prioritizing interventions in low middle income countries.

References

1. World Health Organization 2106: Global guidelines on the prevention of surgical site infection. http://www.who.int/gpsc/ssi-prevention-guidelines/en/
2. Rosenthal VD, Richtmann R, Singh S, Apisarnthanarak A, Kubler A, Viet-Hung N, et al. Surgical site infections, international Nosocomial infection control consortium (INICC) report, data summary of 30 countries, 2005-2010. Infect Control Hosp Epidemiol., 2013; 34(6): 597–604.
3. Black JD, de Haydu C, Fan L, Sheth SS. Surgical site infections in gynecology. Obstet Gynecol Surv., 2014; 69(8): 501–10.
4. Lake AG, McPencow AM, Dick-Biascoechea MA, Martin DK, Erekson EA. Surgical site infection after hysterectomy. Am J Obstet Gynecol., 2013; 209(5): 491–9.
5. Olsen MA, Higham-Kessler J, Yokoe DS, Butler AM, Vostok J, Stevenson KB, et al. Prevention epicenter program CfDC, prevention: developing a risk stratification model for surgical site infection after abdominal hysterectomy. Infect Control Hosp Epidemiol., 2009; 30(11): 1077–83.

6. Krieger Y, Walfisch A, Sheiner E. Surgical site infection following cesarean deliveries: trends and risk factors. J Matern Fetal Neonatal Med., 2017 Jan; 30(1): 8–12.
7. Mahdi H, Goodrich S, Lockhart D, DeBernardo R, Moslemi-Kebria M. Predictors of surgical site infection in women undergoing hysterectomy for benign gynecologic disease: a multicenter analysis using the national surgical quality improvement program data. J Minim Invasive Gynecol., 2014; 21(5): 901–9.
8. Shree R, Park SY, Beigi RH, Dunn SL, Krans EE. Surgical site infection following cesarean delivery: patient, provider, and procedure-specific risk factors. Am J Perinatol., 2016; 33(2): 157–64.
9. European Centre for Disease Prevention and Control. Surveillance of surgical site infections in European hospitals – HAISSI protocol. Version 1.02. Stockholm: ECDC; 2012. [http://ecdc.europa.eu/en/publications/Publications/ 120215_TED_SSI_protocol.pdf].
10. Morhason-Bello IO, Oladokun A, Adedokun BO, Obisesan KA, Ojengbede OA, Okuyemi OO. Determinants of post-caesarean wound infection at the university College hospital Ibadan Nigeria. Niger J Clin Pract., 2009; 12(1): 1–5.
11. Mpogoro FJ, Mshana SE, Mirambo MM, Kidenya BR, Gumodoka B, Imirzalioglu C. Incidence and predictors of surgical site infections following caesarean sections at Bugando medical Centre, Mwanza, Tanzania. Antimicrob Resist Infect Control., 2014; 3: 25.
12. Tran TS, Jamulitrat S, Chongsuvivatvong V, Geater A. Postoperative hospitalacquired infection in Hungvuong obstetric and Gynaecological hospital, Vietnam. J Hosp Infect., 1998; 40(2): 141–7.
13. Roy S, Patkar A, Daskiran M, Levine R, Hinoul P, Nigam S. Clinical and economic burden of surgical site infection in hysterectomy. Surg Infect., 2014; 15(3): 266–73.
14. Culver DH, Horan TC, Gaynes RP, Martone WJ, Jarvis WR, Emori TG, et al. Surgical wound-infection rates by wound class, operative procedure, and patient risk index. Am J Med., 1991; 91: S152–7.
15. Henderson WG, Daley J. Design and statistical methodology of the National Surgical Quality Improvement Program: why is it what it is? Am J Surg., 2009; 198(5A): S19–27.
16. Custovic A, Zulcic-Nakic V, Asceric M, Hadzic S. Surveillance of Intrahospital infections at the Clinic for Gynaecology and Obstetrics. Bosn J Basic Med., 2009; 9(1): 66–70.
17. Gregor M, Paterova P, Buchta V, Ketranek J, Spacek J. Healthcare-associated infections in gynecology and obstetrics at a university hospital in the Czech Republic. Int J Gynecol Obstet., 2014; 126(3): 240–3.
18. Owens WDFJ, Spitznagel EL Jr. ASA physical status classifications: a study of consistency of ratings. Anesthesiology, 1978 Oct; 49(4): 239–43.
19. Horan TC, Andrus M, Dudeck MA. CDC/NHSN surveillance definition of health care-associated infection and criteria for specific types of infections in the acute care setting. Am J Infect Control., 2008; 36(5): 309–32.
20. Pathak A, Sharma S, Sharma M, Mahadik VK, Lundborg CS. Feasibility of a mobile phone-based surveillance for surgical site infections in rural India. Telemed E-Health, 2015; 21(11): 946–9.
21. Cook NR. Use and misuse of the receiver operating characteristic curve in risk prediction. Circulation, 2007; 115(7): 928–35.
22. Hosmer DWL, S. A goodness-of-fit test for the multiple logistic regression

model. Commun Stat., 1980; A10: 1043–69.

23. Steyerberg EW, Vickers AJ, Cook NR, Gerds T, Gonen M, Obuchowski N, et al. Assessing the performance of prediction models a framework for traditional and novel measures. Epidemiology, 2010; 21(1): 128–38.
24. Mitt P, Lang K, Peri A, Maimets M. Surgical-site infections following cesarean section in an Estonian university hospital: postdischarge surveillance and analysis of risk factors. Infect Control Hosp Epidemiol., 2005; 26(5): 449–54.
25. Assawapalanggool S, Kasatpibal N, Sirichotiyakul S, Arora R, Suntornlimsiri W. Risk factors for cesarean surgical site infections at a Thai-Myanmar border hospital. Am J Infect Control., 2016.