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Original Research Article

Aetiopathological Study of Surgical Site Wound Infection after Caesarean Section

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Abstract

Background: Wound sepsis continues to be a bugbear of emergency abdominal surgery where the producer is often inevitably performed on infected tissue. Wound infection causes prolongation of convalesces, prolonged hospital stay, permanent disability, economic loss, production of dangerous focus of infection in the ward, ugly scar and it is intimately related to the fame of the surgeon. The aim of the study was to evaluate aetiopathological of surgical site wound infection after caesarean section. ***Methods:*** The study was conducted at the Sher-e-Bangla Medical College Hospital, Barisal, Bangladesh to evaluate the Aetiopathological of surgical site wound infection after caesarean section. A total of 100 cases were chosen by random sampling with different maternity units from September 2007 to August 2008. The results were statistically analyzed with Statistical Packages for Social Sciences (SPSS-24). ***Results:*** Serosanguineous and foul smelling wound discharge were present in 70% of the cases. Culture of wound discharge showed growth in 67% of the cases and the organisms responsible for most wound infections originated on the patient's skin. Staphylococcus aureus was the organism most commonly isolated. Escherichia coli was found as the second most common organism, followed by Pseudomonas, klebsiella, pneumonia, actinobacter and proteus. ***Conclusions:*** Proper operative site skin preparation (e.g. with povidone iodine) which greatly contributes to reduction of wound infection. Personal cleanliness, smooth gentle handing of tissues, proper haemostasis are all-important. This is possible only by careful surgeons.

Keywords: Aetiopathological; Wound infection; Caesarean section; surgical.

INTRODUCTION

Wound infection is the most common causes of significant post-operative morbidity and mortality. Infection increases the discomfort and disability experienced by patients following elective operation and may, in their most sever forms endanger life. Wound sepsis continues to be a bugbear of emergency abdominal surgery where the producer is often inevitably performed on infected tissue. Wound infection causes prolongation of convalesces, prolonged hospital stays, permanent disability, economic loss, production of dangerous focus of infection in the ward, ugly scar and it is intimately related to the fame of the surgeon [1]. Infection and breakdown of wounds are, in most cases, the results of an error in surgical techniques at the time of operation, although blame is often attached to a particular batch of suture material or some other factor outside the surgeon's control of all the agents which come into contact with the tissues during operation, the suture material as supplied by reputable firms is the least likely to be contaminated. The fault lies more often in the method of scrubbing up, of application of gloves and gowns, of sterilizing and handling of instruments, of preparation of the skin, and in the operative technique. Asepsis is always related and is inevitable that some organisms enter the operation field by one means or another. Their types and number can; however, be controlled by care; their survival and growth can be prevented by not damaging tissues and by not leaving dead spaces and collection of blood on which they thrive. The basis of nearly all wound breakdowns in haematoma formation and this can be avoided by conscientious or, if oozing cannot be arrested by drainage. It is more tant to drain a bleeding than infected operation field [2]. The following risk

factors predispose to subsequent wound infection in women undergoing caesarean section. Obesity, diabetes, prolonged hospitalization before caesarean section, prolonged rupture of the membranes, chorioamnionitis, endomyometritis, prolonged labour, emergency rather than elective indications for caesarian section, and anaemia [3]. Classically, the presence of postoperative infection has been confirmed by documenting the typical clinical signs of inflammation along with drainage of purulent or culture positive material from the wound. Infection included superficial wound infections (involving skin and subcutaneous tissue) (47%), deep wound infections (involving deep and soft tissue -fascia and muscle) (20%) and organ / space infections (i.e. endometritis, pelvic abscess) (33%) [4]. Early diagnosis by clinical features and isolation of organism from the wound by culture with use of most appropriate antibiotic, the morbidity and mortality due to the postoperative wound infection can be reduced [5]. The aim of the study was to identify the micro-organisms found in infected surgical wound, to find out the drug sensitivity of different organisms responsible for post caesarean section abdominal wound infection and to identify the drugs resistant brganisms responsible for post-operative wound infection.

METHODS

The study was conducted at the Sher-e-Bangla Medical College Hospital, Barisal, Bangladesh to evaluate the Aetiopathological of surgical site wound infection after caesarean section. A total of 100 cases were chosen by random sampling with different maternity units from September 2007 to August 2008. Detailed history was taken and clinical examination done on each study population having post-operative wound infection. But if needed, immediate resuscitative measures were instituted first. Particular attention was paid to the diabetic status, drug use (especially steroids or any immunosuppressive drugs) and presence of concurrent disease. The clinical examination stressed particularly on vital parameters, general physical build, nutritional status, anaemia, jaundice and septic focus. Relevant diagnostic investigations as far as possible were done and recorded. All routine investigations were not possible because of lack of urgent laboratory facilities. The results were statistically analyzed with Statistical Packages for Social Sciences (SPSS-24).

RESULTS

This study was carried out at the SIHR-E-BANGLA Medical College Hospital on 100 Caesarean section wound infection patients from September 2007 to August 2008. Table - I shows that incidence of Caesarean section wound infection highest in the age group 21-30 years (50 °/o), followed by S20 years (42 %) and 31 -42 years (8%). Table -II shows that wound infection is most common 50 % if women who had no antenatal check-up had wound infection. Table -Ill shows that post-caesarean wound infection is more common (35%) in patients having 25-48 hours of labour pain. Table - IV shows that wound infection is maximum among patients having rupture membrane 25-48 hours (43%). Intact membrane was present in 6 percent patients. Table - V shows that 82 percent of patients sought intervention for delivery before admission to SBMCH. Table Vi shows that incidence of wound infection is highest among patients who underwent emergency Caesarean section (98%) and majorities are due to obstructed labour (42%). Figure-I shows that wound infection developed in 50 % patient on 4th postoperative day. Followed by 20% on 6th postoperative day. 15% on 7th postoperative day. 10% on 8th postoperativedayand5%on9thpostoperativeday. Table - VIII shows that incidence of wound infection is highest if subcutaneous fat is <2cm in thickness (85%). Table - VIII shows that incidence of wound infection is highest if subcutaneous fat. Table - IX shows colour and smell of wound discharge. Colour is serosanguineous in 70 percent cases and purulent in 30 percent cases and foul smelling discharge is present in 30 percent cases. Table -X shows that 67 percent wound discharge have organisms and the rest 33 percent shows no growth. Staphylococcus is isolated from highest number of patients (30 %). Table - XI shows wound infection was maximum if patient was anaemia. It was 54% when Im was below 55%. Table - XII shows that highest incidence of wound infection is due to anaemia (60%). Table - XIII shows that hospital stay of the patients varies from 7 to 40 days (Table - XII). Among the 100 patients for half of the patients, the hospital is 11-20 days and for only 7 percent of the patients, the hospital stay is 31-40 days. The mean (±SD) hospital stay is 17.85 ± 7.78 days.

Table I: Age distribution of the study

Age group (years)	n=100	%
≤20	42	42.0
21-30	50	50.0
31-40	8	8.0

Table – II: Status Of antenatal check-up of the study.

Age group (years)	n=100	%
Regular	20	20.0
Irregular	30	30.0
None	50	50.0

Table – III: Duration Of labour pain in patients having infections of the Study

Duration (hours)	n=100	%
0-12	11	11.0
13-24	29	29.0
25-48	35	35.0
49-72	9	9.0
>72	3	3.0
No labour pain	13	13.0

Table – IV: Duration Of Duration Of rupture Of membrane of the Study

Duration (hours)	n=100	%
<2	23	23.0
13-24	17	17.0
25-48	43	43.0
49-72	7	7.0
>72	4	4.0
Intact membrane	6	6.0

Table – V: Intervention outside hospital of the Study

Duration (hours)	n=100	%
Yes	82	82.0
No	18	18.0

Table – VI: Indication for Caesarean section of the Study

Indication Elective (n = 2)	n=100	%
Previous 1 Caesarean section for CPD	1	
Previous 2 Caesarean section	1	
Emergency (n = 98)		
Obstructed labour	42	42.9
Ruptured membrane with fetal distress	22	22.5
Ante partum eclampsia	14	14.3
Transverse lie .with hand prolapse	5	5.1
Previous caesarean section labour pain	4	4.1
Severe PET with labour pain	4	4.1
Impending rupture / Ruptured uterus	3	3.1
Bad obstetric history with labour pain	2	2.1
Breech with cord prolapse	2	2.1
Face presentation with Rupture membrane	1	1.1
Total	100	100.0

Table – VII: Relationship between duration of operation and infection of the study

Duration of operation (Hours)	Number of Cases (n=100)	Number of Infection (n=19)	% of wound infection
0-1	82	11	13.41
>1	18	8	44.44

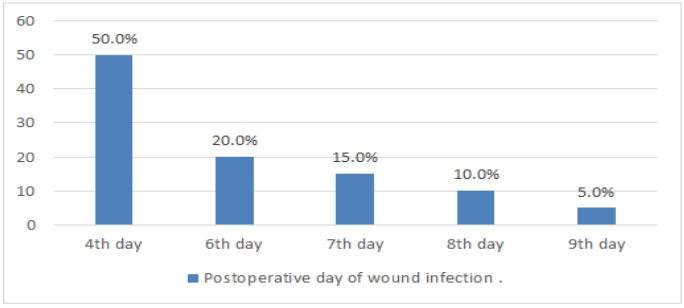

Figure I: Postoperative day of wound infection

Table – VIII: Thickness Of subcutaneous fat of the study

Fat thickness (cm)	n=100	%
<2	85	85.0
>2	15	15.0

Table – IX: Character Of wound discharge of the study

Characteristics of wound discharge	n=100	%
Colour :		
Serosanguineous	70	70.0
Purulent	30	30.0
Smell :		
Foul Smelling	30	30.0
No smell	70	70.0

Table – X: Bacteriological study of wound discharge of the study.

Organism isolated	n=100	%
Staphylococcus	30	30.0
Escherichia coli	16	16.0
Pseudomonas	12	12.0
Klebsiella pneumonia	4	4.0
Acinobacter	3	3.0
Proteus	2	2.0
No growth	33	33.0

Table – X: Status of haemoglobin

Haemoglobin	n=100	%
45-54	54	54.0
55-64	38	38.0
65-74	6	6.0
75-84	2	2.0

Table – XII: Actiological findings

Findings	n=100	%
Anaemia	60	60.0
Malnutrition	25	25.0
Diabetes	10	10.0
Obesity	3	3.0
Chronic asthma	2	2.0

Table – XIII: Postoperative hospital stay

Hospital stay (days)	n=100	%
7-10	16	16.0
11-20	47	47.0
21-30	30	30.0
31-40	7	7.0

DISCUSSION

Surgical infection as was studied by Lewis Pasteur and Joseph Lister, hundreds of years ago is still a subject of controversy and a problem all over the world. Different workers in this field have given their own thoughts and ideas for the control of infection6. In this series 100 cases were included. They were admitted to Sher-e-Bangla Medical College Hospital during the period of September 2007 to August 2008 In spite of advancement in surgical techniques, equipment's, experience and other sophisticated facilities in recent years, post caesarean wound infection is related to significant postoperative morbidity and quortality. In this study, the incidence of wound infection is 3.1 percent. My findings were compared with the results of study made by Barbut F *et al*., [1], Rasul G, Ashraf SA ef czJ [14], Ali SL, Khan ANGA [16], Gruse PJE, Frood R]2, Saha SC, Zaman MA, Khan MR ef cz/L7. There are few reports on noscomial infection in our country though these are the reports of some study on postoperative infection [18, 11, 19, 20]. Patients were examined to establish the diagnosis, and resuscited whenever necessary. The patients' age, physical built, general nutritional status, anaemia, jaundice and presence of any septic focus were observed. Patients were asked for diabetic status, chronic pinlmonary disease, concurrent diseases and use of steroids or immunosuppressive drugs. In relation to surgical wound infection, associations of the above factors are very important. The abdomen was swabbed from proposed line of incision to the periphery. Swabbing cannot eradicate the whole bacterial population. The transient bacteria, which are on the surface are killed by skin antiseptic but cannot destroy the deep resident bacteria. In this series, all of the patients were washed by povidone iodine. So post-operative wound infection was not significantly higher. `Povidone iodine is a safe and effective means of reading wound sepsis following gastrointestinal surgery [21].

In this study, the appearance of abdominal wound infection was highest at fourth postoperative day (50%). Various factors affect wound healing and thus give rise to wound infection. The factors that cause wound infection have been studied extensively throughout the world. Haddad and Alexander and Prudden showed that largest number of wound infection

became clinically evident on the 5th postoperative day [37, 38]. In this study, post-caesarean wound infection occurred at reproductive age group (15-36 years), with peak incidence at third decade of life (mean ±SD-23.056 ± 4.86 years). Aziz in 1997 in Bangladesh also made similar Observation [8].An attempt has been made to identify factors or combination of factors that were responsible for delayed wound healing leading to increased incidence of wound infection. Patients with 25-48 hours duration of labour had highest percentage of wound infection, followed by 13-24 hours (29%) and >72 hours (3%). The mean (±SD) duration of labour was 27.25 ± 22.82 hours. Rabeya in 2001 in Bangladesh also made similar observation [39]. Time of rupture membrane was 25-48 hours in 43 percent patients and 6 percent had intact membrane (mean ±SD -27.92 ± 25.58 hours). My findings were-compared with the results of study made by Rabeya in 2001 [39].

The prevalence of wound infection was highest among patients who underwent emergency Caesarean section (98°/o) rather than elective (2%). Majority of the emergency Caesarean section were due to obstructed labour (42%), followed by fetal distress (22%), ante partum eclampsia (14%) and severe pre-eclampsia (4%). Among the two elective Caesareans section, one patient had history of previous caesarean section and another had history of previous 2 Caesareans section. .b Rabeya in 2001 in Dhaka Medical College also reported that the prevalence of wound dehiscence was highest among patients who underwent emergency caesarean section [39]. There is a relation between the length of operating time and infection rate' [2. In this series rate of wound infection is three times more when the duration is two. times more. `Other studies also shown a rise in infection rate associated with prolongation of the operating time [12].

Dexon, protene, silk, catgut, vicryl were used in different cases. Catgut, the conventional absorbable suture material provokes the strongest inflammatory reaction and prolongs the lag pha;e of wound healing. It is also synergistic with organisms in the promotion of wquhd infection. `Suture material is the most important denominator influencing wound healing [13]. A-wound was defined as infected if it discharged pus"12. In this series, the colour of wound discharge was serosanguineous in 70°/o cases and pus in 30% cases. Foul smelling discharge was present in only 30°/o cases, Bacteriological study of wound discharge showed positive culture in 679/o of the patients. The organisms isolated were Staphylococcus (30%), Escherichia coli (16%), Pseudomonas (12%), Klebsiella pneumonias (4°/o), Actinobacter (3%) and Proteus (2%). Although in this series, the Staphylococcus was the common infective organism (30%). Greenal in 1979 [10] found Escherichia coli as the common infective organism. Riou ef cz/ in 1992 found Staphylococcus aureus as the most common organism responsible for wound infection and pelymicrobial infectious were noted in a smaller number of patients 7.Greenal in 1979 found E coli as the commonest infecting organism [10]. Aziz in 1997 in Dhaka Medical College Hospital reported that among 100 patients. 60 had positive wound culture and staphylococcus, Escherichia coli, Streptococci, Pseudomonas, Proteus and Bacteriodes were the common infective organisms. Matin in 1981 in Institute of Bango Bandhu Sheilch Mujib Medical University, noted the commonest infective organism in his series as Coli foim (60%), followed by Staphylococcus (40%).

In this series, the haemoglobin ranged 45-54% among 54 percent patients, 55-64% among 38 percent, 65-74% among 6 percent patients and 75-84% among 2 percent patients. Anaemia contributes to infection by producing hypoxic effect at healing area. The meant (±SD) Hb% was 53.88 ± 7.67. Riou ef cz/ in 1992 defined anaemia as haemoglobin less than 10gm /100ml in early postoperative period [7]. Anaemia was found in 90 percent patients in the infected group and only 16 percent in control group. Makela ef cr/ in 1995 recorded anaemia in 38 percent patients in the infected group and 10 percent in the control group of patients. Patients considered to be malnourished prior to surgery were more common in the infected group (21%) than control group (4%). Malnutrition was found in 10 percent cases which contributes to infection by the defective synthesis of collagenous ground substance at all the site of wound healing [9].

In all cases antibiotics were used in both the pre-operative and in the postoperative period as therapeutic or prophylactic measures. Antibiotics mostly used were Ampicillin, Amoxicillin, Getamycin, Ciprofloxacin, Cephalosporin or Metronidazole. As mentioned earlier that Rasul G, Ashraf SA *et al*., [14] did not use any antibiotic in 65 selected cases. There was not a single incidence of infection. The results of recent clinical trials of precoperative antibiotic therapy after emergency abdominal Sungery support such policies [15]. Varied from 7 to 40 days and average hospital stay was 15 days in infective cases. Forty percent of the patients had to stay in hospital for 11-20 days and seven percent for 3140 days (mean SD : 17.85 ± 7.78 days). Makela ez a/ in 1995 reported that mean hospital stay in the infected group was significantly longer (25 ± 15 days) than in the control group (11 ± 6 days) [9].

Limitation of the Study

This small study of one hundred patients only cannot be the representative of the entire spectrum of post-operative abdominal wound infection. Anaerobic culture of the wound discharge could not be done due to limitation of time and hospital facilities. Due to various reasons, some patients had to be released from hospital before their full recovery.

CONCLUSION

The quality of surgical care is often correlated with the postoperative wound infection rate in a hospital. The ideal care of the wound begins from the admission and includes immediate assessment and resuscitative measures, preparation of the patient at optimal conditions when the wound is made and an aseptic environment are important for control of infection rates. Most of the wound infections were evident between the period 4th to 8th postoperative day. It indicates that the prime source of infection is the operation theatre. Antibiotics were used both in the pre and post-operative period. The oral antibiotic replaced parenteral antibiotics when the patients were allowed to take food.

RECOMMENDATION

Since this study included a small number of patients and the study period was very short, further studies with larger number of patients and longer follow-up studies are necessary.

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