

Specific Management of Maternal Sepsis and Its Outcome in a High Dependency Unit in a Tertiary Care Center -A Prospective Study

Dr. Ratna Kanta Talukdar¹, Dr. Biva Rani Goswami², Dr. Minakshi Gogoi^{3*}

¹Professor and HOD, Department of Obstetrics and Gynaecology, GMCH, Bhangagarh, Guwahati, Assam 781032, India

²Assistant Professor, Department of Obstetrics and Gynaecology, GMCH, Bhangagarh, Guwahati, Assam 781032, India

³Post Graduate Trainee, Department of Obstetrics and Gynaecology, GMCH, Bhangagarh, Guwahati, Assam 781032, India

Original Research Article

*Corresponding author

Dr. Minakshi Gogoi

Article History

Received: 12.11.2018

Accepted: 27.11.2018

Published: 30.11.2018



Abstract: Sepsis is a clinical syndrome that complicates severe infection and is characterized by inflammation and widespread tissue injury. The clinical process usually begins with infection, which potentially leads to sepsis and organ dysfunction [1]. It is estimated that puerperal sepsis causes at least 75,000 maternal deaths every year, mostly in low-income countries [2]. To assess specific management of maternal sepsis in High Dependency unit (HDU) and its impact on maternal outcome. Prospective study carried out at HDU in Gauhati Medical College (GMCH) and Hospital from 1st June 2017- 30th July 2018. All patients with sepsis admitted to HDU during the period of study were studied for their response to management and outcome is evaluated. Out 74 patients with sepsis admitted to HDU, 42 expired due to severe sepsis, septic shock or MODS. The total number of maternal deaths during the study period was 148 due to various causes and the total number of live births was 15802. So maternal sepsis was responsible for 28 % of maternal deaths. The calculated MMR for the period of study was 936/ lakh live births and calculated MMR for maternal sepsis was 265 / lakh live births. From this study it can be concluded that sepsis is an important cause of maternal morbidity and mortality. A positive blood culture and the antibiotic susceptibility testing of the isolates are the best guide in choosing the appropriate antimicrobial therapy in treating sepsis. Blood and blood products, vasopressors also plays important role as adjunctive treatment of sepsis.

Keywords: Maternal sepsis, Maternal mortality, High dependency unit.

INTRODUCTION

In April 2016, WHO proposed a new global definition for maternal sepsis as- "*Maternal sepsis is a life threatening condition defined as organ dysfunction resulting from infection during pregnancy, childbirth and 6wks post abortion or postpartum period.*" Pregnant women are particularly predisposed to develop infections and sepsis for several reasons. Physiological, immunological and mechanical changes in pregnancy make pregnant women more susceptible to infections compared with non-pregnant women, particularly during the postpartum period [3]. Maternal sepsis is one of the leading cause of maternal morbidity and mortality other than post partum hemorrhage and pre eclampsia / eclampsia.

Problem Scenario-According to a study "Global causes of maternal death: a WHO systematic analysis" about 73% of all maternal deaths between 2003 and 2009 were due to direct obstetric causes and deaths due to indirect causes accounted for 27.5% of all deaths. Haemorrhage accounted for 27.1%, hypertensive disorders 14.0%, and sepsis 10.7% of

maternal deaths [4]. In India, post-partum haemorrhage, hypertensive disorders and sepsis are the most common causes of maternal deaths in India followed by complications of delivery and obstructed labour [5].

Aims and Objectives

To assess specific management of maternal sepsis in HDU and its impact on maternal outcome.

Place of study

High dependency unit (HDU) under department of Obstetrics and Gynaecology, Gauhati Medical College (GMCH).

STUDY DESIGN

Prospective study carried out at HDU from 1st June 2017- 30th July 2018. All patients with sepsis admitted to HDU during the period of study were observed for their response to management and outcome is evaluated

METHODOLOGY

A total of 74 patients with sepsis (antenatal, intrapartum, puerperium and post abortion) were admitted to HDU under Obstetrics and Gynaecology Department, GMCH, from 1st June 2017 to 30th July 2018. All patients were observed for the response to different treatment procedures and outcome is evaluated. Maternal mortality due to sepsis is calculated for the period of study by using data from records of Emergency labour room for total maternal deaths and total live births.

RESULTS

Out 74 patients, 42 expired due to severe sepsis, septic shock or MODS. The total number of maternal deaths during the study period was 148 due to various causes and the total number of live births was

15802. So maternal sepsis was responsible for 28 % of maternal deaths. The calculated MMR for the period of study was 936/ lakh live births and calculated MMR for maternal sepsis was 265 / lakh live births.

All patients were started on antibiotics on admission, empirically selected, and changed later on depending on blood culture reports or response of the patient to initial antibiotics. Many of them needed transfusion of blood and blood products and vasopressors, their response and impact on maternal mortality is evaluated. Surgical intervention was required in many of them as a mode of management. The various results observed were as follows:

- Antibiotic regimen initially started and changed subsequently and relation to maternal outcome.

Table-1: Table showing antibiotic regimen started on admission

| Initial antibiotics on admission | No.of patients | Percentage |
|---------------------------------------|----------------|------------|
| 1. Inj ceftriaxone + inj metronidazol | 58 | 78% |
| 2. Inj piperacillin+tazobactam | 16 | 22% |
| Total | 74 | 100% |

On admission 58 patients (78%) were started on a combination of Inj Ceftriaxone 1g IV BD ANST with Inf Metronidazol 100 ml IV TDS ANST and 16

patients (22%) were started on Inj Piperacillin + tazobactam 4.5g IV TDS ANST.

Table-2: Table showing change of antibiotics and maternal outcome

| Change of antibiotics | Total no. Of patients | Outcome | |
|-----------------------|-----------------------|-----------|---------|
| | | Recovered | Death |
| 1.pip+taz | 39(54%) | 15(21%) | 24(33%) |
| 2. Meropenem/imipenem | 16(22%) | 6(8%) | 10(14%) |
| 3.linezolid | 4(6%) | 0 | 4(6%) |
| 4.none | 13(18%) | 9(12%) | 4(6%) |
| Total | 72(100%) | 30(42%) | 42(58%) |

NB- 2 patients whose antibiotics were changed to piperacillin +tazobactam took LAMA

Antibiotics were changed to Piperacillin and tazobactam in 39 patients (54%) out of which 15 patients (21%) survived and 24 patients (33%) succumbed to death. Change to Imepenem or Meropenem was done in 16 (22%) of patients of which 6 patients (8%) survived and 10 patients (14%) died. Linezolid was started in 4 patients of which all

succumbed to death.No change of antibiotics was done in 13 patients (18%) of which 9 patients (12%) survived and 4 patients (6%) expired.

- Need of blood and blood products and vasopressors agents in the management of patients and their outcome

Table-3: Table showing need of blood and blood products in management and maternal outcome

| | | Recovered | Death | Dama |
|-----------------------------|----------------|-----------|-------|---------------------|
| 1. Blood and blood products | Transfused | 20 | 28 | 1 |
| | Not transfused | 10 | 14 | 1 |
| Total | | 30 | 42 | P value 1 (>.05) |
| 2.vasopressor | Required | 11 | 37 | 1 |
| | Not required | 19 | 5 | 1 |
| Total | | 30 | 42 | P value.0327 (<.05) |

Out of 74 patients, 48 patients (65%) required vasopressor agents while 24 (33%) patients didn't

require vasopressors. 48 patients (65%) required blood and blood products transfusion.

OPERATIVE PROCEDURE PERFORMED FOR MANAGEMENT OF MATERNAL SEPSIS

Table-4: Table showing different operative procedure performed

| Surgical intervention | no.of patients | Percentage % |
|-------------------------------------|----------------|--------------|
| A.lscs | 5 | 7% |
| B.dilatation and evacuation(d&e) | 21 | 28% |
| C.colpotomy | 5 | 7% |
| D.laparotomy and peritoneal washing | 11 | 15% |
| E.wound debridement | 8 | 11% |
| F.none | 24 | 32% |
| Total | 74 | 100% |

Out of 74 patients, 24 (32%) patients didn't undergo any surgical intervention, 21(28%) patients underwent D&E, 11 (15%) required laporotomy with peritoneal toileting, 5 (7%) required colpotomy and 5

(6%) underwent emergency LSCS and 8 patients (11%) required wound debridement and secondary closure.

SURGICAL INTERVENTION AND MATERNAL OUTCOME

Table-5: Table showing relation of surgical intervention and maternal outcome

| Surgical intervention | Maternal outcome | | P value.0482 (<0.05) |
|-----------------------|------------------|---------|----------------------|
| | Recovered | Death | |
| Done | 27(38%) | 21(29%) | |
| Not done | 3(4%) | 21(29%) | |
| Total | 30(42%) | 42(58%) | |

Different surgical interventions that were done has got significant outcome in 27(38%) patients who recovered well but in 21(29%) patients despite of surgical interventions, they succumbed to illness. 3(4%) patients recovered with conservative management. In 21(29%) patients surgical intervention was not done

(either due to non requirement or due to late presentation of the patient) and they died.

PATIENTS WITH SEPSIS REQUIRING TRANSFER TO ICU

Table-6: Table showing patients who required transfer to ICU

| Transfer to icu | No.of patients n=74 | Percentage |
|-----------------|---------------------|------------|
| Transferred | 8 | 11% |
| Not transferred | 66 | 89% |
| Total | 74 | 100% |

DISCUSSION

Antibiotic regimen usually started and changes made

As per protocol given by Surviving Sepsis Campaign (SSC) broad spectrum antibiotics should be started within 3 hrs for emergency admissions and within 1 hr for non emergency ICU Admissions.

During the present study all patients were started on broad spectrum antibiotics within 3hrs of admission. Empirically selected antibiotics were initiated immediately after culture collection .In 58 patients (78%) 3rd generation cephalosporins was given. In combination Infusion metronidazol was given for anaerobic organisms. While in 16 patients (22%) Inj piperillin and tazobactum was used. According to culture reports (E Coli was the commonest organism) and patient's improvement antibiotics were changed subsequently. Change to piperillin +tazobactum was done in 39 patients (54%), meropenem/imipenem in 4

(6%), inj linezolid in 4 patients (6%). No change of antibiotics was done for 13 patients (18%).P value for change of antibiotics and maternal outcome came out to be 0.13 which is statistically insignificant indicating that change of antibiotics alone has got no effect on maternal outcome.

In the study conducted by SJ Knowles *et al.*, [6]. Escherichia coli (103 isolates) caused 37.3% of all sepsis cases. Across the 8-year period, E. coli antibiotic resistance was as follows: amoxicillin 58%, co-amoxiclav 15%, piperacillin-tazobactam 2.1%, gentamicin 1%; no resistance was detected for third generation cephalosporins, ciprofloxacin and meropenem. Group B Streptococcus (57 isolates) (GBS) was responsible for 20.7% of all cases of BSI. These isolates were all susceptible to penicillin and vancomycin, whereas 11% were resistant to clindamycin. All anaerobes were sensitive to metronidazole. Staphylococcus aureus (21 isolates)

caused 7.6% of BSIs. *Enterococcus faecalis* (13 isolates) accounted for 4.7% of all BSI's. All isolates were susceptible to amoxicillin and vancomycin. Group A *Streptococcus* (12 isolates) were responsible for 4.3% of BSIs. All isolates were sensitive to penicillin and vancomycin; 16.7% were resistant to clindamycin.

Need of blood and blood products and vasopressors for management of maternal sepsis

Anaemia is found to be an important co morbid condition in maternal sepsis and sepsis can itself lead to anemia and other complications like DIC so blood and blood products transfusion is essential for the treatment of maternal sepsis. In the present study 48 patients (64%) required transfusion of blood and blood products while 24 patients (36%) required no transfusion. The P value for blood transfusion and maternal outcome is 1 which is insignificant indicating that blood and blood products transfusion is only supportive and for hemodynamic stability but has got no definite role in positive outcome in the present study.

The classical study by Rivers [7] found mortality reduction when the hematocrit (Ht) was maintained >30% by means of packed red blood cells. As a rule, transfusion is indicated when the hemoglobin concentration is <7.0g/dL, aiming to maintain Hb levels between 7.0 and 9.0g/dL, with concomitant assessment of the patient's comorbidities.

Vasopressors are provided for septic shock that does not respond to fluid resuscitation. Norepinephrine, epinephrine, vasopressin, phenylephrine, and dopamine are the most commonly used vasopressors for septic shock.

In the present study vasopressors were required for management of septic shock in 48 patients (65%) while 24 (33%) patients didn't require vasopressors. Out of those who required vasopressors, 11 patients recovered while 37 patients died. The P value for need of vasopressor and maternal outcome is P= 0.32 which is significant indicating vasopressors for management of septic shock has positive effect on maternal outcome.

Pregnancy does not represent a contraindication for vasopressors and/or inotropic agents. However, dopamine and noradrenaline might reduce the uteroplacental blood flow while they improve the maternal state. Therefore, when those drugs are used, greater attention must be directed to fetal vitality. The latest recommendations by Surviving Sepsis Campaign indicate noradrenaline as the first choice, while adrenaline or vasopressin might be added in special situations or when the patient remains hypotensive despite the administration of large noradrenaline doses. Dopamine should only be used in

very specific situations because it is associated with more severe side effects.

Dobutamine infusion should be considered for cases of sepsis associated with myocardial dysfunction and/or continuous signs of tissue hypoperfusion despite fluid resuscitation and normal blood pressure.

A review of critical care management of maternal sepsis by Madiha Hashmi, Fazal Hameed Khan [8] stated that infuse vasopressors (for hypotension that doesn't respond to initial fluid resuscitation or for abnormally low diastolic blood pressure) to maintain MAP of 65 mm Hg or greater. Intravenous norepinephrine is the vasopressor of choice.

Operative procedure performed for management of maternal sepsis

In the present study 50 patients (67%) required surgical intervention. 21 patients (28%) underwent D&E, exploratory laparotomy was done in 11 patients (15%), 8 patients (11%) had wound debridement, 5 patients (7%) had LSCS and 5 patients had colpotomy. While no surgical intervention was required for 24 patients (32%). P value = .04 for surgical intervention which is significant indicating that surgical intervention had a positive effect on maternal outcome.

In a study conducted by Fasiha Tasneem *et al.*, [9] in 2017 puerperal sepsis is responsible for 7.69% of postpartum exploratory laparotomy that were conducted during the study period.

In the study conducted by Sheeba Marwah *et al.*, [10] 73% women required surgical exploration and further procedure for management which was statistically significant (p value = .009). Exploratory laparotomy (with uterine rent closure or bladder repair or gut resection and anastomosis) in 24 patients (73%), subtotal hysterectomy in 2 patients (6%), laparotomy with peritoneal lavage in 8 (24%) patients, and colpotomy in 3 (9%) patients.

In the study conducted by Archana Kumari *et al.*, [11] obstetrical procedure had to be performed in 13% of cases. Repeat laparotomy was required in 3 out of 45 for pyoperitoneum drainage with bowel repair, hysterectomy was done in 1 patient and uterine curettage was done in 2 cases for removal of infected RPOC.

Patients with maternal sepsis requiring transfer to ICU

In the present study only 8 patients (11%) were transferred to ICU for better management and care. While 66 patients (89%) were managed in HDU. In the study conducted by A. Bashir Fazar *et al.*, [12] in

Sudan, during study period the hospital admission was 1124 cases from pregnancy complications; 142 cases were admitted at Intensive care unit (ICU) 13 cases were of severe sepsis and septic shock, made the rate 1.16 (13/1124 = 1.16%).

In the study conducted by Sheeba marwah *et al.*, [10] 24 patients (73%) were transferred to ICU, 3 patients (9%) didn't require ICU care and 6 (18%) required ICU care but due to unavailability of bed couldn't be transferred.

CONCLUSIONS

- Sepsis is an important cause of maternal mortality and morbidity.
- Early identification of sepsis and goal directed specific management can improve maternal mortality.
- A positive blood culture and the antibiotic susceptibility testing of the isolates are the best guide in choosing the appropriate antimicrobial therapy in treating sepsis. Blood and blood products, vasopressors also plays important role as adjunctive treatment of sepsis.
- Ready availability of ICU for better management of patients is an essential requirement.

REFERENCES

1. Gustot, T. (2011). Multiple organ failure in sepsis: prognosis and role of systemic inflammatory response. *Current opinion in critical care*, 17(2), 153-159.
2. van Dillen, J., Zwart, J., Schutte, J., & van Roosmalen, J. (2010). Maternal sepsis: epidemiology, etiology and outcome. *Current opinion in infectious diseases*, 23(3), 249-254.
3. Fernandez-Perez, E. R., Salman, S., Pendem, S., & Farmer, J. C. (2005). Sepsis during pregnancy. *Critical care medicine*, 33(10), S286-S293.
4. Say, L., Chou, D., Gemmill, A., Tunçalp, Ö., Moller, A. B., Daniels, J., ... & Alkema, L. (2014). Global causes of maternal death: a WHO systematic analysis. *The Lancet Global Health*, 2(6), e323-e333.
5. Bigger, J. W., & Fitzgibbon, G. (1925). An investigation into the etiology of puerperal fever. *British Medical Journal*, 1(3356), 775.
6. Knowles, S. J., O'sullivan, N. P., Meenan, A. M., Hanniffy, R., & Robson, M. (2015). Maternal sepsis incidence, aetiology and outcome for mother and fetus: a prospective study. *BJOG: An International Journal of Obstetrics & Gynaecology*, 122(5), 663-671.
7. Rivers, E., Nguyen, B., Havstad, S., Ressler, J., Muzzin, A., Knoblich, B., ... & Tomlanovich, M. (2001). Early goal-directed therapy in the treatment of severe sepsis and septic shock. *New England Journal of Medicine*, 345(19), 1368-1377.
8. Hashmi, M., & Khan, F. H. (2014). A review of critical care management of maternal sepsis. *Anaesthesia, Pain and Intensive Care*, 18(4), 430.
9. Tasneem, F., Shanbhag, V., & Sirsam, S. (2017). A five-year study of postpartum exploratory laparotomy in a tertiary care teaching hospital. *International Journal of Reproduction, Contraception, Obstetrics and Gynecology*, 6(10), 4511-4515.
10. Marwah, S., Topden, S. R., Sharma, M., Mohindra, R., & Mittal, P. (2017). Severe puerperal sepsis-a simmering menace. *Journal of clinical and diagnostic research: JCDR*, 11(5), QC04.
11. Kumari, A., Suri, J., & Mittal, P. (2017). Descriptive audit of maternal sepsis in a tertiary care centre of North India. *International Journal of Reproduction, Contraception, Obstetrics and Gynecology*, 7(1), 124-127.
12. Fazari, A., Gailii, E., Mohammed, W., Abdallha, M., Ali, M., & A Rahman, S. (2016). Maternal Sepsis in Intensive Care Unit at Omdurman New Hospital-Tertiary Obstetric Facility, Khartoum-Sudan.