Original Research Article

Management of severe sepsis and septic shock in pregnancy to improve the survival

Chuppana Ragasudha[1*], Atluri Phani Madhavi[2], Rama Satya Divya[3], Bhavani Y V L[3], Nazia Shaik[3], Rajani Balaga[3], Jyotsna Y[3], Gowthami M[3]

[1]Assistant Professor, Department of Obstetrics and Gynecology, AMC, India
[2]Civil Assistant Surgeon, Labour room, AMC, India
[3]Post Graduate Student, Department of Obstetrics and Gynecology, AMC, India
[*]Corresponding author email: **ragasudhadr@gmail.com**

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Abstract

Background: Sepsis in pregnancy continues to be the third leading cause of preventable maternal deaths in India, still accounts for up to 10 to 50% of maternal deaths in our country. Early recognition and timely treatment is the key to ensuring a favorable outcome.

Aim: To know the prevalence of maternal severe sepsis and septic shock and calculate the case fatality rate and to apply the principles of management suggested by surviving sepsis guidelines in improving the survival.

Materials and methods: This prospective study was carried out in the labour room, department of obstetrics and gynaecology, King George hospital, Andhra medical college for a period of six months from December 2016 to May 2017. All the women who had the criteria satisfied were included in the study. They were all diagnosed and managed as per the recommendations given by surviving sepsis guidelines published in 2016.

Results: Incidence of maternal severe sepsis and septic shock was 0.36% of all admissions to labour room. Out of 0.36% there were three deaths giving case fatality rate of 20%. Deaths due to severe sepsis and septic shock accounted for 20% of all maternal deaths in our institute. Literature gives a mortality rate of 20 to 40% for severe sepsis with acute organ dysfunction, which increases to 60% if septic shock develops.

Conclusion: Awareness of the diagnosis of maternal sepsis and management as per the guidelines suggested by the surviving sepsis guidelines is crucial for improving the outcome.

Key words

Sepsis, Severe sepsis, Septic shock, Pregnancy, Maternal sepsis, Puerperal sepsis, Early goal directed therapy, Group A streptococcal infection.

Introduction

Sepsis was the most frequent underlying cause of maternal mortality in the 19th century, responsible for 50% of all cases [1-3]. Improved socioeconomic circumstances and the introduction of antisepsis and of antibiotics caused a sustained fall in deaths. But still sepsis continues to be major healthcare problem, affecting millions of people around the world each year, and killing as many as one in four [4, 5], causing 75 000 maternal deaths every year [6]. Similar to acute myocardial infarction, or stroke, early identification and appropriate management in the initial hours after sepsis develops improves outcomes. According to 2008 guidelines Sepsis was defined as infection plus systemic manifestations of infection. Severe sepsis is sepsis plus sepsis-induced organ dysfunction or tissue hypoperfusion. Septic shock was defined as the persistence of hypoperfusion despite adequate fluid replacement therapy [7]. In 2016 guidelines, new definitions for sepsis and septic shock were published. Sepsis is now defined as life-threatening organ dysfunction caused by a dysregulated host response to infection. Septic shock is a subset of sepsis with circulatory and cellular/metabolic dysfunction associated with a higher risk of mortality. Both are medical emergencies that necessitate urgent assessment and treatment. As part of this, initial fluid resuscitation should begin with 30 mL/kg of crystalloid within the first 3 hours. High dose intravenous broad-spectrum antibiotic therapy should be started as early as possible; as immediate antibiotic treatment may be life saving. It should be started within the first hour of recognition of septic shock and severe sepsis, as each hour of delay in achieving administration of effective antibiotics is associated with a measurable increase in mortality. Appropriate routine microbiologic cultures should be obtained before starting antimicrobial therapy. One of the most important principles in the management is detailed initial assessment and ongoing reevaluation of the response to treatment.

Materials and methods

This was a prospective study which was carried out in the labour room, department of obstetrics and gynaecology, King George hospital, Andhra medical college for a period of six months from December 2016 to May 2017. All women admitted during pregnancy or within 42 days of termination of pregnancy or delivery with severe sepsis and septic shock were included in the study. Patients who developed pyrexia or sepsis but not satisfied the criteria defined by surviving sepsis guidelines for severe sepsis and septic shock were excluded. Women with severe sepsis and septic shock but were not pregnant or delivered within 42 days or not had an abortion were also excluded. Informed consent was taken in their own language from those women who are included in the study. All patient records were entered on a proforma including age, parity, socioeconomic status, level of education, general health status, antenatal booking status, place of confinement, duration of labor, birth attendants, mode of delivery, duration of rupture of membranes, history of medical or surgical intervention, nature of symptoms and type of morbidity. All the patients included in the study were thoroughly evaluated with clinical examination and investigations. Patient's clinical state was described by evaluation of physiologic variables such as heart rate, blood pressure, arterial oxygen saturation, respiratory rate, temperature, urine output, and others as available. The following definitions were used to define the cases of severe sepsis and septic shock:

Definitions related to sepsis [8]

SIRS is defined by any two of the following

criteria: Temperature >38 or <36^{0}C; Heart rate >90 beats/min; Respiratory rate >20 breaths/min or $PaCO_2$ <32 mmHg (4.3 kPa); White cell count: >12 000 cells/ml or <4000 cells/ml or 10% immature/band forms.

Sepsis is SIRS with infection.
Severe sepsis is sepsis associated with organ dysfunction, hypoperfusion or hypotension. Hypoperfusion and perfusion abnormalities may include, but are not limited to, lactic acidosis, oliguria or an acute alteration in mental status.

Septic shock is defined as sepsis associated with hypotension, despite adequate fluid resuscitation along with the presence of perfusion abnormalities as listed for severe sepsis. Patients who are on inotropic or vasopressor agents may not be hypotensive at the time that perfusion abnormalities are measured.

As the speed and appropriateness of therapy administered in the initial hours after severe sepsis develops are likely to influence outcome with early resuscitation improving survival rates, women identified with severe sepsis and septic shock were given broad spectrum antibiotics immediately after getting the access and removing the samples for culture and serum lactate, complete blood count, liver function tests, renal function tests. Initial fluid resuscitation was with crystalloids of 20 ml/kg body weight and after adequate fluid replacement if the mean blood pressure is still not maintained over 65 mm Hg, noradrenaline or dopamine drips have been used to maintain the blood pressure. Some of the women who had the indications to transfer to intensive care unit were transferred to ICU [9]. Indications for transfer to ICU are hypotension or raised serum lactate persisting despite fluid resuscitation, pulmonary edema, mechanical ventilation, airway protection, renal dialysis, significantly decreased conscious level, multi-organ failure, uncorrected acidosis and hypothermia. Number of maternal death due to severe sepsis and septic shock were also noted.

Results

A total of 3256 obstetrical patients were admitted over the period of six months from December 2016 to May 2017 to the labor room. The frequency of maternal severe sepsis and septic shock was 0.36%. There were 12 patients admitted with maternal severe sepsis and septic shock during the study period. The distribution of cases basing on etiology is given in **Table - 1**.

Table – 1: Distribution of cases based on etiology.

Etiology	No. of cases
Incomplete abortion	5
Genital tract infection after delivery	3
Pyelonephritis	1
Retained placenta	1
Criminal abortion	1
Cesarean section	1

Out of these 12 cases, five were due to incomplete abortion, three were genital tract infection following normal delivery at hospital, one was pyelonephritis at 16 weeks of pregnancy, one was due to retained placenta, one was following criminal abortion and one following a cesarean section.

Distribution of cases based on the gestational age if occurred in antenatal period or in the postpartum period is given in the **Table - 2**. Out of twelve cases of severe sepsis and septic shock seven occurred in the antenatal period and five in the postnatal period which is shown in **Table - 2**. In saving mothers lives report of 2011 which is a confidential enquiry of maternal deaths in UK there were 8 maternal deaths due to sepsis in early pregnancy per 100, 000 maternities.

Women with severe sepsis and septic shock presented with many complications at admission which is shown in **Table - 3**.

Out of twelve cases, six were from tribal area that shows the poor resistance of the individuals to infection and absence of early recourse to

antibiotics at the suspicion of infection. There were three deaths among these twelve women with severe sepsis and septic shock giving a mortality of 25%. Out of three deaths, two deaths were from tribal area. Out of three women who died one tribal woman G5P4L3D1 with 14 weeks was attempted abortion with a stick by local quacks and had come with irreversible septic shock d severe hypoxia. Her ultrasound revealed retained products and a foreign body in the uterus. Another woman also from tribal area was a P2L2 who had a vaginal delivery four days ago had come with severe hypotension and hypoxia who could not be revived despite ventilator support. The third woman was a P2L2 from a rural area had come on 3rd postoperative day after a cesarean section with MRSA positive infection. Out of twelve cases, seven women were shifted to intensive care unit and others were managed in the labour room.

Table – 2: Distribution of cases based on timing of occurrence of sepsis.

Antenatal			**Post-natal**
1st trimester	**2nd trimester**	**3rd trimester**	
5	2	0	5

Table – 3: Complications that are seen in women with severe sepsis and septic shock at admission.

Type of complication	**No of women with the complication**
Severe fever	8
Hypotension	8
Renal failure	6
Metabolic acidosis	4
Severe anaemia	4
Severe breathlessness	3
Diarrhea	3
Hypoxia	2
Pulmonary edema	1
Leucopenia	1

Conclusion

Maternal sepsis is an infrequent, but important complication of pregnancy, childbirth and puerperium resulting in significant maternal morbidity and mortality. Early recognition, correct diagnosis and the implementation of evidence-based management guidelines can reduce the overall risk of mortality and morbidity from maternal sepsis. Infection must be suspected and actively ruled out when women who have had a recent termination of pregnancy or spontaneous miscarriage have pyrexia, persistent bleeding or abdominal pain, especially if the pain is constant and severe. Vaginal swabs, ultrasound scan to exclude retained products of conception and diagnostic evacuation of uterus (evacuation of retained products of conception) should be considered if there is still doubt; hemoglobin, white cell count, C-reactive protein, and blood cultures if pyrexia >38°C are minimum investigations; and high-dose broad-spectrum intravenous antibiotics should be commenced immediately, without waiting for microbiology results.

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