Review Article

Overview of Puerperal Sepsis, Challenges & Management – Hit On The Nail

Authors

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Introduction

Puerperal sepsis is one of the five leading causes of maternal mortality worldwide. Puerperal sepsis accounts for 8% of maternal mortality throughout the world.

So, the basic understanding regarding puerperium will help us in dealing with puerperal sepsis more efficiently and effectively.

The physiological changes of pregnancy and the puerperium can obscure the signs and symptoms of sepsis in the obstetric population.

A high level of suspicion is, therefore, needed in the care for the sick pregnant patient. If sepsis is suspected, timely administration of antibiotics, sepsis care bundles, multidisciplinary discussion and early involvement of senior staff members are important to improve outcome.

Definition

A WHO technical working group on The Prevention and Management of Puerperal (1995) infections proposed in 1992 the following definition of puerperal sepsis –

Infection of the genital tract occurring at any time between the rupture of membranes or labour, and the 42nd day postpartum in which 2 or more of the following are present:

- Pelvic pain
- Fever i.e. oral temperature 38.5°C or higher on any occasion
- Abnormal vaginal discharge, e.g. presence of pus
- Abnormal smell/foul odour of discharge
- Delay in the rate of reduction of the size of the uterus (<2cm/day) during the first 8 days.

Puerperal Pyrexia

A temperature of > 100.4 degree F after 24 hours of delivery on two occasions 24 hours apart within 10 days of delivery.

Puerperal sepsis is the most common cause of puerperal pyrexia.

Infection- pathological process caused by invasion of normally sterile tissue or body cavity by pathogenic micro-organism.

Sepsis- clinical syndrome caused by presence of both infection and SIRS.

Severe sepsis- sepsis associated with sepsis induced organ dysfunction or tissue hypoperfusion.
Septic shock- severe sepsis with circulatory shock with signs of organ dysfunction.

Incidence
According to WHO, sepsis accounts for 8% of maternal mortality in world.
International estimates of incidence of sepsis is 300 cases per 1lac population per annum.
Sepsis mortality ranges between 15 to 37 % in U.S.
Sepsis incidence is predicted to grow at rate of 1.5% annually.

Prevalence of sources of sepsis

<table>
<thead>
<tr>
<th>Source of Sepsis</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory</td>
<td>33%</td>
</tr>
<tr>
<td>Urinary</td>
<td>32%</td>
</tr>
<tr>
<td>Intra-abdominal</td>
<td>26%</td>
</tr>
<tr>
<td>Catheter related blood stream infection</td>
<td>6%</td>
</tr>
<tr>
<td>Device related</td>
<td>5%</td>
</tr>
<tr>
<td>CNS</td>
<td>3%</td>
</tr>
<tr>
<td>Others-Cellulitis, intra articular</td>
<td>2%</td>
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</tbody>
</table>

Organisms commonly responsible
Aerobes
Gram-positive cocci—group A, B, and D streptococci, enterococcus, Staphylococcus aureus, Staphylococcus epidermidis
Gram-negative bacteria—Escherichia coli, Klebsiella, Proteus
Others -Mycoplasma, Chlamydia species, Neisseria gonorrhoeae
Anaerobes
Cocci—Peptostreptococcus and Peptococcus
Others—Clostridium and Fusobacterium, Mobiluncus

Prevalence of resistant strains

Predisposing factors
Immunocompromised state of the host.
Multiplication of organisms in devitalised tissue.
Prevalence of resistant strains.

Antepartum factors
Malnutrition and anemia
Chorioamnionitis
PROM
IUD
Immunocompromised states- receiving corticosteroids, long standing diabetes.

Intrapartum factors
Repeated vaginal examinations
PROM of more than 12hrs
Dehydration and ketoacidosis
Instrumental traumatic delivery
Retained placental tissue or membranes

Site of Infection
Uterus –endomyometritis
Incidence of endomyometritis
1-3% after vaginal delivery
10% after cesarean section
Risk factors for endometritis
Cesarean section
Low socio economic status
Prolonged labour
Multiple vaginal examination

Clinical features of puerperal endometritis
Fever > 38 degree celcius within 36 hours of delivery
Tachycardia
Lower abdominal tenderness
Uterine tenderness
Malodorous lochia
Sequele of puerperal infection
Wound infection
Wound dehiscence
Pelvic abscess
Peritonitis
Septic pelvic thrombophlebitis
Septic shock

Wound Infection
Risk factors for post cesarean wound infection-
Prolonged rupture of membrane
Chorioamnionitis
Obesity
Immunodeficiency state
Incidence is 3 to 5 % following cesarean section.

Clinical features
Fever
Wound erythema, edema and tenderness at wound incision site.

Wound Dehiscence
- It involves the disruption of the facial layer
- Manifests on day 5 with serosanguinous discharge

Septic pelvic thrombophlebitis
Present in less than 1 % of patients with puerperal endometritis.
Puerperal infection may extend along venous routes and cause thrombosis
Presents in two forms-
1. Acute thrombosis of ovarian vein.
Clinical features- fever, pain, GI symptoms, tachycardia, guarding and decreased bowel sounds.
2. Enigmatic (mysterious) fever

Pelvic abscess
Present in less than 1 % of patients with puerperal endometritis.
Abscess commonly present in anterior or posterior cul de sac or within the broad ligament.
Organisms-
Bacteroids
Prevotella
Clinically, malaise, tachycardia, lower abdominal tenderness, palpable pelvic mass anterior or posterior or lateral to uterus

General peritonitis
Fever
Vomiting
Dehydration
Generalised abdominal pain
Tense abdomen
Guarding and rigidity of the abdomen
Washboard abdomen- silent abdomen

Pelvic Peritonitis
Along with the above features.
On Per vaginal examination tenderness in the fornix and cervical motion tenderness present.
Collection of pus in the pouch of douglas.c peritonitis

Septic shock
Tachycardia
Hypotension
Oliguria
ARDS
MODS

Necrotizing fasciitis
Occurs in both abdominal and perineal lacerations.
Involves tissue necrosis involving the skin, subcutaneous tissue, layers of abdominopelvic fascia.
Risk factors- obesity, hypertension, diabetes.
Caused by- polymicrobial – normal vaginal flora, virulent species like type Aβ haemolytic streptococcus.
Present on day 3-5.

Parametrialphlegmon
Metritis which develops following cesarean delivery, parametrial cellulitis is intensive and forms an area of induration, or phlegmon, within the leaves of the broad ligament.
Usually unilateral
Posterior extension may involve the rectovaginal septum, producing a firm mass posterior to the cervix.

Complications
Cellulitis
Peritonitis
Intra abdominal abscess

Toxic shock syndrome
Acute febrile illness with severe multisystem derangement
Case-fatality rate of 10 to 15 percent.
There is usually fever, headache, mental confusion, diffuse macular erythematous rash, subcutaneous edema, nausea, vomiting, watery diarrhea, and marked hemoconcentration.
Renal failure followed by hepatic failure, disseminated intravascular coagulation, and circulatory collapse.
During recovery, the rash covered areas undergo desquamation.
Organisms- Staphylococcus aureus

Group A beta hemolytic streptococci

Diagnostic criteria for sepsis
General variables-
  - Fever
  - Hypothermia
  - Heart rate >90/min
Tachypnoea
Altered mental status
Positive fluid balance
Hyperglycemia
Inflammatory variables-
  - Leucocytosis
Leucopenia
Normal WBC count with >10% immature forms
Plasma CRP > 2 SD
Hemodynamic variables-
  - Arterial hypotension

Organ dysfunction variable-
  - Arterial hypoxaemia
  - Acute oliguria
  - Raised serum creatinine
  - Coagulation abnormality
  - Ileus
  - Thrombocytopenia
  - Hyperbilirubinemia

Tissue perfusion variable-
  - Hyperlactatemia
  - Decreased capillary refilling

Diagnostic criteria of severe sepsis
Hyperlactatemia
Urine output < 0.5 ml/kg/hr
Acute lung injury in absence of pneumonia
Acute lung injury in presence of pneumonia creatinine> 176.8 micromol/l
Bilirubin > 34.2 micromol/l
Platelet count < 1 lac/cumm
Coagulopathy
Sepsis induced hypotension

Septic shock diagnostic criteria
Systolic BP < 90 mmhg or MAP < 65 mmhg
Lactate > 4 mmol/l
Modified SIRS criteria
Temperature > 38 or < 36 degree celcius
HR > 100/ min
RR > 20 breaths/ min
Total leucocyte count > 16,000/ cumm
Blood sugar level > 7.7 mmol/ l
Altered mental status

Management
Investigations
Blood counts, renal profile, blood grouping and rh typing
High vaginal and cervical swab
Blood culture
Serum lactate levels
Ultrasound
Chest x ray
CT /MRI contrast

Treatment of septic shock
Initial resuscitation phase
Send blood culture
Start emperical antibiotics
Start a central line
Maintain central venous pressure above 8mm hg
Start ionotropes if BP is less than 65mm hg
Transfuse blood if hb less than 7g/dl

Haemodynamic management
Central line or arterial line placement
Fluid resuscitation
Vasopressor therapy
Oxygen therapy

Antimicrobial therapy
Prompt cultures
Empirical treatment
Gentamicin 1.5 mg/kg IV
Clindamycin 900 mg IV 8 hourly
Penicillin 30 lac units IV 4 hourly
Search and eliminate source of infection
Retained products
Surgical drainage
Debridement and secondary suturing

Gentamicin 7 mg/kg body weight IV
Clindamycin 900 mg IV 8 hourly
Penicillin 5 million units 6 hourly IV

Regimen 3
Metronidazole 500 mg 12 hourly IV
Penicillin 5 million units 6 hourly IV

Search and eliminate source of infection
Surgical drainage
Debridement and secondary suturing

Endometritis
Diagnosis –
General physical examination
Total leucocyte count
Urine analysis and culture
Blood culture
Treatment–
Patients with mild to moderate infection after vaginal delivery can be treated with short IV course of single agent cephalosporin, penicillin, carbapenem

Combination antibiotic therapy for pueperal endometritis
Regimen 1
Clindamycin 900 mg 8 hourly IV
Gentamicin 7 mg/kg body weight IV
Regimen 2
Clindamycin 900 mg 8 hourly IV
Aztreonam 1-2 gm 8 hourly

Wound Infection
Diagnosis
Physical examination
Needle aspiration
Ultrasound
Treatment–
If pus is present, drainage of pus.
Antibiotic therapy- Vancomycin 1 gm IV to cover MRSA.

Wound Dehiscence
Treatment –
Antibiotic coverage followed by secondary suturing.

Septic Thrombophlebitis
Diagnosis–
CT, MRI for detecting large thrombi in major pelvic vessels.
Treatment–
Heparin challenge test- IV unfractionated heparin or low molecular heparin for 7-10 days.

Pelvic Abscess
Diagnosis–
Total leucocyte count
CT
MRI
Treatment –
Surgical drainage
Antibiotics- Penicillin 5 million units IV 6 hourly
Gentamicin 7 mg/kg body wt
Clindamycin 900 mg IV 8 hourly

Necrotizing fasciitis
Treatment–
Extensive surgical debridement of all infected tissue, leaving wide margins of healthy tissue.
Complications of septic shock

Maternal -
- Pulmonary edema
- Adult respiratory distress syndrome
- Acute renal failure
- Shock liver
- Septic emboli to other organ
- Myocardial ischaemia
- Cerebral ischaemia
- Disseminated intravascular coagulation
- Death
  - Perinatal –
  - Preterm delivery
  - Neonatal sepsis
  - Perinatal hypoxia

Fetal or neonatal death

References

Prognostic indicators of poor outcome in septic shock

Delay in initial diagnosis
Pre-existing debilitating disease process
Decreased cardiac output
Reduced oxygenation
High serum lactate ( >4mmol/l)
Multiple organ dysfunction syndrome

Conclusion
The frequency of common preventable risk factors was high like low standard personal hygiene, obstetrics care, poverty, lack of knowledge of utilization of health care facilities available, unplanned pregnancies, unnecessary induction and delivery by un skilled personals. This all results in severe life threatening complications such as septicaemia disseminated intravascular coagulation as well as maternal death.


