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Review Article

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

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Introduction

Puerperal sepsis is one of the five leading causes of maternal mortality worldwide.

Pueperal sepsis accounts for 8% of maternal mortality throughout the world.

So, the basic understanding regarding pueperium will help us in dealing with pueperial 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 pueperal 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 hypo-perfusion.

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

Respiratory	35%
Urinary	21%
Intra-abdominal	16.5%
Catheter related blood stream infection	2.3%
Device related	1.3%
CNS	0.8%
Others-Cellulitis, intra articular	11.3%

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

Organisms isolated in severe maternal sepsis

Organism	Antepartum	Postpartum
E. Coli	24.6	19.1
Group A *Streptococcus*	1.5	13.0
Group B *Streptococcus*	9.7	7.4
Other *Streptococcus*	4.5	6.5
Staphylococcus	1.5	9.1
Mixed organisms	3.7	6.1
Other	9.0	5.6
Unknown	3.7	0.4
No laboratory confirmed infection	41.8	32.9

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 cortices-teroids, 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 ceasarean section

Risk factors for endometritis

Cesarean section

- Low socio economic status
- Prolonged labour
- Multiple vaginal examination

Clinical features of puerperal endometritis

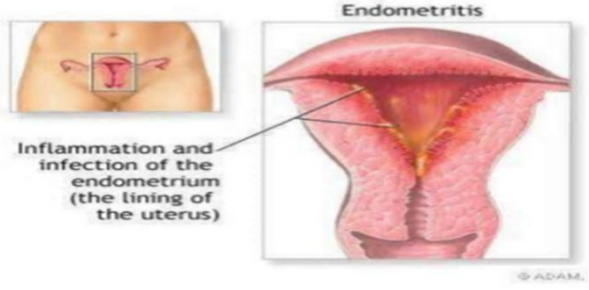
Fever > 38 degree celcius within 36 hours of delivery

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

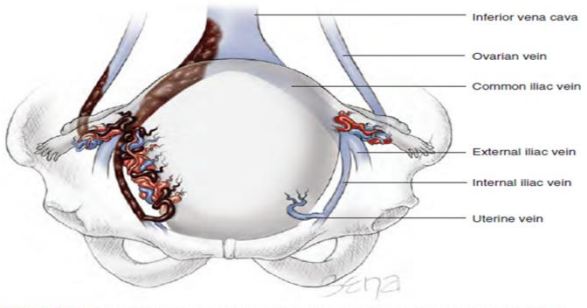


FIGURE 31-5 Routes of extension of septic pelvic thrombophlebitis. Any pelvic vessel and the inferior vena cava may be involved as shown on the left. The clot in the right common iliac vein extends from the uterine and internal iliac veins and into the inferior vena cava.

Pelvic abscess

Present in less than 1 % of patients with pueperal 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.

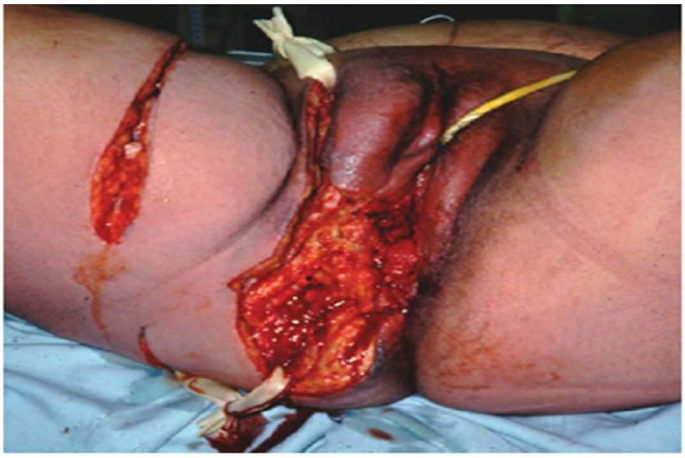


FIGURE 31-8 Necrotizing fasciitis complicating an episiotomy infection. Postpartum day 3, this woman had severe perineal pain and edema of the episiotomy site. Prompt extensive debridement and fasciotomy on her right inner thigh was completed. Cultures grew *Escherichia coli, Streptococcus viridans,* group D streptococcus, *Corynebacterium* species, *Bacteroides fragilis,* and *Clostridium* species. Blood cultures were positive for *Bacteroides fragilis*. She survived.

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

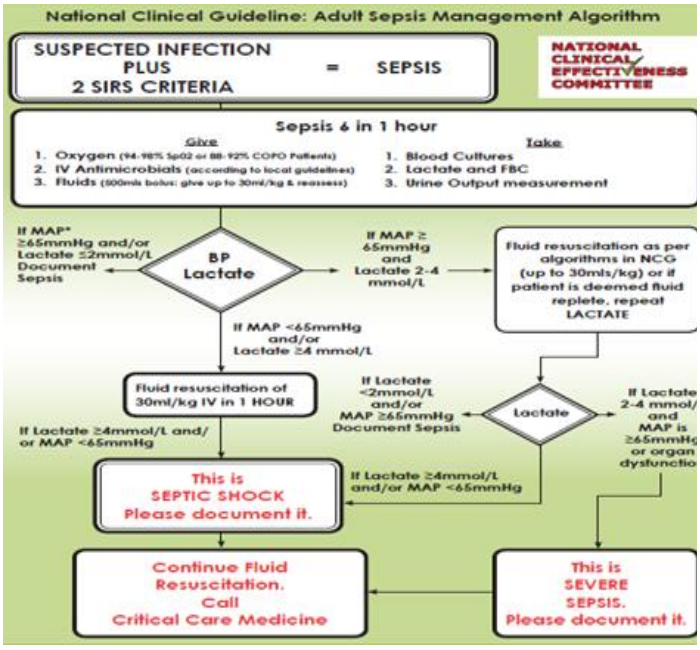
Tempererature> 38 or < 36 degree celcius
HR > 100/ min
RR > 20 breaths/ min
Total leucocyte count > 16,000/ cumm
Blood sugar level > 7.7 mmol/ l
Altered mental status

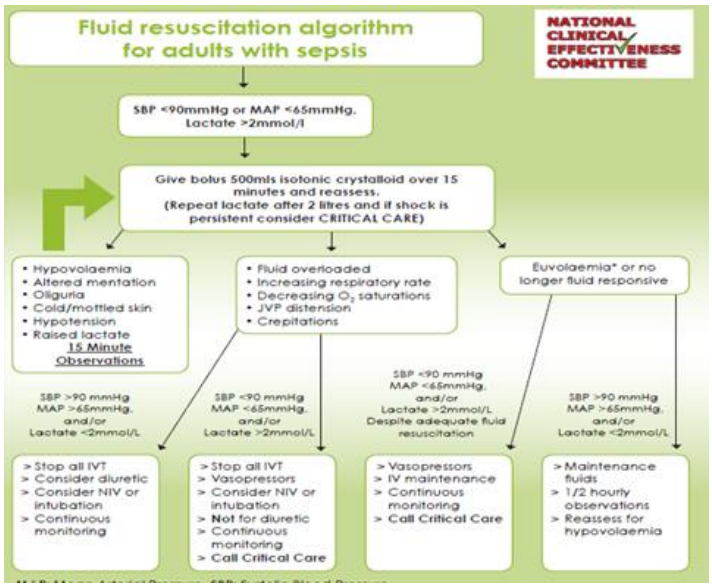
Management

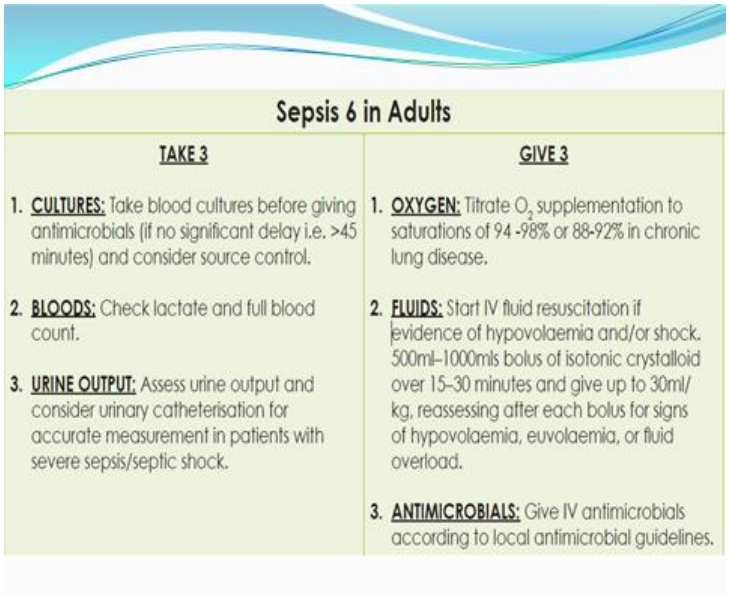
Investigations
Blood counts, renal profile, blood grouping and rh typing
High vaginal and cervical swab
Blood culture
Serum lactate levels
Ultrasound
Chest x ray
CT /MRI contrast

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







SURVIVING SEPSIS CAMPAIGN BUNDLES

TO BE COMPLETED WITHIN 3 HOURS:
1) Measure lactate level
2) Obtain blood cultures prior to administration of antibiotics
3) Administer broad spectrum antibiotics
4) Administer 30 mL/kg crystalloid for hypotension or lactate ≥4mmol/L

TO BE COMPLETED WITHIN 6 HOURS:
5) Apply vasopressors (for hypotension that does not respond to initial fluid resuscitation) to maintain a mean arterial pressure (MAP) ≥ 65 mm Hg
6) In the event of persistent arterial hypotension despite volume resuscitation (septic shock) or initial lactate ≥4 mmol/L (36 mg/dL):
   - Measure central venous pressure (CVP)*
   - Measure central venous oxygen saturation ($Scvo_2$)*
7) Remeasure lactate if initial lactate was elevated*

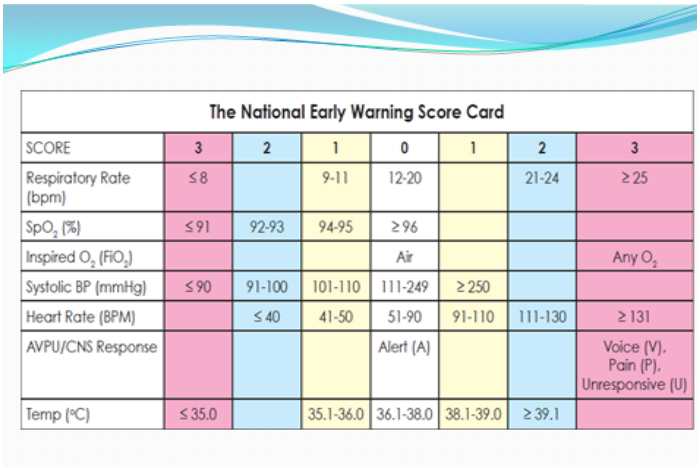
*Targets for quantitative resuscitation included in the guidelines are CVP of ≥8 mm Hg, $Scvo_2$ of ≥70%, and normalization of lactate.

Haemodynamic management

Central line or arterial line placement

Fluid resusitation
Vasopressor therapy
Oxygen therapy

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



The National Early Warning Score Card

SCORE	3	2	1	0	1	2	3
Respiratory Rate (bpm)	≤ 8		9-11	12-20		21-24	≥ 25
SpO_2 (%)	≤ 91	92-93	94-95	≥ 96			
Inspired O_2 (FiO_2)				Air			Any O_2
Systolic BP (mmHg)	≤ 90	91-100	101-110	111-249	≥ 250		
Heart Rate (BPM)		≤ 40	41-50	51-90	91-110	111-130	≥ 131
AVPU/CNS Response				Alert (A)			Voice (V), Pain (P), Unresponsive (U)
Temp (°C)	≤ 35.0		35.1-36.0	36.1-38.0	38.1-39.0	≥ 39.1	

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

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

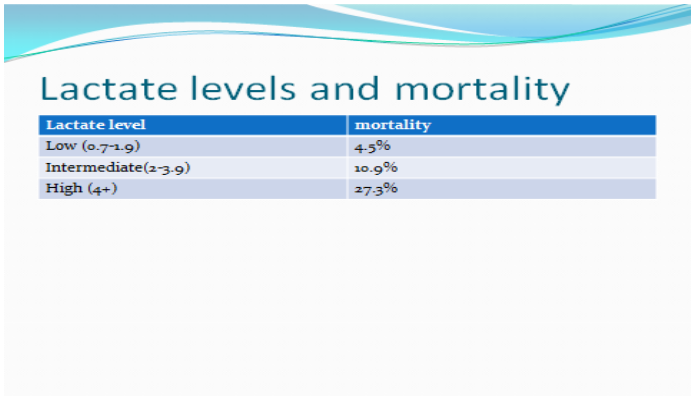
Maternal -

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



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.

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