PUERPERAL SEPSIS

BACKGROUND

Puerperal sepsis is defined as sepsis developing after birth until 6 weeks postnatally[1]. Sepsis is defined as infection plus systemic manifestations of infection, and can lead to septic shock if not identified and treated promptly[1].

Puerperal sepsis is an important cause of maternal death, accounting for 5% of maternal deaths in New Zealand[2]. Endometritis is the most common cause of puerperal sepsis[1-2].

A special note from the Perinatal and Maternal Mortality Review Committee report published June 2014 stated 'Obstetric Sepsis is an important cause of maternal mortality and we are aware of an increase in the incidence of severe maternal sepsis in New Zealand'[2]. Severe sepsis can develop any time throughout the postpartum period and disease progression may be rapid. A high index of suspicion is required as symptoms may be less distinctive.

Caesarean section has been identified as a risk factor for developing endometritis[3].

Early treatment with antibiotics is crucial in determining course of infection and outcome.

DIFFERENTIAL DIAGNOSIS[1]

- Endometritis – by far the most common cause of sepsis postpartum
- Episiotomy or caesarean section wound infection
- Mastitis, breast abscess
- UTI/pyelonephritis
- Pelvic collection/infected haematoma
- Appendicitis
- Pneumonia
- DVT, pelvic thrombophlebitis, pelvic vein thrombosis
- Necrotising fasciitis
- Influenza
- Gastroenteritis
- Infection for regional anaesthesia, eg. spinal abscess
- Meningitis

AETIOLOGY

For endometritis, mixed aerobic and anaerobic organisms.

- Gram-positive cocci – most frequently *Staphylococcus* spp., *Streptococcus* spp. (especially Group B streptococcus and more recently *Streptococcus pyogenes* – Group A *streptococcus* – see box below), *Gardnerella vaginalis*
- Gram-negative – most frequently enteric Gram negative bacilli including *Escherichia coli*, *Klebsiella* spp., *Proteus* spp., *Enterobacter* spp., as well as non-enteric *Neisseria* spp
- Chlamydia trachomatis, *Mycoplasma* spp., *Ureaplasma* spp
- Anaerobes – *Bacteroides* spp. Peptostreptococcus spp
- Others, including – *Mycoobacterium tuberculosis*

Multidrug resistant organisms (MDROs) such as MRSA and extended spectrum β-lactamase (ESBL) producing Gram-negative bacteria can also cause puerperal sepsis and can be hard to treat. Consultation with ID/microbiology is essential if an MDRO is suspected, eg. previous or current colonisation, recent travel history to high risk countries or failure to respond to initial treatment.

Group A streptococcus (GAS)

This requires a specific mention as it is the most common pathogen associated with death from genital sepsis.

Once shock develops, mortality approaches 60%[4].

Pregnant or postnatal women are at a 20-fold increased risk of infection[5].

The key characteristic that distinguishes GAS from other sepsis is the rapid deterioration in clinical condition of the woman, with sudden onset shock and organ dysfunction.

Can cause:

- Endometritis
- Necrotising fasciitis (which can affect uterus, vagina, external genitalia)
- Toxic shock syndrome

Typically presents with fever and abdominal pain.

Streptococcal Toxic Shock Syndrome – hypotension, tachycardia and leucocytosis

Initial treatment is with aggressive fluid resuscitation and antibiotics (usually a penicillin plus clindamycin[4,5], which inhibits exotoxin production.

Source control may be required with wound or vulval debridement, hysterectomy

Risk factors for puerperal sepsis[1]

- Obesity
- Impaired glucose tolerance/diabetes
- Impaired immunity/immunosuppressant medication
- Anaemia
- Vaginal discharge
- History of pelvic infection
- Amniocentesis and other invasive procedures
- Cervical cerclage
- Prolonged spontaneous rupture of membranes
- Prolonged labour
- Prolonged surgery
- Manual removal of placenta
- Vaginal trauma, caesarean section, wound haematoma
- Retained products of conception
- GAS infection in close contacts/family members
- Minority ethnic group origin
- Smoking
- Extremes of maternal age

PRESENTATION

- Fever, rigors (persistent spiking temperature suggests abscess). Beware: normal temperature may be attributable to antipyretics or NSAIDs
- Diarrhoea or vomiting
- Breast engorgement/redness
- Rash (generalised maculopapular rash)
- Abdominal/pelvic pain and tenderness
- Wound infection – spreading cellulitis or discharge
- Offensive vaginal discharge (smelly: suggestive of anaerobes; serosanguinous: suggestive of streptococcal infection)
- Productive cough
- Urinary symptoms
- Heavy lochia, uterus not involuted
- General – non-specific signs such as lethargy, reduced appetite.

INITIAL ASSESSMENT

CALL FOR HELP if patient very unwell: AIRWAY, BREATHING, CIRCULATION

- Temperature
- Pulse
- Blood pressure
- Respiratory rate
- O_2 saturation – pulse oximetry

Examination:

- Heart: heart sounds, ? murmurs
- Lungs: air entry, creps, dullness on percussion
- Breasts: redness, swelling, lumps, tenderness (mark if present)
- Nipples: cracks, bleeding, inverted
- Abdomen: uterus – level of the fundus, tenderness
- Any abdominal signs such as guarding, rigidity, rebound, distension, tenderness
- Caesarean section wound: redness, swelling, bruising, discharge, haematoma
- Perineum/vagina: episiotomy wound – redness, swelling, tenderness, discharge, haematoma, retained tampons or swabs
- Speculum examination and bimanual examination: vaginal discharge, tenderness
- Lower limbs: calf tenderness, swelling, DVT

INVESTIGATIONS

Depends largely on the symptoms and signs:

- Bloods: CBC, CRP, RNLs, LFTs, +/- blood cultures if febrile, preferably before the commencement of antibiotics.
- **Serum lactate in unwell patients: (lactate > 4 indicative of tissue hypoperfusion)**
- Swabs: High vaginal swabs (HVS) (orange and purple), nasopharyngeal
  - (endocervical swab for gonorrhoea culture (purple) is not required initially unless gonorrhoea is suspected, or if the PCR on the HVS swab is positive)
- Wound swab: caesarean section or episiotomy if indicated
- Urine: urinalysis dipstick, microscopy, culture & sensitivities (M,C&S)
- Sputum for culture and sensitivities if indicated
- Stool sample for culture, viral PCR and *C. difficile* if recent antibiotics, if diarrhoea

- Ultrasound scan: Pelvis – if RPOC suspected and to identify a pelvic collection. Usually Endometritis is a clinical diagnosis.
- Further imaging of abdomen, kidneys, liver, appendix if clinically indicated
- CXR if indicated
- CT scan if concerned about collections or pelvic abscess

INITIAL MANAGEMENT

'Red flag' signs and symptoms[1]

- Pyrexia more than 38°C
- Sustained tachycardia more than 90 beats/minute
- Impaired consciousness
- Breathlessness (respiratory rate more than 20 breaths/minute; a serious symptom)
- Hypotension
- Abdominal or chest pain
- Diarrhoea and/or vomiting (early signs of toxic shock – endotoxin production)
- Uterine or renal angle pain and tenderness
- Woman is generally unwell or seems unduly anxious or distressed.
- Failure to respond to treatment

Severity Assessment – can be determined with the help of the MEWS/EWS score

If the patient has abdominal pain, fever > 38°C and a tachycardia > 90 beats per minute then this warrants treatment with IV antibiotics and admission to hospital[1]. Senior medical staff should be involved with severe cases.

Severe sepsis is defined as:

- Clinical diagnosis of sepsis
- At least one sign of tissue hypoperfusion or organ dysfunction (severe hypoxaemia, oliguria, liver failure, DIC, altered mental state, acidosis)

See Appendix 1 for the continuum of the clinical response to severe infection[6]

ANTIOBIOTICS

In severe cases, broad spectrum IV antibiotics should be commenced immediately without waiting for investigation results. This may be initiated in the community setting (GP practice or ambulance) prior to arriving at hospital.

Milder cases (with no red flags listed above) can be managed as outpatients.

- Initial IV antibiotic treatment should follow relevant treatment guideline (eg. mastitis, PID, pneumonia) if cause is 'known'.
- If undifferentiated sepsis or suspected endometritis:
  - **First line:**
    Cefuroxime IV 1.5 g q8h
    AND
    Metronidazole PO 600mg BD or IV 500 mg q12h
    If mild penicillin allergy: consult ID/Micro
  - **For severe sepsis:**
    Piperacillin + tazobactam IV 4.5 g q8h
    AND
    Clindamycin IV 600 mg q6h
    If penicillin allergy: consult ID/Micro
- **Gentamicin:** A single dose of gentamicin IV 7 mg/kg (based on estimate of pre-pregnancy ideal body weight) can be administered if the patient is very unwell. Round dose down to the nearest half vial (40 mg). Consult Infectious Diseases/Clinical Microbiology before giving a second dose. Consult pharmacist prior to giving the second dose if ongoing treatment is recommended.
- Outpatient oral therapy (duration 7–10 days):
  - Amoxicillin+clavulanate PO 500/125 mg TDS
  - *Mild penicillin allergy:*
    Cefalexin PO 500 mg QID **AND** metronidazole PO 600 mg BD
  - Severe penicillin allergy: consult ID/Micro
- These antibiotic regimes are considered to be compatible with breast feeding[7-8]. It is important to note that the infant should be monitored for signs of GI upset whilst these antibiotics are being used. Some (eg. metronidazole) may adversely affect the flavour of breast milk.

NOTE: These antibiotic regimens are supported by the Antimicrobial Stewardship Committee, as well as Obstetrics and Gynaecology.

INPATIENT MANAGEMENT

The 'Sepsis Six' – do these within the first hour[9]

1. Give oxygen to maintain O2Sats above 94%
2. Take blood cultures
3. Give broad spectrum IV antibiotics
4. Give IV fluid resuscitation
5. Measure lactate and CBC
6. Measure hourly urine output (catheter)

Also refer to Hospital HealthPathways: Sepsis in Adults

- Admission to the ward (either gynaecology, SPCU or ICU as appropriate) in a single room for infection control purposes
- IV antibiotics
- Strict fluid balance with an IDC in situ
- Regular observations as per EWS/MEWS score
- IVF and inotropes as necessary, consult ICU
- Monitor lochia and wound ooze
- Thromboprophylaxis – TEDS and enoxaparin
- If the woman is breastfeeding then she may need a pump to assist with this
- Analgesia and laxatives – avoid NSAIDs if infection is confirmed to be due to Group A Strep. Necrotising fasciitis – NSAIDs should be used with caution as they may delay diagnosis, and/or alter host defence mechanisms
- Chest physio if there are chest symptoms, or signs of deconditioning
- Depending on severity of infection, Total Parenteral Nutrition (TPN) may be needed for nutrition

In severe cases, multi-disciplinary team approach

- Obstetrician/Gynaecologist
- Microbiologist
- Pharmacist
- Infectious Diseases
- Radiologist (who specialises in gynaecological radiology)
- Intensivist/ICU
- Dietician
- Physiotherapist

- Lactation consultant
- Social and Maori Health workers
- NICU (if baby of woman is in their care)

Indications for ICU management

Follow EWS/MEWS management protocol and contact ICU outreach team

- Cardiovascular- hypotension or raised serum lactate persisting despite fluid resuscitation suggesting the need for ionotrope support
- Respiratory – pulmonary oedema
- Mechanical ventilation
- Airway protection
- Renal dialysis
- Neurological – significantly decreased conscious level
- Multi-organ failure
- Uncorrected acidosis
- Hypothermia

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10. 2016 New Zealand Sexual Health Guidelines

APPENDIX I

Continuum of clinical response to severe infection (Taken from the MOET course manual)

Bacteraemia
Presence of bacteria in the blood

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Septicaemia
Presence of microbes and their toxin in blood

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Systemic Inflammatory Response Syndrome (SIRS)
(this can be triggered by an infection or a non-infectious cause, eg. trauma, pancreatitis)
Presence of any two of the following features:

- Temperature > 38°C or < 36°C
- Tachypnoea, respiratory rate > 24 breaths per minutes
- Tachycardia > 90 bpm
- Leucocytosis > 11.0
- Leucopaenia < 4.0

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Sepsis
Signs of SIRS and evidence of infection

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Severe Sepsis (multiple organ dysfunction syndrome)
Clinical diagnosis of sepsis and presence of organ dysfunction (severe hypoxaemia, oliguria, liver failure, DIC, altered mental state, acidosis)

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Septic Shock
Clinical diagnosis of sepsis with hypotension
Systolic < 90 mm/Hg or 40 mm/Hg below baseline