Nursing the septic peritonitis patient

Septic peritonitis is commonly encountered by the veterinary nurse in practice, Helen McGlone Dip VN RVN, describes the care involved in nursing these intensive patients

Septic peritonitis can be classified as primary, secondary, or tertiary. Primary septic peritonitis results from spontaneous contamination of the peritoneal cavity, is usually monomicrobial (gram positive) and most commonly occurs in cats. Secondary peritonitis usually results from primary loss of gastrointestinal integrity. The term 'tertiary' peritonitis is used when there is persistent infection from a primary or secondary peritonitis episode.

The pathophysiology depends on the cause and severity of the infection. It is reported that localised manifestations (such as the peritoneum for example) result in mild cases, however, the disease may go on to cause dysfunction of the endocrine, cardiovascular, urinary and respiratory system. Local sepsis is linked to the release of histamine and microbial endotoxins causing increased capillary permeability and vasodilation, which facilitates the spread of infection throughout the body. Fluid leakage into the abdominal cavity occurs as a result, leading to haemoconcentration and third-spacing. Fibrin is deposited around the site of injury, while macrophages and neutrophils are distributed to the site causing the accumulated abdominal fluid to become turbid. The increased volume and pressure of accumulated fluid slows bacterial clearance and increases bacterial proliferation; further compounding the problem.

CLINICAL PRESENTATION

Patients may present with: hypovolaemia; hyperaemic mucous membranes; capillary refill time; rapid and weak pulses; hyperthermia, tachypnoea; abdominal distension and pain; a fluid wave may be seen on ballottement; and/or tachycardia is reported to be a clinical presenting sign in dogs. In contrast, the majority of cats have been reported to present with bradycardia.

Initial sampling should include a complete blood count, blood biochemistry, blood gas analysis, electrolyte profile, serum lactate measurement and urinalysis. High white blood cell (WBC) counts and band neutrophils are indicative of septic peritonitis.

If septic peritonitis is suspected paracentesis should be performed and cytological evaluation carried out to detect the presence of fibrin, neutrophils, intracellular bacteria and blood. Testing peritoneal fluid for bicarbonate, glucose and lactate can be a useful diagnostic tool. A concentration difference of >20mg/Dl between blood glucose and peritoneal glucose is a reliable indicator of sepsis in peritoneal effusion. During paracentesis large volumes of fluid can be aspirated which can greatly alleviate discomfort. If no fluid can be aspirated from paracentesis, a patient may require a diagnostic peritoneal lavage. Abdominal ultrasonography can be performed very early on eg. a focus assessment sonography for trauma (FAST) scan will highlight any focal points of infection, free-gas or pathology within the abdominal cavity. Abdominal radiography, with or without contrast, may highlight a decrease in serosal contrast, ileus, free gas due to gas-forming bacteria, loss of GI integrity, or a penetration wound.

These commonly performed diagnostic procedures can be very useful and minimally invasive. Any animal suffering from shock is in a very fragile state and every effort should be made to reduce stressful episodes, spacing out treatments and providing time out in a quiet, comfortable location.

INITIAL STABILISATION OF THE PATIENT

The patient's condition must be stabilised before any surgical intervention takes place – circulatory shock should be addressed. Small-volume hypertonic saline resuscitation is advocated to restore blood volume, improve cardiac output, microcirculation and, in turn, modulate the immune response by decreasing inflammation triggered by septic shock and cellular damage. Low-volume hypertonic saline resuscitation decreases susceptibility of sepsis induced immune dysfunction. Colloids may be warranted in patients who are hypoalbuminaemic with careful monitoring of clotting factors. Increasing osmotic pressure by administration of a colloid can also decrease vessel permeability. Plasma transfusions may be warranted for clotting deficiencies.

Antimicrobial therapy should be initiated as soon as possible – broad spectrum antimicrobial should be administered intravenously while awaiting culture of the peritoneal fluid. Early initiation of antimicrobial therapy is crucial to a positive outcome – each hour of delay in administration is associated with a 1.8 times increase in mortality.

After pain scoring, an appropriate analgesic regimen should be drawn up. Typically the mu agonists, such as fentanyl, methadone or morphine, are preferred. Combined continuous rate infusions (CRIs) offer these patients' different benefits of actions at lower dosages when used in combination, making them more effective and safer for the patient eg. common analgesic CRIs are morphine, ketamine, lidocaine, or fentanyl. These drugs do have potential side-effects that the vet nurse should bear in mind. Non-steroidal anti-inflammatory drugs (NSAIDs) should be avoided due to the risk of gastric ulceration. All infusion pumps and drip lines should be clearly marked for safety; they can be piggy-backed together using three-way taps for ease of administration and disconnections should be kept to a minimum to prevent contamination of the intravenous (IV)

line. Septic shock increases oxygen demand so, it is important to avoid stress and maintain normothermia, as both can further increase oxygen demand. Supplemental oxygen with humidification can be provided by placing bilateral nasal catheters into the animal or by placing the animal into an oxygen environment.

THE POST-OPERATIVE PERIOD

After successful stabilisation the animal can then be treated surgically. Veterinary staff should consider how nutritional support could be provided in the post-operative period. An oesophageal feeding tube may be placed intraoperatively so the veterinary nurse must pre-clip for this instance. Post-operatively the nurse should be aware that abdominal drainage could be continued. Drainage may be open, active, passive (via a Jackson-Pratt Drain), or vacuum-assisted. Management of these drains is an important nursing task. Strict barrier nursing protocol should be adhered to in preventing nosocomial infection in these immunosuppressed patients. It is important to remember that hypoproteinaemia can be a common complication associated with abdominal drainage.

Nurses should be aware that early nutritional support is vital in these patients to prevent hypoproteinaemia and hypoglycaemia. The septic patient has an increased demand for protein and glucose. Enteral feeding of a calorie dense food is preferable; to maintain enterocyte function, prevent ileus, bacterial overgrowth and prevention of subsequent bacterial migration through the bowel wall. Feeding tubes should be kept flushed and placement verified before each feed. Partial enteral nutrition may be an option if the total resting energy requirements (RERs) cannot be met by enteral intake. Antiemetics, gut-motility enhancers, appetite stimulants and gastro-protectants may be administered depending on requirements to preserve intestinal function and encourage voluntary enteral nutritional intake.

The recumbent patient should be positioned with sternum raised to alleviate abdominal pain and turned every two to four hours. This prevents decubital ulceration and pneumostatic pneumonia. Swabbing of the oral cavity with dilute chlorhexidine can reduce oral bacterial translocation and pneumonia. Bedding should be kept clean and dry; dressings should be checked for contamination, position and tightness regularly. Stress overload should be avoided as it elevates cortisol and glucose levels and contributes to immune dysfunction and increased risk of mortality. Basic nursing can be vital to a successful outcome. Anxiety can be reduced using plug-in diffusers, turning down the lights for patients to sleep, reducing the number of unnecessary personnel in the room, noise reduction, and the provision of home comforts such as the animal's own blanket and toys. Often, visits from the owners can boost the mental well-being of some patients depending on their temperament.

The veterinary nurse can provide basic physiotherapy – effleurage and passive range of motion are beneficial in the management of swollen extremities, a common complication in hypoproteinaemic patients. If the patient is ambulatory, they should exercise for mental stimulation and socialisation.

MONITORING

Maintenance of homeostasis in these patients can be difficult and requires intensive monitoring. Inflammatory mediators released in systemic inflammation can increase the chances of multiple organ dysfunction syndrome (MODS), or disseminated intravascular coagulation (DIC). It is preferable that a central venous catheter and arterial line be placed early on in therapy. Multi-lumen central catheters facilitate concurrent administration of fluids, drugs, parenteral nutrition and transfusions, if warranted. An arterial line can be placed for invasive blood pressure monitoring (BPM). Invasive BP is the most accurate method of guiding therapy and monitoring the effectiveness of fluid therapy and oncotic pressure. The aim is to keep mean arterial pressure above 70mmHg to ensure adequate kidney and brain perfusion. If an adequate response to fluid therapy isn't achieved the clinician may choose to administer a vasopressor eg. dobutamine. Having an arterial line will facilitate repeated blood gas analysis. Nurses must ensure these are dressed well to prevent accidental removal and clearly marked 'arterial line' to avoid accidental intra-arterial injection.

Cardiovascular parameters such as heart rate rhythm and pulse quality should be monitored closely. An intermittent or continuous electrocardiogram (ECG) can be placed on the patient to monitor electrical activity of the heart and assist the clinician in detection of electrolyte imbalances. Monitoring urine output can guide the effectiveness of fluid resuscitation; a urinary catheter can facilitate this, keep the patient clean and facilitate collection of samples for urinalysis. Urinary tract infections (UTIs) are common so strict aseptic technique should be employed in the maintenance of urinary catheters and removal at the earliest opportunity is advised.

Regular sampling for blood biochemistry provides the clinician with vital information regarding organ function and early detection of potential complications. Clotting dysfunction is commonly associated with sepsis. Patients with a clotting deficiency may require plasma transfusion to supplement vital clotting factors. Ongoing measurement of total solids can track the white blood cell count to guide effectiveness of therapy. Addressing hypoproteinaemia is a crucial part in the management of this condition; human serum albumin has been mentioned to be more effective than plasma at raising oncotic pressure.

Blood gas and electrolyte readings are good indicators of perfusion, tissue oxygenation and metabolic state. The clinician may wish to monitor these closely. Pulse oximetry can also be employed to monitor respiratory function. A multi-parameter monitor is ideal for monitoring these patients if available. Cytological examination of abdominal effusion has been described as a useful monitoring tool in the post-operative period. This can indicate whether sepsis persists. As hypoxia is associated with sepsis, lactate can accumulate as a by-product of anaerobic metabolism. Blood lactate measurement can help to guide therapy and can be relied upon as a good prognostic indicator – levels that remain over 4mmol/l likely carry a poor patient outcome.