PICC Line Safety at HRH

By Erik Meidl, M.D.

Peripheral inserted central catheters (PICC lines) are being utilized frequently in the in-patient and out-patient setting in patients with poor vascular access or who require extended IV access. Unfortunately, thrombotic complications from PICC line use have been increasingly recognized as a source of morbidity and mortality. (1) The process improvement committee therefore investigated the incidence of PICC line associated DVT at Hannibal Regional Hospital to determine the thrombosis rate in our population.

An electronic search was performed by Jennifer Lee, Director of Health Information Management, of all HRH patients from Jan. 2006 through the present (June, 2013). 323 PICC line placements were identified during this time period. 34 DVT episodes were identified in these patients. Erik Meidl, M.D. then reviewed these 34 charts and found that 8 DVT episodes occurred in the same upper extremity of the patient who had the PICC line in place. This yielded a rate of PICC line associated thrombosis of 2.5%.

The rate of PICC line associated DVT in the literature has been reported to be between 2-5% for patients without cancer and 3-8% in patients with cancer. (2) The largest study of 2014 PICC line placements reported an incidence of symptomatic thrombosis at 3%. (3)

Risk factors for the development of DVT include prior DVT, recent surgery, and cancer. (4) PICC line associated thrombosis may be recognized by inability to draw blood from or infuse into the catheter, pain, swelling, induration, or erythema along the catheter, or upper extremity edema ipsilateral to the catheter. Embolization has been reported to occur in 1-8% of upper extremity DVT’s. (5)

Diagnosis of upper extremity DVT related to a PICC line is usually made by obtaining an ultrasound. Venography can also be performed. Treatment is generally the same as with lower extremity DVT with anticoagulation with consideration of PICC line removal.

Post-phlebitic syndrome has been reported to occur in 7-46% of patients with a lower rate in isolated brachial vein thrombosis. Prevention with prophylactic anticoagulation is not currently recommended. Using PICC lines for proper indications and timely removal would seem to be the most prudent course for the prevention of PICC line associated DVTs.

2. Ibid.
5. Ibid.
6. Ibid.
The Role of Procalcitonin in Guiding Antibiotic Therapy
By Dorthy Kurylo, M.D.

Early differentiation between sepsis and systemic inflammatory response syndrome (SIRS) is of central importance for therapeutic decision-making, but is often difficult in clinical practice. SIRS criteria such as fever, tachycardia, and tachypnea, are observed in most intensive care patients and are fairly non-specific features of various underlying diseases. On the other hand, fever and leukocytosis may not necessarily be present in clinically manifest sepsis. The broth culture method is the gold standard for the diagnosis of bacterial infection, but a definitive result can take 24 hours or more before a conclusive diagnosis. A number of inflammatory markers, such as leukocyte count, C reactive protein (CRP), and cytokines (TNF-α, IL-1β, or IL-6), have been applied in the diagnosis of inflammation and infection, but they are non-specific as far as etiology of disease process. Until recently, no laboratory marker has been available to differentiate bacterial infection from viral or non-infectious inflammatory reaction. However, over the past years, procalcitonin (PCT) is the first among a large array of inflammatory variables that offers this possibility. Elevated PCT values indicate systemic bacterial infections with high sensitivity.

Procalcitonin expression occurs in a tissue-specific manner. In the absence of infection, it’s expressed only in the C cells of the thyroid gland. Calcitonin is stored in secretary granules and is secreted into the blood to regulate the calcium concentration. In the presence of microbial infection, non-neuroendocrine tissues also express the CALC-1 gene to produce PCT. A microbial infection induces a substantial increase of CALC-1 gene expression in all parenchymal tissue. Its levels increase significantly in severe systemic infections, as compared to other parameters of microbial infections.

PCT elevation occurs within 2–4 hours after onset of the inflammatory disorder; often peaks in the second day, and falls rapidly during clinical recovery.

A recently developed approach is to measure proinflammatory biomarkers to guide the initiation and/or duration of antimicrobial therapy by helping physicians estimate the likelihood of invasive infection or to gauge the rapidity of the patient’s response to treatment, respectively. Numerous recent clinical studies have investigated the usefulness of PCT for guiding antibiotic therapy in intensive care patients. The aim of some of these studies was to address the role of daily PCT-serum determinations for guiding the length of antibiotic treatment in attempt to minimize possibility of development of antibiotic resistance.

During the course of disease and treatment PCT-guided algorithms can help to shorten the length of antibiotic therapy without any unfavorable effects on treatment success and outcome. Beyond a reduction of the length of antibiotic treatment PCT guidance also had a favorable effect on the length of the intensive care stay.

Pitfalls to using PCT as a marker of bacterial infection:

Serum PCT elevation has been shown to be present in other systemic inflammatory conditions, including pancreatitis, inhalational burns, traumatic injuries and major surgery.

Addisonian crisis caused by adrenal failure has been associated with elevated PCT levels.

Increased PCT levels were also seen in transplant patients receiving certain forms of antibody therapy.

Marked elevations in PCT and CRP levels were observed in patients scheduled for hematopoietic stem cell transplantation and receiving anti-thymocyte globulin during conditioning.
Key messages:

• PCT is the first laboratory marker among a large array of inflammatory variables that offers the possibility to differentiate bacterial infection from viral or non-infectious inflammatory reaction.

• PCT assessment provides a helpful tool to decide on the duration of antibiotic treatment, if interpreted in the clinical context including the underlying disease.

• PCT-based algorithm supports the cautious use of antibiotics and has a favorable effect on the clinical outcome.

• PCT-based algorithm is certainly practicable and simple.

• PCT-controlled antibiotic therapy must still be tested in heterogeneous groups of patients, particularly for safety

PHARMACY NOTES

• Hannibal Regional Hospital has successfully contracted with suppliers to ensure adequate intravenous fluid solutions for our patients.

• Daptomycin (Cubicin) has joined the carbapenem class antibiotics for restricted use at Hannibal Regional Hospital. Please contact the pharmacist to discuss your patient’s case if you desire to use daptomycin.

• Patient safety with medication administration will be enhanced this fall with new barcoded medication administration. The new technology has been purchased with a planned go live this fall.

SUNRISE Helpful Hints

To achieve success with meaningful use two, it is important to complete your admission and discharge medication reconciliations. The admission medication reconciliation may be started by the emergency room physician and saved as incomplete. The admission medication reconciliation can then be completed by the attending physician.

For non-urgent help or suggestions, contact the Sunrise team by dialing the dictation line at 248-5420, using the code 411, and speaking your suggestion or comment and your name. The sunrise team will get back to you with answers.

CONTACT US

Please send us story suggestions especially any good cases that have highlight important points to improve the care of our patients. These could include success stories which others could emulate to improve outcomes or cases with problems from which we could learn. Patient identifiers will be removed from the cases to preserve anonymity. Send suggestions to Dr. Erik Meidl at emeidl@hannibalclinic.com