venous catheters, and other invasive diagnostic procedures. Fear and anxiety related to these procedures may be minimized with parent and child preparation. The preparation starts with obtaining information from the parent about the child's coping styles, explaining the procedure, and enlisting their support, followed by an age-appropriate explanation to the child. CBT (guided imagery, relaxation, music therapy, hypnosis), conscious sedation, and general anesthesia have been effective in decreasing pain and distress during the procedure. Topical analgesics (cold sprays, EMLA, amethocaine gels), as discussed previously, are effective in providing analgesia before needle procedures.

Lumbar puncture for administration of chemotherapy (e.g., cytarabine, methotrexate) and collection of cerebrospinal fluid may lead to a leak at the puncture site and low intracranial pressure. Some children may experience post-dural puncture headache, which may be treated by administering nonopioid analgesics and placing the patient in the supine position for 1 hour after the procedure. The pain related to bone marrow aspiration is due to the insertion of a large needle into the posterior iliac space and the unpleasant sensation experienced at the time of marrow aspiration.

If the patient is neutropenic (absolute neutrophil count $<500/mm^3$), the antipyretic action of acetaminophen may mask a fever. In patients with thrombocytopenia (platelet count $<50,000/mm^3$), who may be at risk for bleeding, NSAIDs are contraindicated. Morphine is the most widely used opioid for moderate to severe pain and may be administered via the oral (including sustained release formulations, such as MS Contin), IV, subcutaneous, epidural, and intrathecal routes.

The most common clinical syndrome of neuropathic pain is painful peripheral neuropathy caused by chemotherapeutic agents, particularly vincristine and cisplatin, and rarely cytarabine (Hickman, Varadarajan, and Weisman, 2014). After withdrawal of the chemotherapy, the neuropathy may resolve over weeks to months, or it may persist even after withdrawal. Neuropathic pain is associated with at least one of the following: (1) pain that is described as electric or shocklike, stabbing, or burning; (2) signs of neurologic involvement (paralysis, neuralgia, pain hypersensitivity) other than those associated with the progression of the tumor; and (3) the location of the solid organ cancer consistent with neurologic