

be related to an operation, mucositis, a phantom limb, or infection. Pain can also be related to chemotherapy and procedures, such as bone marrow aspiration, needle puncture, and lumbar puncture. Tumor-related pain frequently occurs when the child relapses or when tumors become resistant to treatment. Intractable pain may occur in patients with solid tumors that metastasize to the central or peripheral nervous system. In young adult survivors of childhood cancer, chronic pain conditions may develop, including complex regional pain syndrome of the lower extremity, phantom limb pain, avascular necrosis, mechanical pain related to bone that failed to unite after tumor resection, and postherpetic neuralgia.

**TABLE 5-13**  
**Cancer Pain in Children**

Type	Clinical Presentation	Causes
<b>Bone</b>		
Skull Vertebrae Pelvis and femur	Aching to sharp, severe pain generally more pronounced with movement; point tenderness common Skull—headaches, blurred vision Spine—tenderness over spinous process Extremities—pain associated with movement or lifting Pelvis and femur—pain associated with movement; pain with weight bearing and walking	Infiltration of bone Skeletal metastases—irritation and stretching of pain receptors in periosteum and endosteum Prostaglandins released from bone destruction
<b>Neuropathic</b>		
Peripheral Plexus Epidural Cord compression	Complaints of pain without any detectable tissue damage Abnormal or unpleasant sensations, generally described as tingling, burning, or stabbing Often a delay in onset Brief, shooting pain Increased intensity of pain with receptive stimuli	Nerve injury caused by tumor infiltration; can also be caused by injury from treatment (e.g., vincristine toxicity) Infiltration or compression of peripheral nerves Surgical interruption of nerves (phantom pain after amputation)
<b>Visceral</b>		
Soft tissue Tumors of bowel Retroperitoneum	Poorly localized Varies in intensity Pressure, deep or aching	Obstruction—bowel, urinary tract, biliary tract Mucosal ulceration Metabolic alteration Nociceptor activation, generally from distention or inflammation of visceral organs
<b>Treatment Related</b>		
Mucositis Infection	Difficulty swallowing, pain from lesions in oropharynx; may extend	Direct side effects of treatment for cancer: