Safe Management of Chemotherapy: Infusion-Related Complications

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Extravasation

1. Pathophysiology: Tissue damage secondary to vesicant infiltration or leakage outside of the vessel that occurs as a result of one of two major mechanisms

a) The vesicant binds to nucleic acids in the DNA of healthy cells in the tissue, causing cell death. The dead cells release complexes, which are taken up by adjacent healthy cells. This process of cellular uptake of extracellular substances sets up a continuing cycle of tissue damage as the DNA-binding vesicant is retained and recirculated in the tissue for a long period of time (Luedke, Kennedy, & Retschel, 1979). Examples of DNA-binding vesicants include anthracyclines (daunorubicin, doxorubicin, epirubicin, idarubicin), dactinomycin, mechlorethamine (nitrogen mustard), mitomycin, and mitoxantrone.

b) The vesicant does not bind to cellular DNA. The vesicant has an indirect rather than direct effect on the cells in healthy tissue. It is eventually metabolized in the tissue and is more easily neutralized than DNA-binding vesicants (Ener, Meglathery, & Styler, 2004). Examples of non-DNA-binding vesicants include plant alkaloids (vinblastine, vincristine, vindesine, vinorelbine) and taxanes (docetaxel, paclitaxel, paclitaxel protein-bound particles for injectable suspension), which are mild vesicants.

2. Factors affecting tissue damage severity

a) Type of vesicant extravasated (DNA-binding or nonbinding)

b) Concentration and amount of vesicant in the tissue

c) Location of extravasation

d) Patient factors, such as older age, comorbidity (e.g., diabetes), and impaired immunocompetence (Ener et al., 2004; Schulmeister, 2011)

3. Risk factors for peripheral extravasations (Goolsby & Lombardo, 2006; Sauerland, Engelking, Wickham, & Corbi, 2006)

a) Small, fragile veins

b) Previous multiple venipunctures

c) Prior treatment with irritating or sclerosing drugs, such as chemotherapy

d) Sensory deficits

e) Limited vein selection because of lymph node dissection, lymphedema, or limb removal

f) Impaired cognition, altered mental status (impairs ability to detect administration site sensation changes), or somnolence

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