



# Violaceous Skin Reaction of the Hand

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## Case Study

Mr. C is a 74-year-old male with colon cancer who originally was treated with surgery and 5-fluorouracil-based chemotherapy. One year after Mr. C completed treatment, paramedics were called to transport him to the emergency room (ER) after he experienced a grand mal seizure in his home. An 18-gauge catheter was placed in his right hand in the ambulance for IV access. He was given 10 mg IV diazepam en route to the ER to control his seizures; then, an IV bolus dose of 750 mg of phenytoin was administered in the ER. Once his seizures were controlled, Mr. C was admitted to the inpatient medical/oncology unit with a diagnosis of metastatic colon cancer with new onset of seizures. He was placed on a medication regimen of daily oral phenytoin and oral diazepam as needed.

On day two of Mr. C's hospitalization, his IV line was discontinued because the nursing staff noted that his right hand had become violaceous and edematous (see Figure 1). By the end of day two, the patient had notable tenderness, discoloration, and edema of the right hand extending to his elbow (see Figure 2). During this time, Mr. C had palpable 2+ ulnar and radial pulses. The staff provided symptomatic care, including elevation of the affected extremity and application of a warm, dry compress to the hand. Possible drug reaction or IV infiltration versus cellulitis of the extremity was considered as the etiology for the patient's soft-tissue injury.

## Discussion

**Etiology:** Although extravasation of IV fluids or medications can cause erythema, swelling, and tissue breakdown, many factors play a role in tissue injury. Extravasations of certain chemotherapeutic agents, such as vesicants, are capable of causing



**FIGURE 1. 74-YEAR-OLD MALE WHO DEVELOPED A VIOLACEOUS SKIN REACTION ON HIS RIGHT HAND ON THE SECOND DAY OF ADMISSION FOR NEW ONSET SEIZURE ACTIVITY**

severe tissue injury and damage, which may extend to the tendon and bone. Erythema and ulceration usually occur more frequently as a delayed manifestation when chemotherapy agents are involved in extravasation and may not present for days to weeks following the event (Fishman & Mrozek-Orlowski, 1999). IV infiltrations of nonvesicant agents can cause edema and erythema; the affected skin most often appears cool and possibly indurated (Hadaway, 1999).

Even IV solutions, such as normal saline, may cause tissue injury if extravasated in large enough quantities to cause compartment syndrome, although initial symptoms usually include pain with localized swelling and possibly erythema. Compartment syndrome causes nerve damage and may precipitate tissue breakdown when muscles, nerves, and vessels are confined in essentially inflexible spaces (Hadaway, 1999). When excess fluid is trapped in the affected area, the venous end of the capillary bed becomes compressed and may lead

to arteriolar compression, vascular spasm, pain, and muscle necrosis. These changes can occur within 4–12 hours of initial injury (Hadaway).

Cellulitis of an upper extremity commonly presents with erythema, edema, and tenderness and may be related to an IV catheter, injury, or insect bite. Patients frequently experience fever, lymphangitis, or axillary adenopathy (Gardner, 1998).

Soft tissue injuries related to the administration of phenytoin result in a unique clinical presentation. Phenytoin, an anticonvulsant that may be given by mouth or IV, is capable of irritating subcutaneous tissue, producing discoloration and edema with a distinctive violet coloration of the tissue. This phenomenon is referred to as the purple glove syndrome (PGS). The causes of PGS have been debated in the literature: One possible explanation suggests that the highly alkaline solution of phenytoin can produce a reactive vasoconstriction of the veins during administration (Hanna, 1992). Other theories include the possibility of precipitation of the phenytoin admixing with blood, producing obstruction of the venous structures or catheter, thus leaking the phenytoin solution into surrounding tissues (Snelson & Dieckman, 2000). Because the phenomenon occurs more frequently in older patients, the IV cannulation itself may cause a small tear in the vessel wall, which would allow small amounts of the phenytoin solution to infiltrate unknowingly into the surrounding soft tissue

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