Chemotherapy-Induced Nail Changes: An Unsightly Nuisance

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P.S. is a 53-year-old female patient with stage IIB breast cancer. In November 2000, she received Adriamycin® (Pfizer Inc., New York, NY) and Cytoxan® (Bristol-Myers Squibb, New York, NY), along with Herceptin® (Genentech, Inc., South San Francisco, CA), as part of a clinical trial.

In July 2002, the patient was found to have a left supraclavicular axillary recurrence. Because of this recurrence, P.S. received docetaxel (Taxotere®, Aventis Pharmaceuticals, Bridgewater, NJ) by IV on day 1 and 4,000 mg capecitabine (Xeloda®, Roche Laboratories Inc., Nutley, NJ) by mouth on days 2–15 for the first two cycles. Docetaxel was given by IV every three weeks (210 mg total dose). Beginning with cycle three, P.S.’s capecitabine dose was reduced because of the onset of plantar palmar erythrodysesthesia (PPE) and swelling in the hands.

When PPE was noted, the patient had inflamed, edematous hands, particularly on the tips of the fingers. In addition, small blisters developed on the tips of most of her fingers. The capcitabine dose was held until the next cycle (her fourth); as a result, her symptoms cleared within one week. During her fourth cycle, the capcitabine dose was decreased by 25%, and the PPE did not return.

After the final cycle of docetaxel and capcitabine (cycle 6), the patient reported to the oncology office with extreme nail changes (see Figure 1). All of the nails of her fingers were bulging, whitish-green in color, and very foul smelling. This was interfering with the patient’s activities of daily living and caused embarrassment because of the odor. The physician was consulted, and the patient was instructed to soak her fingers in water with an antibacterial soap. The patient made a self-referral to a podiatrist.

After receiving six cycles of Taxotere and Xeloda, the patient went on to receive radiation therapy to the nodal sites on the left chest. Radiation therapy was completed in March 2003. Today, P.S. is disease-free and enjoying a good quality of life.

What do oncology nurses need to know about chemotherapy-induced nail changes? Most importantly, they probably occur more often than they are reported. Patients may experience these changes but, because the symptoms do not inhibit daily activities, may never report them.

Patients typically present with a dark discoloration of the nails, followed by nail raising and paronychia. Paronychia, an inflammation of the nail fold surrounding the nail plate, frequently is caused by bacteria or fungi, most often staphylococci and streptococci (Dirckx, 1997). These nail changes can be unsightly and distressing.

In addition to their cosmetic value, nails provide protection for the fingers and toes, contribute to tactile sensation, and assist in the manipulation of objects by the fingers (Noronha & Zubkov, 1997; Scher, Fleckman, Tulumbas, McCollam, & Enfanto, 2003). Nail changes may provide clues to illness or disease. However, before understanding nail changes and their causes, nurses must be familiar with nail anatomy and physiology.

The nail unit is comprised of four epithelial parts: the nail bed, matrix, folds, and plate (Noronha & Zubkov, 1997; Piraccini & Tosti, 1999; Scher et al., 2003). The nail bed adheres closely to the nail plate with protein fibers. The nail matrix produces the nail plate starting in embryo at 15 weeks. The nail folds surround the nail plate at the proximal and lateral portions of the finger. The dorsal layer of the nail fold is a continuation of the skin, and the ventral layer continues with the nail matrix. The outgrowth of the proximal nail fold is the cuticle. The digital arteries supply the blood.
flow to the vessels that circulate in the nail unit. Normal growth of fingernails is approximately 1 cm every three months, whereas toenails grow at about half that rate (Noronha & Zubkov, 1997).

Nail growth can be affected by several variables. Faster growth occurs on the right hand and larger fingers. In addition, nails grow faster during the summer and in daylight (Noronha & Zubkov, 1997). Faster nail growth may result from minor trauma and nail biting, and slower growth has been attributed to illness and arteriosclerosis of the small arteries, which, in turn, reduce the blood flow to the nail unit (Scher et al., 2003). When an event occurs to disrupt the normal nail growth, once corrected, improvement may not be seen for as long as six months.

Some drugs (e.g., chemotherapy, antimalarials, retinoids, tetracycline, zidovudine) may impair nail growth and can affect several or all 20 nails (Piraccini & Tosti, 1999). Drug-induced nail changes usually are temporary and resolve slowly when the drug is discontinued. The specific causative agent for this case study was docetaxel; however, capecitabine alone or in combination with docetaxel also may be related to P.S.’s nail changes.

Docetaxel is a semisynthetic taxane used to treat various solid tumors such as breast, lung, and prostate cancer. The most significant side effect of docetaxel is neutropenia. Additional adverse effects include alopecia, asthenia, hypersensitive reactions, and skin changes (Correia, Azevedo, Ferreira, Cruz, & Polonia, 1999). According to the package insert, nail changes occur in approximately 30% of patients receiving docetaxel (Aventis, Inc., 2002). As a result of docetaxel administration, reported nail alterations include onycholysis, subungual hyperkeratosis, Beau’s lines, and dyschromia (Correia et al.; Pavithran & Doval, 2002).

Onycholysis, the disorder that occurred in the case study, is one of several common nail disorders (Noronha & Zubkov, 1997) and involves a separation of the nail plate from the nail bed (Piraccini & Tosti, 1999). The damage to the epidermis causes a change in the tight adhesion between the nail plate and nail bed, resulting in separation. Onycholysis can be painful, and a large portion of the nail plate may be involved.

Chemotherapeutic agents that have documented onycholysis as a side effect include anthracyclines, taxanes, and topical 5-fluorouracil (Hussain et al., 2000). In addition, docetaxel and paclitaxel can cause onycholysis. Hussain et al. reported five cases of onycholysis that developed while patients were receiving weekly paclitaxel at 100 mg/m². In three of the five cases, fingernails and toenails were affected. The remaining two patients wore shoes and socks instead of sandals and did not develop onycholysis of the toenails (Hussain et al.). The researchers examined the association of sunlight exposure and development of onycholysis but were unable to establish a direct correlation.

When caring for patients with drug-induced nail changes, documentation of the changes is imperative. The National Cancer Institute (NCI) has described only two grades of nail changes: grade 1, which is a discoloration, ridging, or pitting of the nails; and grade 2, which is a complete loss of the nails or pain in the nail beds (NCI, 1999). In a letter to the editor of the Journal of Clinical Oncology, Spazzapan et al. (2002) suggested that the NCI criteria be expanded to include three grades of nail changes, similar to the three grades of PPE. This would assist in data collection regarding incidence because NCI requires documentation of grade 3–5 toxicities.

Healthcare providers should assure patients that their nail changes are temporary and will resolve after chemotherapy administration is completed (Piraccini & Tosti, 1999). However, complete resolution is not immediate and may take as long as six months. Patients should be instructed to keep nails short, maintain proper personal hygiene, and avoid exposure to harmful chemicals or detergents. Fragile nails may be improved by the administration of biotin, a water-soluble B-complex vitamin, at 5 mg per day. Additionally, patients should use moisturizer for hands and nails, wear gloves when completing household tasks, and avoid injury (Breast Care Site, n.d.). Wearing artificial nails is not recommended, but nail polish may be used. However, patients should be advised to be cautious when using nail polish remover. Frequent use can make nails fragile or brittle.

Nail changes resulting from chemotherapy have not received much attention in the nursing literature. Clinical research studies should investigate potential remedies for chemotherapy-induced nail changes. In their recent abstract, Scott et al. (2004) described the results of a case-controlled study using an Elasto-Gel (Akromed, France) frozen glove during docetaxel infusion. Patients were specially designed frozen glove on the right hand while the left hand remained ungloved for control purposes. The investigators reported that occurrences of onycholysis and cutaneous reactions were reduced in the gloved hand. Although not statistically significant, the onset of onycholysis occurred later in the gloved hand (Scott et al.).

The effects of nail changes can be physical and psychological. Nurses are in a unique position to offer guidance to patients who are experiencing nail changes. Because of potential patient embarrassment, oncology nurses need to be aware and proactive in addressing nail changes.

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