Nail Toxicity Associated With Paclitaxel Treatment for Ovarian Cancer

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A 57-year-old woman named C.B. began experiencing abdominal pain and bloating. She presented to her primary physician with these symptoms, and her physician palpated an adenexal mass on pelvic examination. That prompted a computed tomography (CT) scan of the abdomen and pelvis, which demonstrated omental thickening as well as a mildly enlarged left ovary. After initial consultation with a gynecologic oncologist, C.B. was taken to surgery and a total abdominal hysterectomy, bilateral salpingo-oophorectomy, omentectomy, partial bowel resection, and pelvic and periaortic lymph node dissection were performed. C.B. was diagnosed with stage IV ovarian cancer involving the omentum, pelvic lymph nodes, and bowel wall and was subsequently referred for postoperative chemotherapy.

C.B. was offered the option of participating in the Gynecologic Oncology Group 262 study, a phase III randomized study comparing dose-dense weekly paclitaxel to every three weeks paclitaxel in combination with carboplatin and consolidation bevacizumab (National Institutes of Health, 2012). She decided to participate in the study and was randomized to the dose-dense weekly paclitaxel at 80 mg/m^2 plus carboplatin (area under the curve = 6) every 21 days for six cycles. In addition, she received carboplatin and bevacizumab every three weeks.

Figure 1. Nail Toxicity

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She began chemotherapy treatment in January and, by mid-April, at the beginning of treatment cycle 5, she began experiencing soreness in her fingertips and under her nail beds. The discomfort was not severe at that time, and her chemotherapy dose and schedule were not changed. At the beginning of cycle 6, she was re-evaluated and, at that time, she experienced dark discoloration under the nail beds and several of her fingernail beds were starting to lift up (see Figure 1). She also reported crusty green drainage from around some of her fingernails.

A dermatologist was consulted and cultures of the drainage were performed. The dermatologist recommended that C.B. soak her fingernails in a tablespoon of white vinegar (acetic acid) in a bowl of water (1:10 ratio) for 30 minutes every evening to help treat the presumed infection. He also prescribed thymol 4% in alcohol topical solution liquid application to C.B.'s nails and along the nail bed two times a day. C.B. was instructed to wear gloves whenever she did household chores involving soaking her hands in water, such as washing the dishes or laundry. In a follow-up appointment two weeks later, the infection under the fingernails appeared to be resolving and the pain was minimal, but several of the nail beds were loose. C.B. wore a bandage on the affected fingernails because they "felt like they were going to fall off" and interfered with basic daily tasks such as dressing and bathing. All of the nails on both hands changed significantly in appearance; they were thick, lined with deep groves, and had yellow and dark discoloration. She also experienced discoloration of her toenails and the right great toenail became loose and fell off.

- **Beau's lines:** deep grooved ridges that span from side to side on the fingernail
- **Hemorrhagic onycholysis:** collection of blood in the space beneath a nail bed that causes detachment of the nail bed
- **Onycholysis:** nail disorder characterized by detachment of the nail place starting at the distal margin and progressing proximally
- **Paronychia:** swelling and redness of the skin alongside the fingernails or toenails
- **Subungual suppuration:** formation or discharge of pus beneath a nail bed

Figure 2. Definitions of Nail Toxicity Conditions Related to Chemotherapy

Note. Based on information from MedicineNet, 1996–2012.

Epidemiology

Nail toxicity is associated with certain chemotherapy drugs such as docetaxel, paclitaxel, and anthracyclines (Chew & Chuen, 2009; Gilbar, Hain, & Peereboom, 2009; Gori et al., 2004). An estimated 40% of patients who receive docetaxel and about 2% of patients who receive paclitaxel have nail toxicity (Bristol-Myers Squibb, 2011; Sanofi Oncology, 2012). However, rates of nail toxicity may be much higher when paclitaxel is administered weekly than when administered every three weeks (Chitapanarux et al., 2012; Markman et al., 2002; Mauri et al., 2010). Prolonged treatment of taxanes also increases the likelihood of experiencing nail toxicity (Shin et al., 2000; Sorbe et al., 2012); one study found that nail toxicity developed about 10–13 weeks after the first weekly dose of paclitaxel (Flory et

Clinical Highlights

Nail Toxicity Associated With Paclitaxel

- Weekly paclitaxel is being given with more routine frequency because of greater treatment efficacy; however, an increase in nail toxicity is associated with paclitaxel treatment.
- To promote healthy nails during chemotherapy, patients should be instructed to keep their nails clean and dry and to cut their nails rounded slightly in the center. Petroleum jelly may be applied to the periungual soft tissue to prevent skin dryness.
- To prevent onycholysis, patients should be taught to avoid trauma to their nail beds and to wear gloves during activities that expose their hands to moisture and irritants.
- When nail toxicity occurs, patients should be instructed to report it promptly to their clinical team so that appropriate referral and intervention can be initiated.
- Referral to a dermatologist may be recommended to initiate appropriate treatment for nail toxicity. White vinegar soaks or oral antibiotics may be recommended to treat fungal or bacterial infections.

Guidelines and Resources

American Academy of Dermatology
www.aad.org/media-resources/stats-and-facts/prevention-and-care/nails/nails
– Recommendations for general care of nail problems

Memorial Sloan-Kettering Cancer Center
www.mskcc.org/cancer-care/dermatologic-health-during-after-treatment
– An informational video reviews dermatologic health during and after treatment (including nail toxicity).

Oncology Nursing Society Putting Evidence Into Practice
www.ons.org/Research/PEP/Skin
– Guidelines for skin reactions include information on managing paronychia based on summary of expert opinion.

al., 1999). Toxicity also may be exacerbated by sunlight exposure (Hussain et al., 2000). Terminology related to nail toxicity may be unfamiliar to oncology nurses and, therefore, terms with common definitions are listed in Figure 2.

Onycholysis, the detachment of the nail from the nail bed, is primarily associated with taxanes and can range from a relatively painless nail separation to a very painful hemorrhagic condition that causes brown or dark red discoloration of the nail bed (Ghetti, Piraccini, & Tosti, 2003; Minisini et al., 2003). Taxanes have been associated with subungual suppuration related to fungal and bacterial infections (Paul & Cohen, 2012). For patients who are receiving immunosuppressive chemotherapy, infectious processes may present an additional risk of sepsis.

Pathophysiology

The mechanism that causes nail toxicity is uncertain; some researchers have hypothesized that cremophor, the formulation vehicle for paclitaxel, may cause the development of onycholysis (DeGiorgi, Rosti, Monti, Frassineti, & Marangolo, 2003; Minutilli et al., 2006). Others have found that taxanes' direct effects on the peripheral nervous system may substantially contribute to nail toxicity (Wasner et al., 2002). During treatment with taxanes, subungual hemorrhage and suppuration may occur first, followed by onycholysis, which suggests that early antimicrobials may be useful to clear infectious processes under the nail bed (Roh, Cho, & Lew, 2007).

Nursing Management: Prevention and Treatment

To prevent onycholysis and nail bed infection, patients should be taught to avoid trauma to nail beds, chronic moisture, and irritant exposure to their hands and feet while undergoing treatment with taxanes. The use of frozen gloves and socks by the patient during administration of the taxane has been investigated for prevention of nail toxicity, but results are mixed (Can, Aydiner, & Cavdar, 2012; Scotte et al., 2008). Patients should be instructed to report pain or discoloration in the nail beds so that prompt, appropriate medical intervention and dermatologic consultation may be initiated.

Management of nail toxicity includes obtaining appropriate cultures if signs of infection such as suppuration or paronychia occur. To relieve pressure, drainage of subungual hematomas may be helpful (Roh et al., 2007). Medications such as cycloxygenase-2 inhibitors (Wasner et al., 2002), topical antifungal agents (Daniel, Daniel, Daniel, Sullivan, & Bell, 2004), and topical or systemic antibiotics may be used as appropriate for the infectious agent identified (Gilbar et al., 2009). Thymol topical solution is an herbal substance made from common thyme and has antibacterial properties (Miladinovic, Mihajilov-Krstev, Nikolic, Miladinovic, & Cvetkovic, 2012). When patients experience onycholysis, treatment discontinuation is generally not recommended because nails will grow back after treatment is completed (Mackay-Wiggan, Nair, & Halasz, 2003).

Early assessment and recognition of nail toxicity are important. As part of chemotherapy teaching, patients should be made aware of the possibility of nail toxicity and prompted to report symptoms to their medical and nursing team.

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