Psoriatic onychopachydermoperiostitis (POPP), also known as psoriasiform onychopachydermoperiostitis of the large toes (OP3GO syndrome) is a rare form of psoriatic arthritis. It is characterized by nail changes (usually onycholysis), painful soft tissue swelling at the end of a digit (that resembles a drumstick), and periosteal changes of the distal phalanx. Unlike psoriatic arthritis, evidence of joint changes are absent in the distal interphalangeal joint, and the hallmark psoriatic skin lesions often have not yet developed. Classic drugs to treat psoriasis, such as sulfasalazine and methotrexate, have shown less than desirable results in alleviating the symptoms of POPP.

Case History

A 37-year-old male was seen at the Des Moines University Foot and Ankle Institute for a 2-week history of pain in his left hallux, which became symptomatic after a minor injury chopping wood. The patient denied an abrasion to the toe because of protection from his work boot. The lateral border of his nail was mildly inflamed and the nail partially separated from the bed. A standard total nail avulsion was performed. Beneath the nail was a 2-cm hyperkeratotic nodular lesion that was biopsied and proved to be a subungual verruca. Following routine local wound care for the paronychia, the patient was instructed to apply a compounded topical preparation of 5-flurouracil, 2%, and salicylic acid, 16%, daily to the wart and follow-up in 1 month.

Approximately 3 months later the patient returned with a dramatic increase in pain, not only to the hallux, but to the ball of the left foot, which he felt was secondary to avoiding weightbearing on the hallux. The left hallux was markedly and uniformly enlarged and erythematous. The wart was absent, and a hyperkeratosis had replaced the nail plate (Fig. 1). Pain to plantar palpation of the tip of the hallux was exquisite. Radiographs (not shown) revealed a prominent “whiskering-type” periostal reaction to the plantar surface of the base of the distal phalanx with no other visible bone or joint changes. There was mild uniform swelling beneath the lesser metatarsals with only mild pain to palpation. The patient denied any family history of an inflammatory arthropathy. He related some finger pain and occasional swelling, which he attributed to his work as an airplane mechanic. He denied any other signs or symptoms of an arthropathy. He also had an asymptomatic solitary, scaly, 1-cm annular lesion to the sole of his left foot, which had been diagnosed as eczema 6 months previously by his dermatologist, but which had failed to respond to topical steroid treatments. Our differential at this time included osteomyelitis, reactive bone changes secondary to the topical medications, and an inflammatory arthropathy. He was placed on prophylactic Augmentin, 500 mg, twice daily. Magnetic resonance imaging revealed generalized bone marrow edema involving the entire distal phalanx and the distal one-half of the proximal phalanx of the great toe without evidence of a bone tumor. Cortical margins were intact. There was an effusion of the interphalangeal joint and the flexor tendon apparatus beneath the hallux (Fig. 2).
an area of well-defined edema beneath the third and fourth metatarsals throughout the interosseous muscles that did not involve the metatarsophalangeal joints (Fig. 3). It was decided at this point to biopsy the nail bed and the base of the distal phalanx. The bone biopsy revealed focal fibrosis with evidence of degenerative joint disease (Fig. 4A).

Bone culture grew out light amounts of group B streptococcus and Prevotella. During surgery, there was no evidence of purulence and the bone was firm. Osteomyelitis was discounted because of the absence of confirmatory bone changes. The positive culture was felt to be secondary to contamination with skin flora.

Augmentin was discontinued and the patient returned for follow-up 2 weeks after the biopsy with little change to the appearance of his toe. Repeat radiographs showed an increase in the extent of the plantar fluffy periosteal changes to the distal phalanx, but without any joint changes (Fig. 5).

He had also developed two similar skin lesions to the right anterior ankle and dorsal foot. Upon further questioning the patient revealed his mother had active Sjogren’s syndrome. Laboratory results were unremarkable for all common inflammatory arthropathies. He was referred to rheumatology where a diagnosis of psoriasis with arthropathy was made, largely because of his joint pain, swelling, and his skin lesions. There were no bone or joint changes found on radiographs of his fingers or lower back. After an exhaustive review of the literature, it was felt that our patient fit the criteria of POPP.

**Discussion**

The combination of onychopathy with painful thickening of the soft tissue and periosteal involvement of the phalanx seems significant enough to allow one to make the diagnosis of POPP in a patient with or without a history of psoriasis. After a review of the literature, it is apparent that, although joint (mostly distal

![Figure 1. Appearance of the hallux 3 weeks after onset of pain and swelling.](image1)

![Figure 3. Soft-tissue edema throughout interosseous muscle compartment plantar to the third and fourth metatarsal regions.](image3)

![Figure 2. Sagittal image shows bone marrow edema of entire distal phalanx and distal one-half of proximal phalanx, along with flexor tendon inflammation. Note the absence of cortical erosions and interphalangeal joint changes.](image2)
interphalangeal) and nail involvement occurs simulta-
neously in more than 80% of psoriatic cases, changes
in the distal phalanx underlying a psoriatic nail are
rare. The great toes are most commonly involved. Psoriatic onychopachydermoperiostitis is a rare form
of psoriatic arthritis that does not even fit into the
established classification as proposed by Moll and
Wright. It could fit into a newer scheme that has
identified three general subgroups: peripheral arthri-
tis, spondyloarthropathy, and extra-articular osseous
disease.

Resnick and Broderick in 1977 described a case
study of their patients with psoriatic arthritis with
pedal involvement who manifested the so-called
“ivory” phalanx sign. There was increased radiodensi-
ity of the terminal phalanges in 28% of their patients
with absence of joint changes in half of these same
patients. It is hypothesized that the bony changes in
POPP are caused by the spread of inflammation from
the subungual dermis to the bone via the fibrous se-
ptum that directly joins these two tissues. Some au-
thors have suggested that spondyloarthropathies, of

Figure 4. A, Bone biopsy of base of distal phalanx showing focal fibrosis. B, Skin biopsy showing mild dermal in-
flammation from nail bed.

Figure 5. Anteroposterior (A) and oblique (B) radiographs of distal phalanx and interphalangeal joint of left hallux
4 months after initial presentation.
which psoriatic arthritis is one type, may be caused by inflammation beginning at areas of soft tissue attachment into bone and then spreading to articular structures.\(^9\) This may help explain the mechanism behind this rare variant of psoriatic arthritis.

Our patient fits the classic description of POPP, but several confounding variables caused a delay in diagnosis. The first was the subungual wart and the changes it caused to the overlying nail plate. The second was the denial of a family history of inflammatory arthropathy. Lastly, we should have biopsied the right foot plantar lesion to establish a definitive diagnosis of psoriasis rather than relying on the diagnosis of eczema that was made by his dermatologist.

Of particular concern was the localized soft tissue swelling within the interossei muscles beneath the third and fourth metatarsal shafts of the left foot. We questioned whether this was attributable to pressure transfer secondary to the painful hallux, or whether this was also an indication of POPP. Cases of unilateral limb edema in psoriatic patients have been described elsewhere.\(^10\), \(^11\) A possible explanation may be found in the work of De Silva et al.\(^12\) They describe two cases of upper limb edema caused by lymphatic obstruction in rheumatoid arthritis. In these patients, lymphangiography demonstrated complete obstruction of the subcutaneous lymphatic channels with dermal backflow and extravasation in the perivenous tissues. There was no lymph node enlargement or involvement. They hypothesized that the obstruction may be a consequence of immune complexes reaching (lymphatic) channels and initiating a chronic lymphangitis.

**Conclusions**

This case describes POPP, a rare variant of psoriatic arthritis, which proved difficult to diagnose. It is hoped that this will alert other practitioners to the presence of this disorder, especially in light of its predilection for the great toe.

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**Conflict of Interest:** None reported.

**References**