Brachioradial pruritus in a patient with metastatic breast cancer to her cervical spine

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INTRODUCTION

Brachioradial pruritus (BRP) is a localized neuropathic condition of aberrant sensation that occurs on the dorsolateral upper extremities. BRP most commonly occurs in women, particular those who are fair skinned, with a mean age of 59 years at diagnosis.[1] The diagnosis is clinical, with patients reporting symptoms in C5-C6 dermatomes of the dorsolateral arms, which sometimes radiate to the shoulders, neck, or upper trunk.[2] Classically, patients report improvement of the pruritus with application of ice packs and return of symptoms after removal.[3] The pathogenesis of BRP is unknown, although the condition has been linked to cervical spinal disease and ultraviolet (UV) radiation.

Here we present a 46-year-old woman with UV-induced pruritus of her bilateral shoulders, anterior upper arms, and dorsal forearms. BRP was diagnosed subsequently in the setting of breast cancer metastases of the cervical spine, a novel association to our knowledge.

Abbreviations used:

BRP: brachioradial pruritus
MRI: magnetic resonance imaging
UV: ultraviolet

CASE PRESENTATION

A 46-year-old woman with a medical history of metastatic breast cancer presented to our clinic for slowly worsening pruritus of her bilateral shoulders, anterior upper arms, and dorsal forearms present for 1 year. Sunlight worsened her symptoms and application of ice relieved them, although they always returned upon removal of the ice. The patient's medications included fulvestrant, pertuzumab, trastuzumab, anastrozole, denosumab, and venlafaxine. Basic laboratory evaluation including liver and kidney function was unremarkable.

Physical examination found excoriations on her bilateral upper extremities without appreciable primary lesions. There was mild lichenification of the bilateral arms concentrated at skin folds.

She had breast cancer diagnosed 9 years prior at stage T2N1M0, for which she was treated with a combination of chemotherapy, surgery, and radiation. She remained in remission for the next 8 years, but unfortunately at about the time that her pruritus began, she was found to have widely metastatic recurrent breast cancer to the brain, liver, and axial skeletal system. A cervical spine magnetic resonance imaging (MRI) at the time of presentation showed diffuse osseous metastatic disease throughout the vertebral bodies and posterior elements (Fig 1). Alignment and cervical cord were intact with no overt prevertebral soft tissue swelling.

In light of this history, BRP was diagnosed likely secondary to her cervical spine metastases. As she was already being treated with a selective serotonin and norepinephrine reuptake inhibitor, additional treatment recommendations included strict photoprotection and low-dose gabapentin. She initially reported drowsiness with this medication, although slow titration to 500 mg daily divided into 3 afternoon doses eventually improved both her pruritus and drowsiness. Although referral to the neurology department for electromyography was considered, this was deemed unnecessary given the patient's classic presentation, MRI findings, and improvement with gabapentin. Unfortunately, her

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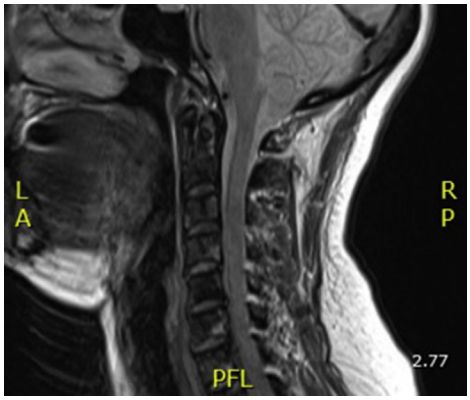

Fig 1. Cervical spine MRI depicts diffuse osseous metastatic disease.

metastatic disease progressed despite initiation of chemotherapy.

DISCUSSION

The etiology of BRP is not well understood, although the prevailing theory is that symptoms result from the combination of 2 factors: (1) abnormalities of the cervical spine may compress the spinal cord or cervical nerves as they exit the spinal column and (2) increased UV exposure further damages peripheral sensory nerves. The interplay of these factors is thought to result in the inappropriate interpretation of normal stimuli as pruritus in the distribution of the affected nerves.[2] Although most BRP is seen in the setting of cervical spine degenerative changes, a few cases have been reported secondary to primary spinal cord tumors.[4-8] To our knowledge, this is the first case of BRP reported in the setting of metastatic malignancy to the cervical spine.

Neural pathways for pruritus involve the nonmedullated, mechanoinsensitive C fibers, and finely medullated polymodal C fibers. These peripheral nerve fibers ascend through the dorsal horn of the spinal cord, synapsing with second-order neurons and crossing the midline until they eventually course through the spinothalamic tract to the thalamus. Thus, lesions that occur anywhere along these tracts are capable of causing neuropathic itch. Localized cutaneous pruritus may be related to damage of the peripheral nerve, nerve root, spinal cord, or central nervous system.[5] Our patient's dermatomal distribution of symptoms correlated well with the locations of her spinal metastases, supporting this theoretical mechanism.

Imaging with computed tomography or MRI of patients with BRP typically finds abnormalities such as degenerative joint disease, cervical nerve impingement, osteoarthritis, foraminal stenosis, or other evidence of nerve compression.[2] In this patient, although cervical spine MRI showed no macroscopic evidence of spinal cord compression by the tumor islands, it is possible that subtle compression or nerve irritation could have resulted from inflammation and edema surrounding the metastases. Metastatic cancer often induces inflammation that may cause fluid buildup, leading to pressure that can compress nervous tissue. Furthermore, almost all patients with BRP related to degenerative spinal change also do not meet radiologic diagnostic criteria for cervical radiculopathy.[2] This finding suggests that our current imaging resolution or visual diagnostic capabilities may not be sensitive enough to identify subtle changes that result in BRP. Although this could explain the compressive aspect of BRP development in our patient, the role of UV radiation has yet to be addressed.

The impact of UV radiation on BRP symptoms has been repeatedly described, yet only theoretically explained. The most widely accepted theory is that excessive UV radiation may damage and reduce the C fibers that transmit itch leading to an increased pruritic response, a process known as *alloknesis*.[2] This epidemiologically explains why most BRP patients are fair-skinned individuals who live in sunny climates and participate in outdoor activities. Moreover, the pruritus of BRP frequently worsens during the summer months, when temperatures are warmer. In our patient, sunlight worsened her symptoms and application of ice relieved them, indicating temperature and UV sensitivity of her condition. Therefore, we hypothesize that our patient's BRP resulted from her metastatic cervical spinal disease acting as the predisposing factor, and exposure to UV radiation acting as the inciting factor.

CONCLUSION

Our case suggests that metastatic cancer to the cervical spine may cause compression of cervical nerves and predisposes these patients to BRP. This case also shows that future studies are needed to explore the complex neuropathic signaling involved in this condition and expand our current knowledge of associated risk factors beyond degenerative spinal disease.

REFERENCES

1. Pinto AC, Wachholz PA, Masuda PY, Martelli AC. Clinical, epidemiological and therapeutic profile of patients with brachioradial pruritus in a reference service in dermatology. *An Bras Dermatol*. 2016;91(4):549-551.
2. Robbins BA, Schmieder GJ. *Brachioradial Pruritus*. Treasure. Island, FL: StatPearls Publishing; 2020.

3. Berger AA, Urits I, Orhurhu V, Viswanath O, Hasoon J. Brachioradial pruritus in a 52-year-old woman: A case report. *Case Rep Womens Health*. 2019;24:e00157.
4. Fleuret C, Dupré-Goetghebeur D, Person H, et al. [Brachioradial pruritus revealing an ependymoma]. *Ann Dermatol Venereol*. 2009;136(5):435-437 [in French].
5. Soltani-Arabshahi R, Vanderhooft S, Hansen CD. Intractable localized pruritus as the sole manifestation of intramedullary tumor in a child: case report and review of the literature. *JAMA Dermatol*. 2013;149(4):446-449.
6. Kavak A, Dosoglu M. Can a spinal cord tumor cause brachioradial pruritus? *J Am Acad Dermatol* 2002;46(3):437-440.
7. Koç B, Boyraz I, Özkan H, et al. Brachioradial pruritus: secondary to cervical ependymoma. *FTR Bil Der*. 2015;18:200-203.
8. Hardy J, Uthurriague C, Bibas N, Bon E, Paul C, Nougué J. [Brachioradial pruritus revealing cervicomedullary astrocytoma and treated with 8% capsaicin patches]. *Ann Dermatol Venereol*. 2014;141(5):374 [in French].