

Brachioradial Pruritus: An Etiologic Review and Treatment Summary

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PRACTICE POINTS

- The etiology of brachioradial pruritus (BRP) has been associated with cervical spine pathology and/or UV radiation exposure.
- Treatment options for BRP range from conservative to invasive, and clinicians should consider the evidence for all options to decide what is best for each patient.

Brachioradial pruritus (BRP) is a relatively uncommon neuropathic dysesthesia localized to the dorsolateral arms that causes unrelenting itching, burning, tingling, or stinging sensations. There is no identifiable cause of BRP to date, though it is thought to be secondary to either cervical spine pathology or exposure to UV radiation (UVR). Gold-standard treatment of BRP remains unknown. This article reviews previously trialed conservative management options, including chiropractic manipulation, acupuncture, physiotherapy, and photoprotection, as well as medical management options that have been utilized to treat BRP, such as medications, interventional pain management procedures, and surgery. We compiled an updated comprehensive list of possible treatment strategies to be utilized by future providers.

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Brachioradial pruritus (BRP) is a neuropathic condition typically characterized by localized dysesthesia of the dorsolateral arms.¹ This dysesthesia has been described as a persistent painful itching, burning,

tingling, or stinging sensation²⁻⁴ and has a median duration of expression of 24 months.^{5,6} The condition may be unilateral or bilateral in nature but tends to have a predilection for a bilateral distribution along the C5 to C6 dermatomes.^{1,7,8} There are no primary skin lesions associated with BRP; however, excoriations, prurigo nodules, and lichenification may arise secondary to scratching of the irritated skin.^{1,4,5,9} Brachioradial pruritus tends to have a predilection for adult females (3:1 ratio) with lighter skin. The mean age at diagnosis is 59 years, but cases have been reported in patients aged 12 to 84 years.^{1,5} The diagnosis of BRP is based on clinical signs and symptoms, though the ice-pack sign tends to be pathognomonic for the diagnosis.^{10,11} Although there is no clear evidence on the exact cause of BRP, there are 2 prevalent theories: cervical radiculopathy secondary to cervical spine pathology and/or excessive exposure to UV radiation (UVR) in the summer months.^{3-5,12} Brachioradial pruritus remains poorly described in the literature, and even its origin is under debate. As such, the clinician may have difficulty deciding on the best course of management. The goal of this article is to identify and discuss known treatment options for BRP (Table).

Etiology

Cervical Spine Pathology—A correlation appears to exist between BRP and cervical spine changes seen on plain film radiographs at the levels of C3 to C7, with increased incidence at the C5 to C6 levels. These plain film

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Overview of Treatments for Brachioradial Pruritus

Conservative

Acupuncture

Cervical spine manipulation or cervical traction

Physiotherapy

Protection from UV radiation

Medical

Anterior cervical discectomy and fusion

Epidural steroid injection

Intravenous naloxone

Mirogabalin

Neuroleptics, including gabapentin and pregabalin

Topical interventions

radiographs typically show degenerative joint disease and neural foraminal stenosis at levels that correlate to the dermatomal distribution of BRP.^{1,7,10,12-14} In addition to plain film radiography, some studies have utilized magnetic resonance imaging to view the cervical spine and have documented evidence of intervertebral disc protrusion/bulging, central canal stenosis, neuroforaminal stenosis, and spondylosis at the affected regions.^{5,15-17} Moreover, supporting the theory that the cervical spine is responsible for the emergence of BRP, Marziniak et al¹⁷ investigated 41 patients with BRP utilizing magnetic resonance tomography to find that 33 patients (80.5%) had changes in nerve compression, and 8 patients (19.5%) had degenerative changes. In addition to these findings, they found that there was a significant correlation ($P < .01$) between the dermatomal expression of BRP and the location of cervical anatomical changes.¹⁷ Further validating the relationship between cervical spine pathology and BRP is a case study of a patient who saw rapid and complete resolution of the pruritus following spinal decompression surgery.¹⁰ Another case study described an intramedullary tumor found in a patient with BRP that was diagnosed as an ependymoma after magnetic resonance imaging revealed an intramedullary lesion within the spinal cord between C4 and C7. The location of the tumor and dermatomal pattern of the neuropathic itch pointed to a possible association between nerve compression and BRP.¹⁴ Electromyography studies performed on individuals with BRP have shown an increase in polyphasic units, decreased motor units, and/or denervation changes along the C5/C6 or C6 nerve roots, which provides additional

support for the theory of cervical spine pathology as a causative factor for BRP.¹⁶

UVR Exposure—Another etiologic theory for BRP is that UVR exposure may be responsible for the genesis of pruritus. Previously known as solar pruritus, BRP was deemed a clinical condition, as there was increased prevalence in patients living in warmer climates, such as Florida.⁹ Wallengren and Dahlbäck¹⁸ reported that sun exposure is a notable factor in the onset of BRP, as they saw an increase in symptoms during the late summer and a decrease in symptoms over the winter months. To further support the theory that UVR is linked to BRP, several studies have shown that the utilization of sun protection is linked to a reduction of symptoms, specifically in patients who showed seasonal variations of their symptoms.^{9,12,19} Additionally, a study by Mirzoyev and Davis⁵ retrospectively reviewed 111 patients diagnosed with BRP. Of these patients, 84 (75.7%) presented with bilateral symptoms, and 54 (48.6%) reported prolonged sun exposure. Both of these findings demonstrate correlation between UVR and BRP.⁵ Interestingly, UV light exposure is known to release β -endorphin in the skin and may theoretically provide an area of exploration between UVR and cervical spine theories.

Conservative Treatment

Chiropractic Manipulation—Because one etiologic theory includes disease of the cervical spine, there is evidence that targeting this region with treatment is beneficial.⁷ Two case reports found in the literature noted that cervical spine manipulation and cervical traction yielded positive results.^{20,21} It has been established that pain generated by disc lesions can be the result of local nociceptive fiber activation, direct mechanical compression of the nerve roots, or inflammatory mediators.²² There are several postulated models describing the hypoalgesic effects of spinal manipulation, which contains both biomechanical and neurophysiological mechanisms. Biomechanical changes theorized to elicit analgesia include restoration of faulty biomechanical movement patterns, breaking up of periarticular adhesions, and reflexogenic muscle inhibition of hypertonic musculature. Hypothesized neurophysiological effects of joint manipulation include an increase in afferent information overwhelming the nociceptive input, reduction of temporal summation, and autonomic activation leading to non-opioid-induced hypoalgesia.²³ Cervical traction is another plausible treatment for BRP, wherein the physiological effects of traction allow for a separation of vertebral bodies and expansion of the intervertebral foramen circumference, thus decreasing compression of the nerve roots.²⁴

Acupuncture—Neurogenic pruritus, including BRP, is a group of conditions that have been treated using acupuncture. Acupuncture treatment consists of intramuscular needle stimulation and has been found to alleviate itching in patients with neurogenic pruritus. In 1 retrospective case series, acupuncture was used to treat 16 patients who were identified

as having segmental pruritus. Acupuncture targeted the spasmed paravertebral muscles of the affected dermatomal levels as well as other regions of the body, and it was found that 12 patients (75%) experienced full resolution of symptoms. However, relapse did occur in 6 patients (37%) within 1 to 12 months following treatment.²⁵ Multiple theories exist as to why acupuncture may help. One is that it relieves muscle spasms, which in turn relieves neural irritation of the spinal nerves as they traverse the respective paraspinal musculature. Another is that acupuncture decreases nociception by stimulating release of opioid peptides in the dorsal horn.²⁶ A third proposed theory is that acupuncture acts on the afferent nerve fibers responsible for transmitting pain—A δ and C fibers—activating these afferent nerves to produce an analgesic effect.²⁷

Physiotherapy—The literature suggests that possible first-line therapies for neurogenic pruritus, including BRP and notalgia paresthetica, consist of noninvasive nondermatologic treatments that target cervical spine disease. Notalgia paresthetica and BRP have similar proposed mechanisms of nerve impingement; therefore, they often are grouped together when discussing proposed manual treatment options. Physiotherapy treatment includes cervical muscle strengthening, increased range of motion, application of cervical soft collars, massage, transcutaneous electronic nerve stimulation, and cervical traction.⁷ A study of 12 patients by Raison-Peyron et al²⁸ in 1999 discussed the use of spinal and paraspinal ultrasound or radiation physiotherapy. Six patients underwent this treatment, and the symptoms subsided in 4 cases.²⁸ Another study by Fleischer et al²⁹ in 2011 discussed improvement in 2 patients with notalgia paresthetica by exercise involving active range of motion and strengthening.

Photoprotection—Avoidance of UVR exposure has been beneficial to some patients to reduce symptoms. Use of sunscreen and long-sleeved UV-protective clothing during outdoor activities or the warmer summer months may be beneficial.¹

Medical Treatment

Medication—Because of the nonspecific clinical presentation of BRP, initial treatment often involves prescription of first-line antipruritic agents, including steroid creams and systemic antihistamines, both of which generally fail to provide symptom relief.^{1,30} Medications with neurologic mechanisms of action appear to provide potentially superior outcomes. Neuroleptics, including gabapentin and pregabalin, are typical therapeutic agents for neurogenic pruritus and inhibit nociceptive pain propagation.³¹ Intervention with pregabalin in 3 patients with BRP achieved complete symptom relief in all patients, with initial improvement occurring in as little as 1 week.⁸ Mirogabalin, operating under a similar mechanism, has shown preliminary success in treating BRP, causing anecdotal patient improvement within 4 months of initial dosage.³² Prolonged 1-month intravenous naloxone

treatment also appears to be promising, offering symptom improvement of at least 80% six months posttreatment.¹⁵

Topical interventions for BRP and related neurogenic pruritus have shown limited success. A case series evaluating capsaicin for pruritus offered only transient relief, likely because of its temporary hyperstimulatory and desensitizing effect on neuropeptides.^{7,33} In small populations, the use of topical antidepressants has yielded cutaneous and pathological relief for BRP. A case study of a 70-year-old woman evaluated the efficacy of a combination cream of ketamine and amitriptyline (a tricyclic antidepressant) yielding moderate pruritus improvement and notable improvement of secondary brachial skin lesions.³⁴ Oral steroids also have shown success in the treatment of chronic pruritus; however, limited research is available on the efficacy of such medications for BRP, and the long-term use of oral steroids is limited by many side effects.³⁰

Interventional Pain Procedure—A 2018 case series investigated 3 patients with a clinical diagnosis of BRP who were treated between 2010 and 2016 with epidural steroid injection using computed tomography guidance of the cervical spine.³⁵ The authors reported that 2 patients had near-complete resolution after 1 interventional procedure. The third patient had a total of 3 injections, with mild to moderate relief that continued to improve on mexiletine.³⁵ Another case in 2010 of a 56-year-old man with BRP documented use of a series of 2 epidural steroid injections that resulted in clinical resolution of symptoms.³⁶

Surgery—There are multiple case studies in the literature that discuss anterior cervical discectomy and fusion (ACDF) as a last resort in patients with refractory BRP of discogenic cause. In 2022, Morosanu et al³⁷ described a case of a 63-year-old woman with BRP in the C5–C6 distribution who had an associated disc protrusion at this level following magnetic resonance imaging. The patient underwent a C5/C6 ACDF after conservative and medical treatment failed, and at 3-month follow up her symptoms had resolved entirely.³⁷ Another case report described a 56-year-old man who ultimately underwent ACDF after failed multimodal treatment attempts, with instant improvement in symptoms. Four months after surgery, the patient reported a 95% improvement of symptoms.¹⁹ An older case in 2008 discussed the use of ACDF in a 64-year-old woman with severe distress and an identifiable surgical target. The patient's symptoms resolved completely within 1 week after surgery.¹⁰

Conclusion

The pathogenesis of BRP continues to be an area of debate—it may be secondary to cervical spine disease or UVR. This review found there is more research pointing to cervical spine disease. There is an abundance of literature discussing both conservative and invasive treatment strategies, both of which carry benefits. Further research is needed to better establish the etiology of BRP so that formal treatment guidelines may be established.

Neuropathic itch can be a frustrating condition for providers and patients, and many treatment modalities often are tried before arriving at a helpful treatment for a particular patient. Clinicians who may encounter BRP in practice benefit from up-to-date literature reviews that provide a summary of management strategies.

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