Neuroma

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- Evaluating the Impact of Diabetes and Metformin on Painful Neuromas After Lower Extremity Amputations

A neuroma /njuːˈroʊmə/ (plural: neuromata or neuromas) is a growth or tumor of nerve tissue.

Neuromas tend to be benign (i.e. not cancerous); many nerve tumors, including those that are commonly malignant, are nowadays referred to by other terms.

Neuromas can arise from different types of nervous tissue, including the nerve fibers and their myelin sheath, as in the case of genuine neoplasms (growths) like ganglioneuromas and neurinomas.

The term is also used to refer to any swelling of a nerve, even in the absence of abnormal cell growth.

Neuromas are a substantial cause of morbidity and reduction in quality of life. This is not only caused by a disruption in motor and sensory function from the underlying nerve injury but also by the debilitating effects of neuropathic pain resulting from symptomatic neuromas. A wide range of surgical and therapeutic modalities have been introduced to mitigate this pain. Nevertheless, no single treatment option has been successful in completely resolving the associated constellation of symptoms. While certain novel surgical techniques have shown promising results in reducing neuroma-derived and phantom limb pain, their effectiveness and the exact mechanism behind their pain-relieving capacities have not yet been defined. Furthermore, surgery has inherent risks, may not be suitable for many patients, and may yet still fail to relieve pain. Therefore, there remains a great clinical need for additional therapeutic modalities to further improve treatment for patients with devastating injuries that lead to symptomatic neuromas.

Formation

The molecular mechanisms and genetic contributions behind the regulatory programs that drive neuroma formation as well as the resulting neuropathic pain remain incompletely understood.

Traumatic neuroma

see Traumatic neuroma.

Regenerative Response: In response to nerve damage or irritation, the body attempts to repair the nerve. This involves the regrowth of nerve fibers and surrounding connective tissue.

Disorganized Growth: During the regenerative process, the nerve fibers and surrounding tissue may grow in a disorganized and haphazard manner. This can lead to the formation of a neuroma.

Ulnar nerve neuroma

Ulnar nerve neuroma

Morton's neuroma

Morton's neuroma affects the foot.

Acoustic neuroma

Acoustic neuroma.

Facial neuroma

Facial neuroma

Trigeminal Neuroma

Trigeminal Neuroma.

All 3 of these tumors may present in the CPA and may cross from the posterior fossa to the middle fossa, but they tend to do so in different manners. Vestibular schwannomas show “transhiatal” extension by passing through the tentorial hiatus medially. Most trigeminal neuromas show “transapicopetrosal” extension by crossing into the middle fossa via the petrous apex (although some show transhiatal extension). When facial neuromas cross, they tend to spread across the midpetrosal bone, which is characteristic for facial neuromas. When a facial neuroma enlarges the IAC, unlike a vestibular schwannoma, it tends to erode the anterosuperior aspect of the IAC.

Amputation Neuroma: This type of neuroma can develop at the site of a previously amputated limb. It is the result of nerve regrowth and often causes localized pain or discomfort.

Common Digital Nerve Neuroma: These neuromas typically occur in the fingers and toes and are often associated with repetitive trauma or injury. They can lead to localized pain and tingling.

Spinal Neuromas: These neuromas are found in the spine and can be associated with nerve root compression or irritation. They may result from various spinal conditions.

Neuroma of the Digestive System: Some neuromas can develop in the digestive system, such as the gastrointestinal tract. These may be associated with conditions like carcinoid tumors.

Other Neuromas: Neuromas can also develop in other locations in the body, depending on the nerves involved and the underlying causes.

Optic sheath neuroma

Clinical features

Symptoms of a neuroma can vary depending on its location. Common symptoms include pain, tingling, numbness, and sometimes a feeling of a lump or bump at the affected site.

Hwang et al. review the histopathological features of symptomatic neuromas, our current understanding of the mechanisms that favor neuroma formation, and the putative contributory signals and regulatory programs that facilitate somatic pain, including neurotrophic factors, neuroinflammatory peptides, cytokines, along with transient receptor potential, and ionotropic channels that suggest possible approaches and innovations to identify novel clinical therapeutics [1)]

Diagnosis

Diagnosis usually involves a physical examination by a healthcare provider, who may also use imaging studies (such as ultrasound or MRI) to visualize the neuroma and rule out other conditions.

Treatment

Treatment options for neuromas may include conservative measures such as rest, footwear modifications, orthotic inserts, medication for pain management, and physical therapy. In some cases, corticosteroid injections or surgical removal of the neuroma may be considered.

1)

Hwang CD, Hoftiezer YAJ, Raasveld FV, Gomez-Eslava B, van der Heijden EPA, Jayakar S, Black BJ, Johnston BR, Wainger BJ, Renthal W, Woolf CJ, Eberlin KR. Biology and pathophysiology of symptomatic neuromas. Pain. 2023 Oct 17. doi: 10.1097/j.pain.0000000000003055. Epub ahead of print. PMID: 37851396.