

**TRIGEMINAL NEUROPATHY: ETIOLOGY, PATHOGENESIS, CLINICAL
MANIFESTATIONS AND MODERN APPROACHES TO TREATMENT**

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Abstract

Trigeminal neuropathy is one of the most common neurological disorders affecting the maxillofacial region. The disease is characterized by severe pain syndrome, sensory disturbances, and a significant decrease in patients' quality of life. This article discusses the main causes of trigeminal neuropathy, mechanisms of its development, clinical manifestations, and modern diagnostic and treatment methods. Particular attention is paid to dental factors that may lead to damage to the branches of the trigeminal nerve. Analysis of modern scientific data shows that timely diagnosis and a comprehensive treatment approach significantly improve therapeutic outcomes and prevent complications.

Keywords

trigeminal nerve, neuropathy, facial pain, dentistry, neuropathic pain, diagnosis, treatment.

Introduction

The trigeminal nerve (cranial nerve V) is the largest sensory nerve of the face and plays an important role in providing innervation to the facial skin, oral mucosa, teeth, and masticatory muscles. Disorders of the trigeminal nerve occupy a significant place among neurological diseases of the maxillofacial region.

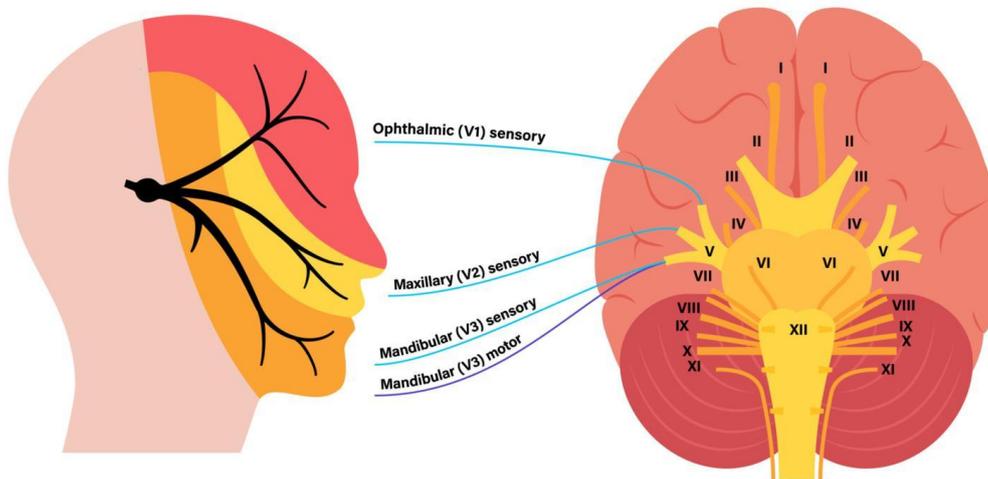
Trigeminal neuropathy is a pathological condition caused by damage to nerve fibers and accompanied by impaired sensitivity, development of pain syndrome, and dysfunction of the innervated tissues.

The relevance of this problem is associated with the high prevalence of the disease, difficulties in diagnosis, and its significant impact on patients' quality of life. In dental practice, neuropathy may occur after surgical procedures, tooth extraction, implantation, endodontic treatment, and local anesthesia.

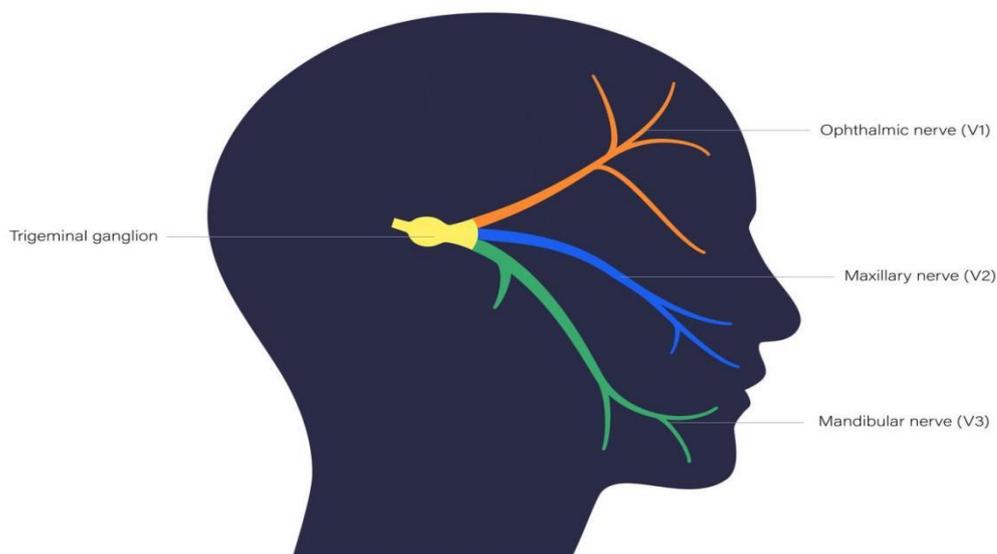
The aim of this study is to analyze modern scientific data regarding the causes, mechanisms of development, clinical manifestations, and treatment methods of trigeminal neuropathy.

Anatomy of the Trigeminal Nerve

TRIGEMINAL NERVE



TRIGEMINAL NERVE



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Figure 1. Anatomy of the trigeminal nerve

The trigeminal nerve consists of three main branches:

- 1. Ophthalmic branch (V1)** – innervates the forehead, upper eyelid, and the bridge of the nose.
- 2. Maxillary branch (V2)** – provides sensory innervation to the upper jaw, upper teeth, cheeks, and upper lip.
- 3. Mandibular branch (V3)** – innervates the lower teeth, lower lip, chin, and masticatory muscles.

Damage to any of these branches may lead to sensory disturbances and pain syndrome.

Etiology of the Disease

The causes of trigeminal neuropathy are diverse. The most common etiological factors include:

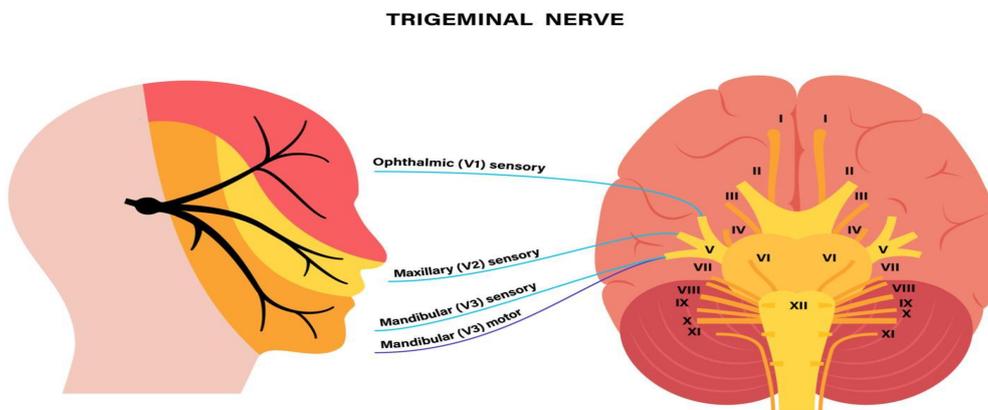
- traumatic injuries
- inflammatory processes
- vascular compression of the nerve
- tumor processes
- dental procedures

In dental practice, trigeminal nerve damage may occur during:

- extraction of wisdom teeth
- dental implantation
- endodontic treatment
- local anesthesia procedures

Traumatic injury to the nerve leads to structural damage to nerve fibers and development of pathological changes.

Pathogenesis of Trigeminal Neuropathy



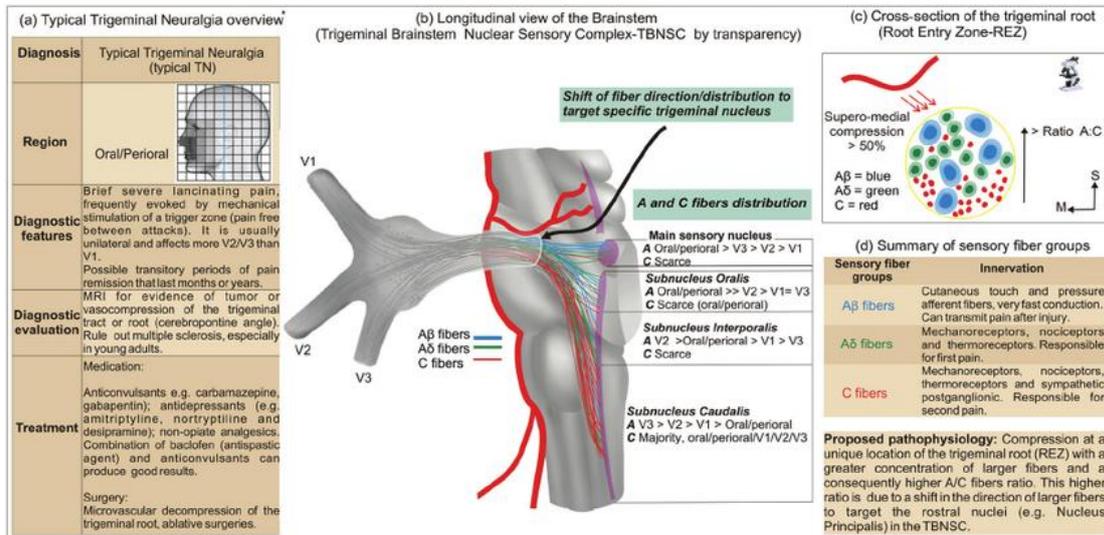


Figure 2. Mechanism of trigeminal nerve damage

In trigeminal neuropathy, structural and functional changes occur in nerve fibers. One of the main mechanisms of disease development is compression of the trigeminal nerve root by blood vessels or surrounding tissues.

Prolonged pressure causes damage to the myelin sheath of nerve fibers. The myelin sheath is essential for rapid conduction of nerve impulses. Its destruction results in impaired signal transmission.

As a result, the following pathological processes develop:

- demyelination of nerve fibers
- increased excitability of nerve tissue
- formation of pathological pain impulses
- development of neuropathic pain

Inflammatory changes and microcirculatory disturbances may also occur, which further aggravate nerve damage.

Clinical Manifestations

The clinical picture of trigeminal neuropathy depends on the degree of nerve damage and localization of the pathological process.

The main symptoms include:

- intense facial pain
- numbness of the lips, cheeks, or tongue
- paresthesia
- decreased sensitivity
- dysfunction of masticatory muscles

Pain may be constant or paroxysmal and often increases during speaking, chewing, or touching certain areas of the face.

Diagnostic Methods

Diagnosis of trigeminal neuropathy is based on comprehensive examination of the patient.

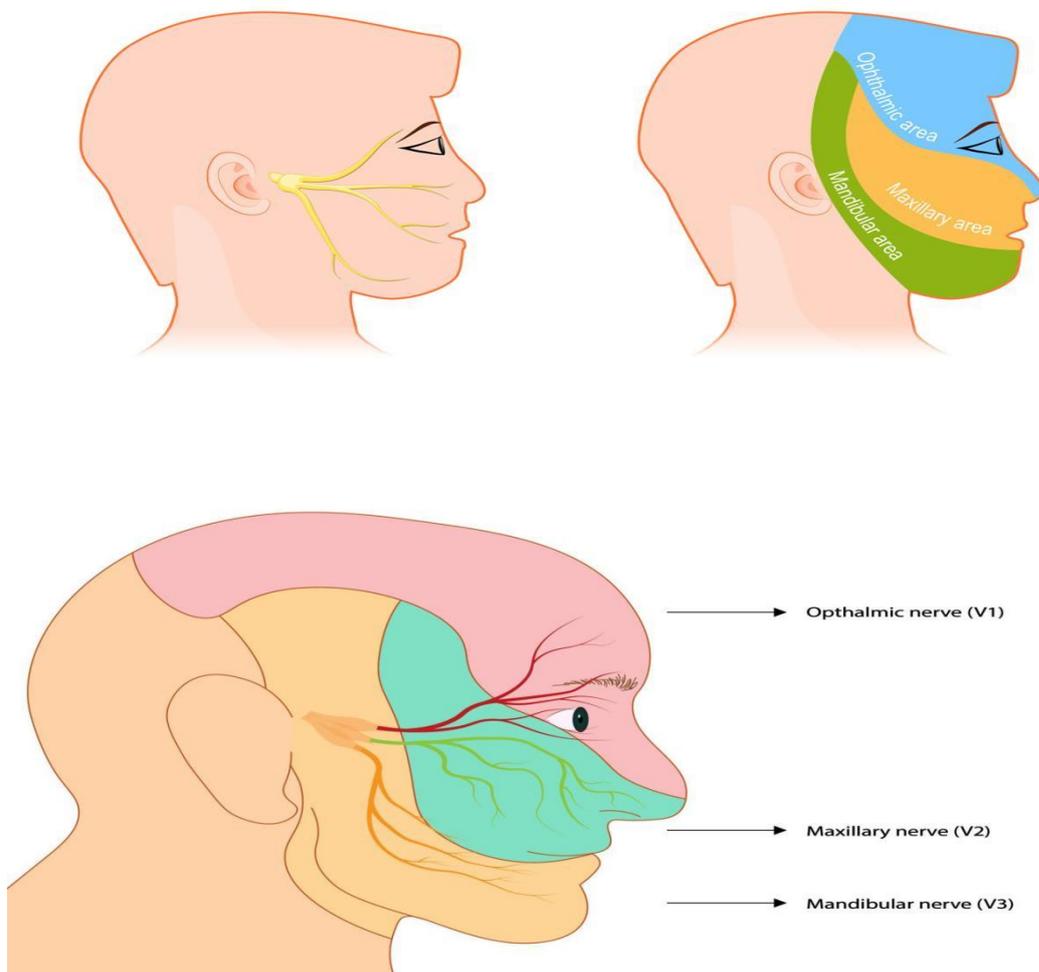
The main diagnostic methods include:

- clinical examination
- neurological testing
- computed tomography (CT)
- magnetic resonance imaging (MRI)
- electrophysiological studies

Differential diagnosis between trigeminal neuropathy and trigeminal neuralgia is particularly important.

Sensory Innervation Zones of the Trigeminal Nerve

Trigeminal nerve



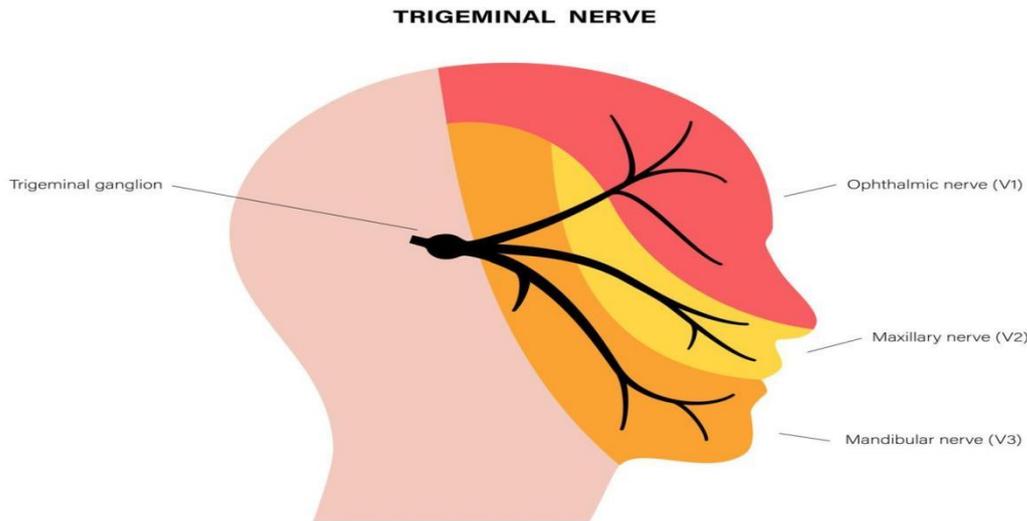


Figure 3. Sensory innervation areas of the trigeminal nerve

The ophthalmic branch innervates the forehead and upper eyelid.

The maxillary branch provides sensation to the upper lip, cheeks, and upper teeth.

The mandibular branch innervates the lower lip, chin, and lower teeth.

Treatment

Treatment of trigeminal neuropathy should be comprehensive and aimed at eliminating the underlying cause of the disease.

Pharmacological Therapy

The following groups of drugs are commonly used:

- anticonvulsants
- antidepressants
- non-steroidal anti-inflammatory drugs
- B-group vitamins

Physiotherapy

Common physiotherapeutic methods include:

- electrophoresis
- laser therapy
- magnetotherapy

These methods improve microcirculation and promote nerve tissue recovery.

Surgical Treatment

In cases of severe nerve compression, surgical intervention may be required. One of the most effective methods is microvascular decompression.

Conclusion

Trigeminal neuropathy is a serious condition that requires timely diagnosis and comprehensive treatment. The main causes of the disease include traumatic injuries, inflammatory processes, and vascular compression of nerve structures.

Modern diagnostic methods allow early detection of the disease and effective treatment. Comprehensive therapy helps reduce pain syndrome and restore the function of the affected nerve.

Further research in this field is necessary to develop more effective methods of prevention and treatment of trigeminal neuropathy.

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