CASE REPORT

Assessment of causality and impairment following unilateral hypoglossal nerve paralysis: A case report

Emre Nuri İgde,[1] Zuhal Özlüoglu İgde,[2] Burak Tastekin,[3] Ramazan Akcan,[3] Aysun Balseven Odabası[3]

[1]Department of Autopsy, Ankara Group Chairmanship, The Council of Forensic Medicine, Ankara-*Türkiye*
[2]Department of Forensic Medicine, Ankara City Hospital, Ankara-*Türkiye*
[3]Department of Forensic Medicine, Hacettepe University Faculty of Medicine, Ankara-*Türkiye*

ABSTRACT

Isolated hypoglossal nerve injury is an infrequent occurrence in clinical and forensic traumatology practice. Its etiology includes trauma, malignancy, vascular events, autoimmune diseases, and complications of surgical procedures. Clinical manifestations resulting from nerve damage may present early or be delayed. We present the case of a 44-year-old woman who sustained a fracture of the third cervical vertebra following a traffic accident. An anterior approach was employed for instrumentation using an anterior plate spanning two cervical segments. The patient developed dysphagia and swallowing difficulties and subsequently underwent evaluation for disability status. Physical examination revealed significant atrophy and asymmetry of the right half of the tongue body, slight rightward deviation of the tongue apex at rest, and fasciculations. Electromyography performed 22 months after the injury demonstrated chronic axonal injury of the right hypoglossal nerve. Causality assessment favored the traffic accident as the initiating event, with postoperative edema and retraction likely contributing to progression. The condition was classified as permanent, and a 25% functional loss was assigned for tongue paralysis according to national disability criteria. This report highlights the diagnostic, prognostic, and legal complexities of delayed hypoglossal nerve palsy following cervical trauma and underscores the importance of a multidisciplinary approach in determining the etiology and prognosis of isolated hypoglossal nerve paralysis, as well as in establishing medical causality.

Keywords: Forensic traumatology; hypoglossal nerve palsy; anterior cervical surgery; medico-legal causality; disability assessment.

INTRODUCTION

Isolated hypoglossal nerve paralysis is a rare medical condition. It may arise from trauma, neoplasms, cerebrovascular disease, aneurysm, complications related to medical procedures (such as surgery, intubation, or radiotherapy), or may be idiopathic in origin.[1-3] Due to its anatomical location, the hypoglossal nerve is one of the cranial nerves least affected by blunt head trauma. Hypoglossal nerve paralysis may result in dysphagia, facial twitching, and tongue weakness.[4]

Isolated hypoglossal nerve injury has been reported in the literature primarily as case reports, focusing on treatment approaches and prognostic outcomes.[5,6] However, no studies addressing this condition from a forensic medicine perspective have been identified. Medicolegal assessment of hypoglossal nerve injury with delayed symptom onset presents several challenges. In such cases, it is essential to determine causality, assess whether the condition is permanent, and evaluate the severity of clinical impairment (including sensory-organ dysfunction, functional loss, and degree of disability) for both criminal and civil proceedings.

The aim of this case report is to highlight the evaluation of causal relationships and degree of disability based on clinical functionality from a medicolegal perspective.

Cite this article as: İgde EN, Özlüoglu İgde Z, Tastekin B, Akcan R, Balseven Odabası A. Assessment of causality and impairment following unilateral hypoglossal nerve paralysis: A case report. Ulus Travma Acil Cerrahi Derg 2026;32:402-407.

Address for correspondence: Emre Nuri İgde
Department of Autopsy, Ankara Group Chairmanship, The Council of Forensic Medicine, Ankara, Türkiye
E-mail: emre.nuri.igde@gmail.com

Ulus Travma Acil Cerrahi Derg 2026;32(3):402-407 DOI: 10.14744/tjtes.2025.73307
Submitted: 29.08.2025 Revised: 09.09.2025 Accepted: 02.11.2025 Published: 10.03.2026

CASE REPORT

A 44-year-old female patient presented to the Department of Forensic Medicine seven months after a traffic accident with complaints of dysphagia, tongue weakness, and restricted tongue movement for disability evaluation. The traffic accident resulted in comminuted displaced fractures of the C3 vertebral body and the anterior and posterior walls of the left transverse foramen. Cervical spinal magnetic resonance imaging (MRI) performed on the day of the accident revealed edema-like signal changes in the proximal cervical region, as well as degenerative changes. The patient underwent anterior surgical intervention using a microsurgical technique due to an unstable cervical vertebral fracture and traumatic disc pathology. An anterior plate was placed spanning two segments, including the C3 and C4 vertebral bodies. Discectomy, intervertebral graft placement (cage), and disc prosthesis implantation were performed at the C3–4 level (Fig. 1). No major intraoperative complications were reported. The patient was discharged on the first postoperative day. In the days following discharge, the patient developed swallowing difficulties, followed by weakness on the right side of the tongue, unintentional tongue biting, and chewing difficulties. Upon recommendation by an otolaryngologist, she was referred for swallowing therapy. Atrophy of the right side of the tongue, rightward deviation of the tongue tip, and fasciculations were noted during our team's examination seven months after the injury (Fig. 2). The preliminary diagnosis was considered to be

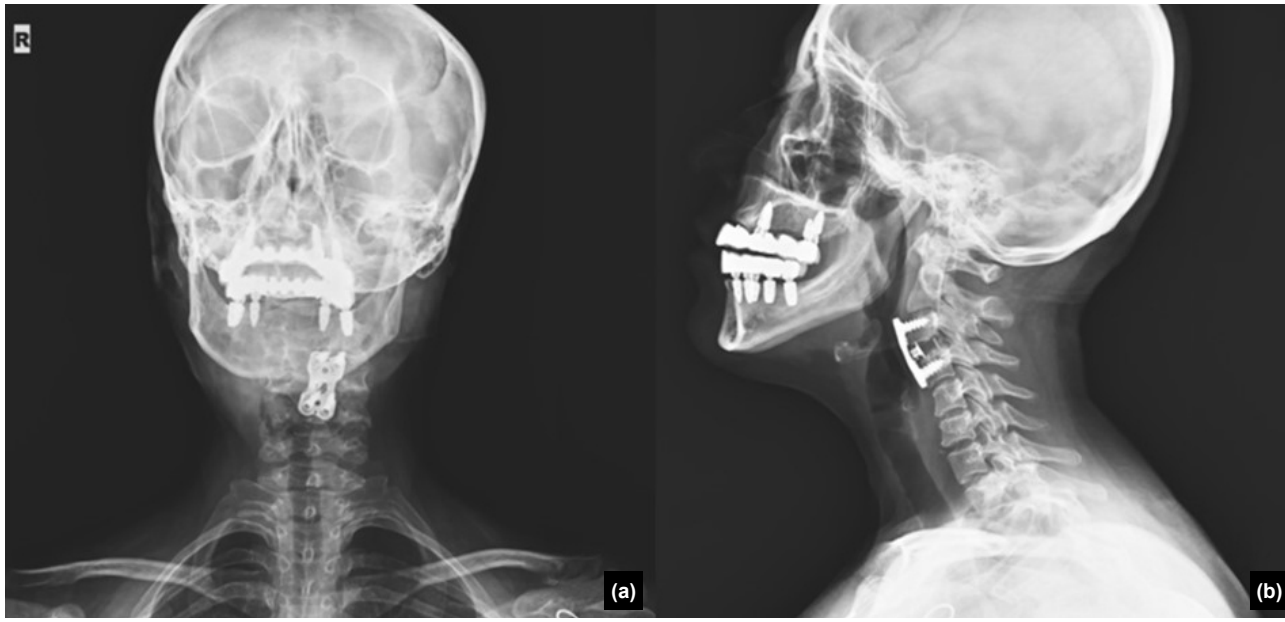

Figure 1. (a) Coronal and **(b)** sagittal cervical spine X-rays demonstrating displaced C3 fractures with postoperative instrumentation.

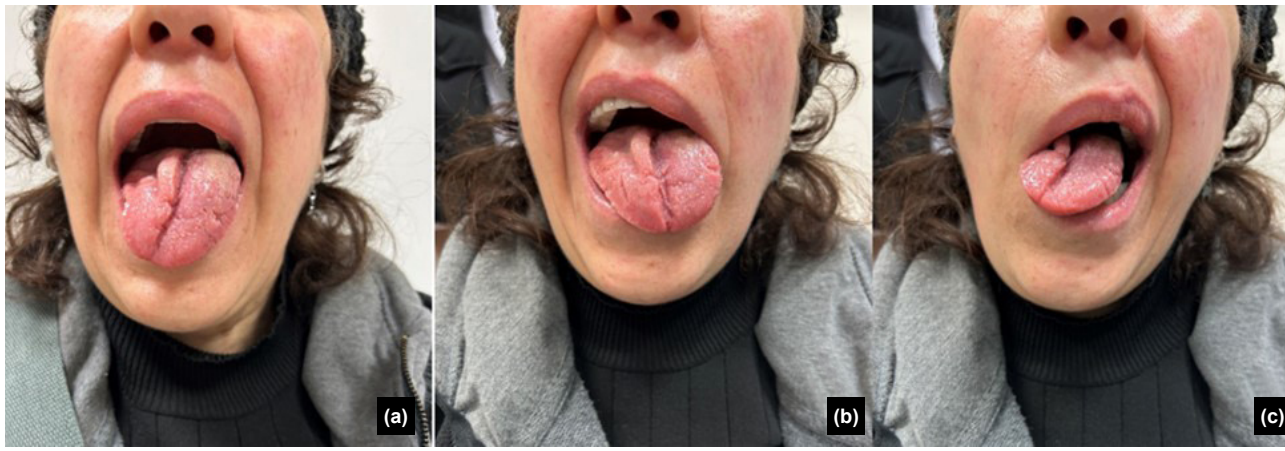

Figure 2. (a) Atrophy of the right half of the tongue and rightward deviation of the tongue apex; **(b-c)** comparison of tongue movement from right to left.

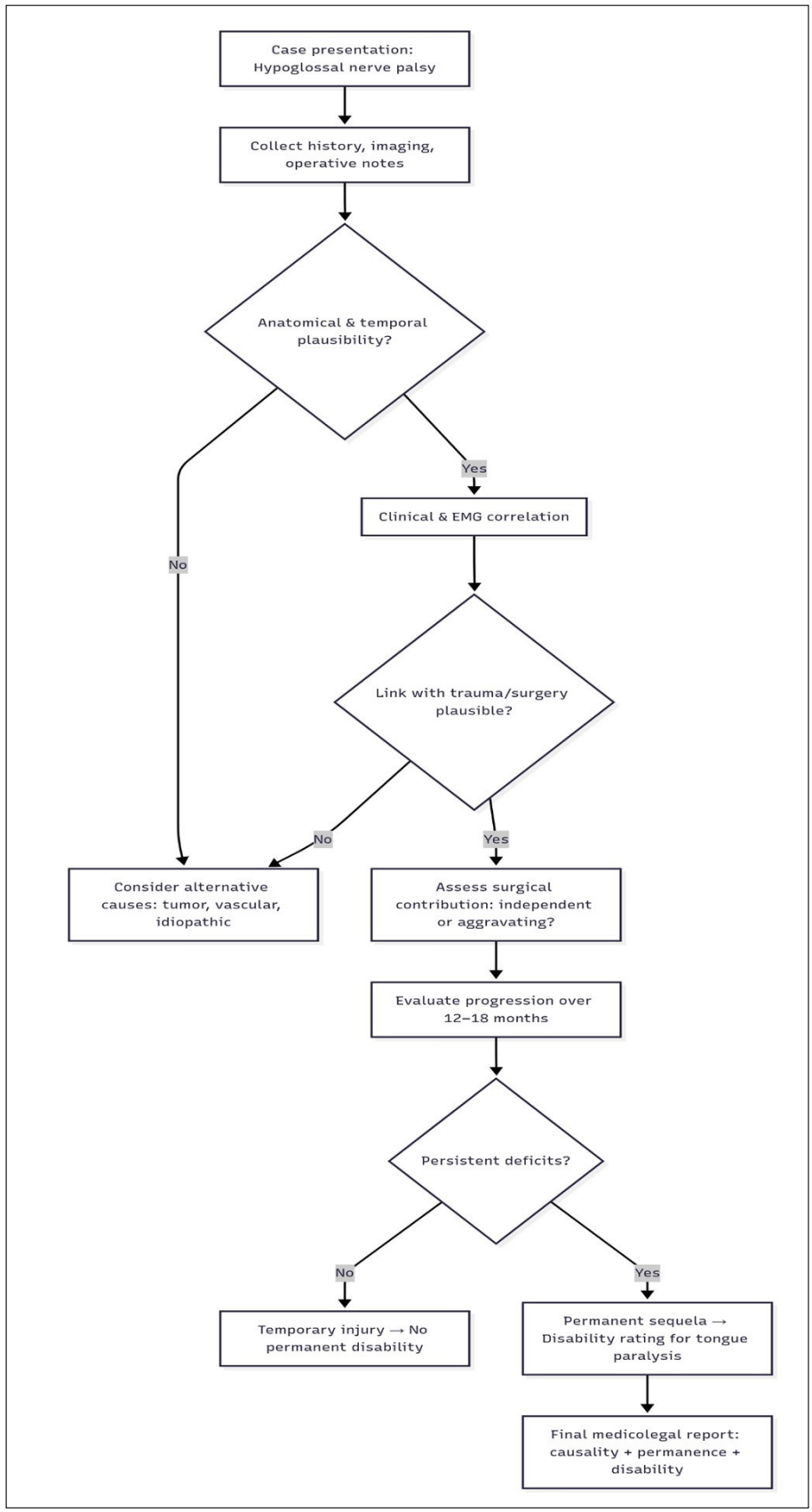

Figure 3. Algorithmic approach to the medicolegal evaluation of cases involving hypoglossal nerve paralysis.

paralysis of the right peripheral hypoglossal nerve secondary to trauma. A neurology consultation and electromyography (EMG) were requested to clarify the diagnosis (central versus peripheral pathology). It was decided that the patient would be re-evaluated after an adequate rehabilitation period and diagnostic confirmation—at least 18 months after the injury—for a final disability assessment.

Following the neurology consultation, needle EMG was performed on the bilateral intrinsic tongue muscles 22 months after the trauma. Denervation potentials and neurogenic motor unit action potentials were observed on the right side, while EMG findings on the left were within normal limits. These results were consistent with active chronic axonal injury of the right hypoglossal nerve. Cranial MRI revealed no evidence of vascular pathology, mass lesion, or diffusion restriction. Physical examination demonstrated significant atrophy and asymmetry of the right half of the tongue body, along with slight rightward deviation of the tongue apex in the neutral position and fasciculations.

The hypoglossal nerve paralysis was considered permanent (sequela) because there was no clinical improvement despite adequate treatment and rehabilitation. A causal relationship was established between the motor vehicle accident and the nerve paralysis. The patient's degree of disability resulting from the nerve paralysis was assessed as 25%, according to the "loss of tongue function due to paralysis" criterion outlined in the Regulation on Disability Assessment for Adults.

Written informed consent was obtained from the patient publication of this case report and associated images.

DISCUSSION

Hypoglossal nerve palsy can be caused by a variety of pathologies (such as malignancy, cerebrovascular events, and autoimmune diseases), as well as trauma and surgery. The most common etiological factors are surgical complications and malignancies.[4,7] Hypoglossal nerve injury has been reported as a surgical complication following anterior cervical spine surgery and carotid endarterectomy.[8,9] Approximately 4% of hypoglossal nerve palsy cases are caused by trauma, with the majority involving occipital condyle fractures affecting the hypoglossal canal.[5] Isolated hypoglossal nerve palsy may occur after penetrating trauma,[10] stretching of the nerve in the cervical region,[11] and minor head trauma.[6] Assessing causality between trauma and nerve injury requires an in-depth understanding of the course of the hypoglossal nerve. The hypoglossal nerve originates from the medulla oblongata. After following a lateral and caudal course within the cranium, it passes through the hypoglossal canal. Upon exiting the cranium, it travels downward in the neck, in close proximity to the internal carotid artery and the internal jugular vein, until it reaches the mandibular angle. Beyond this point, it continues anteriorly to innervate its target tissues.[1,12] Along its course through the cervical region, the nerve is susceptible to injury caused by surgical complications (such as traction) and trauma. In our case, a C3 comminuted vertebral fracture was accompanied by soft tissue edema in the region corresponding to the adjacent nerve pathway. Because the fracture was unstable, anterior cervical instrumentation was performed. Considering the site and mechanism of trauma, it was assumed that nerve stretching due to acceleration-deceleration forces, along with edema, caused neurapraxia. Furthermore, the use of retractors during surgery and postoperative soft tissue swelling may have exacerbated the nerve injury.

The hypoglossal nerve innervates the extrinsic and intrinsic muscles of the tongue (except for the palatoglossus muscle), enabling movements such as tongue protrusion and retraction.[12] It plays a crucial role in swallowing and speech. Dysphagia, dysarthria, odynophagia, tongue weakness, and headache are common symptoms of hypoglossal nerve palsy.[4] Symptoms may appear either abruptly or in a delayed manner following a traumatic event or surgical procedure. Delayed symptom onset may result from nerve compression caused by displaced fracture fragments, callus formation, hematoma, or increased edema at the fracture site.[8] Delayed onset occurs in approximately 38% of cases involving traumatic hypoglossal nerve injuries.[13] Clinical findings may remain undetectable in the early stages of trauma unless axonotmesis or neurotmesis is present. Dysphagia and dysarthria are frequently observed in the postoperative period, particularly after anterior surgical approaches.[14] This can make the diagnosis of hypoglossal nerve palsy difficult in the postoperative setting. One of the most important clinical indicators is noticeable tongue deviation. In our case, the initial neurological examination following the trauma revealed no cranial nerve deficits. However, the patient subsequently reported a gradual progression of dysphagia in the early postoperative period, which was considered consistent with delayed-onset hypoglossal nerve injury. Evaluation suggested that increasing edema in the paraspinal and parapharyngeal regions, secondary to surgery, may have contributed to the onset or worsening of symptoms.

The prognosis of hypoglossal nerve injury largely depends on the underlying cause. In idiopathic cases, nerve function typically returns to normal within a few days.[2] The majority of unilateral isolated hypoglossal nerve injuries recover normal function within the first six months.[15] However, in some traumatic cases and injuries resulting from surgical complications, the subsequent nerve palsy may become permanent.[16,17] In our case, the clinical findings of hypoglossal nerve palsy persisted for approximately 22 months after the accident, with no improvement in symptoms or neurological signs. The absence of nerve palsy findings in the early post-traumatic period, along with the worsening of symptoms in the early postoperative phase, suggests that neurapraxia caused by a stretch injury during the trauma may have progressed to permanent nerve damage due to increased traction and compression from surgery-related edema. In forensic medical practice, if symptoms of nerve injury persist for at least 18

months, the condition is considered permanent (sequela). In accordance with this principle, the resulting disability in this case was considered permanent. The degree of impairment was determined in accordance with the relevant regulation concerning functional loss of the tongue due to paralysis.

In the medicolegal evaluation of the case, the trauma dynamics and associated findings (such as fracture and edema) suggest that traction and acceleration-deceleration forces in the cervical region may have caused injury to the hypoglossal nerve along its anatomical course. Given that clinical signs of nerve injury may not be immediately evident in the early post-traumatic phase, it was hypothesized that either the comminuted fracture of the C3 vertebra or the traumatic forces responsible for the fracture could have induced hypoglossal nerve damage. Postoperatively, edema resulting from the surgical procedure may have facilitated the onset or worsening of clinical symptoms and may have contributed to the progression of the nerve injury to a permanent condition. It was further assessed that both the trauma and the potential surgical complication may have independently contributed to the development of the nerve palsy, complicating the differentiation of their individual effects (alternative causation).[18] Consequently, it was determined that the surgical procedure did not interrupt the chain of causation between the traffic accident and the nerve injury. A causal link was established between the traffic accident and the hypoglossal nerve palsy. Due to the complexity of the case, a neurology consultation was requested. The neurology board concluded that the current clinical condition could not be attributed solely to the surgery and was more plausibly related to the accident. This clinical opinion supported our medicolegal evaluation. The medicolegal assessment algorithm for such cases is presented in Figure 3.

CONCLUSION

Isolated hypoglossal nerve injury is an uncommon condition. For medicolegal assessment, it is essential to understand its prognosis, causes, and clinical manifestations. However, in forensic traumatology, establishing causality is not always straightforward. Each case must be evaluated individually. The mechanism of trauma, associated findings, anatomical localization of the injury, and the patient's clinical presentation should all be carefully considered in every forensic case. Medical interventions that have the potential to influence or interrupt the causal relationship must be thoroughly analyzed, and complex cases should be managed using a multidisciplinary approach.

Peer-review: Externally peer-reviewed.

Authorship Contributions: Concept: E.N.İ.; Design: E.N.İ., R.A., A.B.O.; Supervision: R.A., A.B.O.; Resource: Z.Ö.İ., B.T.; Materials: Z.Ö.İ., B.T.; Data collection and/or processing: Z.Ö.İ., B.T.; Analysis and/or interpretation: E.N.İ., R.A., A.B.O.; Literature review: E.N.İ., Z.Ö.İ., B.T.; Writing: E.N.İ., Z.Ö.İ., B.T.; Critical review: B.T., R.A., A.B.O.

Conflict of Interest: None declared.

Financial Disclosure: The author declared that this study has received no financial support.

REFERENCES

1. Węgiel A, Zielinska N, Głowacka M, Olewnik Ł. Hypoglossal nerve neuropathies-analysis of causes and anatomical background. Biomedicines 2024;12:864. [CrossRef]
2. Tetik S, Güven O, Çoban M. idiopathıc isolated hypoglossal nerve palsy: Case report. J Emerg Med Case Rep 2021;12:55–7. [CrossRef]
3. Yazici D, Karaogullarindan A, Kuran G, Karakaya A. An uncommon complication: Isolated unilateral hypoglossal nerve palsy after septorhinoplasty. Med Bull Sisli Hosp 2017;338–41. [CrossRef]
4. Stino AM, Smith BE, Temkit M, Reddy SN. Hypoglossal nerve palsy: 245 cases. Muscle Nerve 2016;54:1050–4. [CrossRef]
5. Yoon JW, Lim OK, Park KD, Lee JK. Occipital condyle fracture with isolated unilateral hypoglossal nerve palsy. Ann Rehabil Med 2014;38:689–93. [CrossRef]
6. Kaushik V, Kelly G, Richards SD, Saeed SR. Isolated unilateral hypoglossal nerve palsy after minor head trauma. Clin Neurol Neurosurg 2002;105:42–7. [CrossRef]
7. Keane JR. Twelfth-Nerve Palsy. Arch Neurol 1996;53(6):561. [CrossRef]
8. Dattatreya Sitaram C, Nishanth A, Bhat SN, Kundangar RS. Delayed hypoglossal nerve palsy following occipital condyle fracture. BMJ Case Rep 2019;12:e232645. [CrossRef]
9. Ocak Ö, Celik H, Varıslı B. Hypoglossal Nerve Palsy after Carotid Endarterectomy: Case Report. J Emerg Med Case Rep 2020;11:9–12. [CrossRef]
10. Ozdemir B, Kanat A, Batcik S, Batcik OE, Celiker M, Kayayurt K. Unilateral isolated hypoglossal nerve palsy caused by gunshot injury. J Craniofac Surg 2018;29:424–6. [CrossRef]
11. Kacker A, Komisar A, Kakani RS, Reich E, Rothman L. Tongue paralysis following head trauma. J Laryngol Otol 1995;109:770–1. [CrossRef]
12. Kim SY, Naqvi IA. Neuroanatomy, Cranial Nerve 12 (Hypoglossal). 2022 Nov 7. In: StatPearls. Treasure Island (FL): StatPearls Publishing; 2025.
13. Tuli S, Tator CH, Fehlings MG, Mackay M. Occipital condyle fractures. Neurosurgery. 1997;41:368–7. [CrossRef]
14. Vargas López AJ, González Quarante LH, Gil de Sagredo Del Corral OL, Montalvo Afonso A, Fernández Carballal C. Hypoglossal nerve paresis secondary to anterior approach of upper cervical spine followed by spontaneous recovery. J Spine Surg 2017;3:481–3. [CrossRef]
15. Hiremath AS, Korlapati S. A rare case of unilateral hypoglossal nerve injury. Ann Indian Acad Neurol 2023;26:569–70. [CrossRef]
16. Sengupta DK, Grevitt MP, Mehdian SM. Hypoglossal nerve injury as a complication of anterior surgery to the upper cervical spine. Eur Spine J 1999;8:78–80. [CrossRef]
17. Obeidallah MS, Fleisher M, Harris P, Mozaffari K, Rosner M. Delayed hypoglossal nerve injury after traumatic skull base fracture: A case report and literature review. Clin Case Rep 2025;13:e70053. [CrossRef]
18. Aktaş EÖ, Yılmaz K, Kaya A. The Concept of causal relation in medicolegal evaluations: traditional review. Turkiye Klinikleri J Foren Sci Leg Med 2022;19:210–7. [In Turkish] [CrossRef]

OLGU SUNUMU - *ÖZ*

Unilateral hipoglossal sinir paralizisinde illiyet bağı ve maluliyet değerlendirmesi: Olgu sunumu

Hipoglossal sinir paralizisi klinikte ve adli travmatolojide nadir görülen bir durumdur. Sinir hasarı etiyolojisinde travma, malignite, otoimmünite ve cerrahi komplikasyonlar gibi çeşitli nedenler bulunmaktadır. Sinir paralizisine bağlı semptom ve klinik bulgular erken dönemde veya gecikmiş olarak gözlenebilir. Bu yazıda trafik kazası sonucu servikal 3.vertebrasında fraktür gelişen 44 yaşındaki kadın bir olgu sunuldu. Anterior cerrahi yaklaşımla servikal vertebrada iki segmentte anterior plak ile enstrümantasyon yapılmıştır. Disfaji ve yutma şikayetleri gelişen hasta maluliyet açısından tarafımızca değerlendirildi. Fizik muayenede, dil sol yarısında atrofi ve asimetrik görünüm tespit edildi. Nötral pozisyonda dil apeksinde sağ deviasyon ve fasikülasyon görüldü. Kaza sonrası 22. ayda gerçekleştirilen elektromiyografide sağ hipoglossal sinirde kronik aksonal hasar tespit edildi. Hastadaki semptom ve bulguların, trafik kazasıyla illiyet bağının olduğu değerlendirildi. Cerrahi işlem ve postoperatif dönemde gelişen ödemin bulguları şiddetlendirdiği düşünüldü. Hastada dil paralizisine bağlı fonksiyonel kaybın kalıcı olduğu ve gelişen dil paralizisinin Erişkinler İçin Engellilik Değerlendirmesi Hakkında Yönetmelik hükümlerine göre hastada %25 engel oranına neden olduğu belirlendi. Bu olgu sunumunda, servikal travma sonrası gelişen gecikmiş izole hipoglossal sinir paralizisinin tanısal, prognostik ve medikolegal değerlendirmesindeki zorlukların tartışılmasıyla birlikte sinir hasarının etiyolojisi, prognozu ve illiyet bağının belirlenmesinde kapsamlı ve multidisipliner yaklaşımın öneminin vurgulanması amaçlandı.
Anahtar sözcükler: Adli travmatoloji, hipoglossal sinir paralizi, anterior servikal cerrahi, medikolegal illiyet bağı, maluliyet değerlendirmesi.

Ulus Travma Acil Cerrahi Derg 2026;32(3):402-407 DOI: 10.14744/tjtes.2025.73307