



Horner's syndrome as a rare outcome of a penetrating subclavicular stab wound

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Abstract

Background: Horner's syndrome is characterized by the triad of miosis, ptosis, and anhidrosis, indicating disruption in the oculosympathetic pathway. It typically occurs following injury to the cervical sympathetic chain, often secondary to neoplasms or surgical procedures. This syndrome occurring after chest trauma is rare and has been documented only in a limited number of case reports.

Case presentation: A 42-year-old man was admitted with a stab wound to the left subclavicular region. He had a massive left hemothorax, rupture of the left subclavian vein, and a laceration of the superior lobe of the left lung, all of which were successfully managed. A miotic left pupil was noted on admission, and anhidrosis of the face and hand on the same side was reported the following day. The symptoms were attributed to the compressive effect of an apical lung hematoma. The patient's symptoms remained unchanged during a 6-month follow-up period.

Discussion: Horner's syndrome following trauma may aid clinicians in recognizing serious and potentially life-threatening conditions, such as aortic dissection, highlighting the importance of a thorough evaluation of the neural pathways in thoracic injuries.

Keywords: Horner's syndrome, Chest trauma, Penetrating chest trauma, Lung hematoma, Stab injury.

Introduction

Horner's syndrome originates from the name of Johann Friedrich Horner, an ophthalmologist who first described the syndrome in a case report in 1869.^[1] It occurs when there is a pathology along the sympathetic pathway from its origin in the hypothalamus to the eye, anatomically classified into central, preganglionic, and postganglionic segments.^[2] The syndrome manifests as ipsilateral miosis, upper eyelid ptosis (1-2 mm), and anhidrosis of the face or forehead. Neoplasia is the most common etiology (17-60%), while iatrogenic causes, including central venous catheterization, thyroidectomy, chest tube insertion, and thoracic and neck surgeries, account for about 7.5-13% of cases.^[3,4] Trauma contributes to approximately 2.5% of cases, predominantly involving neck injury.^[3] However, in the following, we discuss a patient with Horner's syndrome following a penetrating injury to the left subclavicular region.

Case presentation

A 42-year-old man with no medical history was brought to the emergency department with active bleeding from a stab wound in the left subclavicular region. On arrival, he was fully oriented (GCS: 15/15), respiratory distress was obvious, and he was tachypneic (RR: 27, BP: 110/70, PR: 106). Physical examination revealed a vertical stab wound, 2 cm in diameter, over the lateral side of the subclavian region [Figure-1].

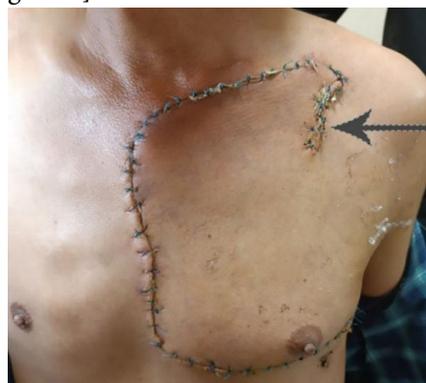


Figure-1. Stab wound site in the left subclavicular region

Other findings were decreased pulmonary sounds on the left side and a non-reactive miotic left pupil [Figure-2.A]. Chest CT scan demonstrated left pneumothorax, hemothorax, and subcutaneous emphysema extending from the neck root to the left supraclavicular region and anterolateral part of the left hemithorax [Figure-3. A and B]. Head and neck CT angiography (CTA) showed no arterial defects [Figure-3. C and D].



Figure-2. (A) Miotic left pupil on admission. (B) Persistent miosis at 6-month follow-up

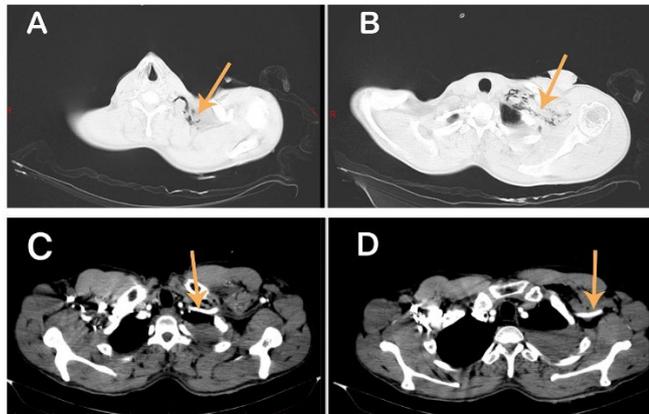


Figure-3. (A, B) Chest CT scan showing subcutaneous emphysema extending from the neck root to the left supraclavicular region and anterolateral part of the left hemithorax. (C, D) Head and neck CTA demonstrating an intact left subclavian and carotid artery

Within an hour, the patient underwent thoracotomy via a left trap-door incision. Two liters of blood were evacuated, and rupture of the left subclavian vein and laceration of the superior lobe of the left lung were properly repaired. On postoperative day 1, the left pupil remained fixed and miotic. The patient reported dry eye sensation and inability to sweat on the same side of his face and hand, leading to a diagnosis of Horner's syndrome.

Finally, the patient was discharged after 10 days, and he was followed up with no further interventions. Outpatient MRI and MRA confirmed no central pathology. In addition, electromyography (EMG) and nerve conduction studies (NCV) showed no evidence of peripheral nerve lesions. At 6-month follow-up, the patient's symptoms remained unchanged [Figure-2.B].

Discussion

Horner's syndrome following trauma could be indicative of carotid artery injury, which lies in close proximity to the cervical sympathetic chain. Internal carotid artery dissection is associated with the Horner's syndrome in up to 58% of cases.^[5] In this patient, vascular injury was properly excluded with head and neck CTA.

This syndrome does not affect visual function, but it is known as a serious warning for oculosympathetic pathway interruption. In this pathway, the central neurons originate from the hypothalamus, traveling down through the spinal cord to synapse with the preganglionic neurons in the ciliospinal center extending from C8 to T2 called budge-waller. Then the preganglionic neurons exit the spinal cord at the level of C8, T1, and T2 vertebrae. They then fuse to form the stellate ganglion anterior to the neck of the first rib. These neurons make a loop anterior to the subclavian artery, called the ansa subclavia, traversing the upper chest cavity to synapse in the superior cervical ganglion. This is where upper chest traumas can cause sympathetic disruption. Direct injury to the nerves or the compression effect of bleeding due to ruptured vessels or fractured ribs could be the cause. In our case, the left apical hematoma from the subclavian vein rupture could have compressed the ganglia. Finally, postganglionic neurons go up with the carotid artery to innervate the pupillary dilator, Muller's muscles, and a patch of skin above the brow.^[6]

Pupil size is controlled by two opposing parasympathetic and sympathetic inputs. The pupillary sphincter with circular fibers is innervated by the parasympathetic neurons and makes the pupil smaller. The pupillary dilator with radial fibers is innervated sympathetically and makes the pupils larger. Horner's syndrome disturbs this balance by disrupting the sympathetic nerves and leads to miosis on the affected side, which was present in our patient. Müller's muscle contributes to the levator palpebrae muscle to retract the eyelid by another 1-2 millimeters. So Horner's syndrome causes a small amount of ptosis, which may be subtle or absent, such as in our patient. Ptosis has been absent in 12% of patients with the Horner syndrome.^[7] Face perspiration is innervated by the

sudomotor fibers of the oculosympathetic system. Most of these fibers move along the external carotid artery, supplying most of the face for perspiration, and some of them travel with the internal carotid artery, innervating a small area on the forehead and side of the nose. So proximal lesions in this path can cause facial anhidrosis, while disruption in postganglionic neurons manifests as anhidrosis in a small part of the face. Our case complained of anhidrosis on the left side of the face, which could be justified by the compression effect of the hematoma on the preganglionic neurons. Moreover, the sympathetic fibers that innervate eccrine sweat glands of the upper limb mostly originate from the second thoracic ganglion, which

is located in the second intercostal space in 92.5% of cases, and is sometimes fused to the stellate ganglion.^[8] Hematoma in this region likely compressed these fibers, explaining hand anhidrosis.

We reviewed articles reporting Horner's syndrome following chest trauma. We identified eight studies in which their full text was available in English [Table-1]. To the best of our knowledge, the present study is the second study that reports Horner's syndrome following penetrating chest trauma. Though rare, Horner's syndrome after chest trauma should prompt urgent evaluation for life-threatening neurovascular injury, including CTA of the head and neck.

Table-1. Case reports of the Horner's syndrome following chest trauma

Study / Year	Sex / Age	Mechanism of Trauma	Symptoms Onset	Resolution/Follow-up
A.N.A. Hassan et al/2000 ^[9]	M / 32	Blunt / bilateral first rib fracture	1 day later	Yes / 12 weeks
Ozel SK et al / 2005 ^[2]	M / 10	Blunt / first rib fracture	3 days later	Partially / 6 months
Paiva WS et al / 2007 ^[10]	M / 22	Blunt/ C7 transverse process fracture	Immediately	Yes / 4 weeks
Ahmadi O et al / 2013 ^[11]	M / 47	Blunt / first rib fracture	Immediately	Partially / 8 weeks
Demetrius J / 2013 ^[12]	M / 72	Blunt / first rib fracture	Immediately	Yes / 1 year
Sayan M et al / 2014 ^[13]	M / 18	Penetrating / stabbing	Immediately	No / 1 year
Lin YC et al / 2015 ^[14]	M / 33	Blunt / first rib fracture	1 day later	Partially / 2 years
Ofri A et al / 2017 ^[15]	M / 51	Blunt / first rib fracture	4 days later	Yes / 6 weeks
Present study / 2025	M / 42	Penetrating / stabbing	Immediately	No / 6 months

Acknowledgment

None.

Competing interests

The authors declare that they have no competing interests.

Abbreviations

Horner's syndrome: HS; Glasgow Coma Scale: GCS; Respiratory rate: RR; Blood pressure: BP; Pulse rate: PR; Computed tomography: CT; Computed tomography angiography: CTA; Magnetic resonance imaging: MRI; Magnetic resonance angiography: MRA; Electromyography: EMG; Nerve conduction velocity: NCV.

Authors' contributions

All authors read and approved the final manuscript. All authors take responsibility for the integrity of the data and the accuracy of the data analysis.

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Availability of data and materials

The data used in this study are available from the corresponding author on request.

Ethics approval and consent to participate

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Consent for publication

By submitting this document, the authors declare their consent for the final accepted version of the manuscript to be considered for publication.

References

1. Silverman A, Beres S. Child Neurology: Horner Syndrome in an Otherwise Well-Appearing Infant. *Neurology*. 2022;99(23):1053-6. doi:10.1212/WNL.0000000000201377 PMid:36130839
2. Ozel SK, Kazez A. Horner syndrome due to first rib fracture after major thoracic trauma. *J Pediatr Surg*. 2005 Oct;40(10):e17-9. doi:10.1016/j.jpedsurg.2005.06.020 PMid:16226969
3. Sadaka A, Schockman SL, Golnik KC. Evaluation of Horner Syndrome in the MRI Era. *J Neuroophthalmol*. 2017;37(3):268-72. doi:10.1097/WNO.0000000000000503 PMid:28445191

4. Bell RL, Atweh N, Ivy ME, Possenti P. Traumatic and iatrogenic Horner syndrome: case reports and review of the literature. *J Trauma*. 2001;51(2):400-4. doi:10.1097/00005373-200108000-00034 PMID:11493809
5. Bogousslavsky J, Despland PA, Regli F. Spontaneous Carotid Dissection With Acute Stroke. *Arch Neurol*. 1987 Feb;44(2):137-40. doi:10.1001/archneur.1987.00520140009010 PMID:3813930
6. Martin TJ. Horner Syndrome: A Clinical Review. *ACS Chem Neurosci*. 2018;9(2):177-86. doi:10.1021/acchemneuro.7b00405 PMID:29260849
7. Maloney WF, Younge BR, Moyer NJ. Evaluation of the causes and accuracy of pharmacologic localization in Horner's syndrome. *Am J Ophthalmol*. 1980;90(3):394-402. doi:10.1016/S0002-9394(14)74924-4 PMID:7425056
8. Singh B, Ramsaroop L, Partab P, Moodley J, Satyapal KS. Anatomical variations of the second thoracic ganglion. *Surg Radiol Anat*. 2005;27(2):119-22. doi:10.1007/s00276-004-0304-5 PMID:15800733
9. Hassan AN, Ballester J, Slater N. Bilateral first rib fractures associated with Horner's syndrome. *Injury*. 2000;31(4):273-4. doi:10.1016/S0020-1383(99)00300-9 PMID:10719111
10. Paiva WS, De Amorim RL, Tavares WM, Alho EJ, Jeng BP, Figueiredo EG. Horner's syndrome after blunt cervical and chest trauma: case report. *Arq Neuropsiquiatr*. 2007;65(4a):1037-9. doi:10.1590/S0004-282X2007000600026 PMID:18094873
11. Ahmadi O, Saxena P, Wilson BK, Bunton RW. First rib fracture and Horner's syndrome: a rare clinical entity. *Ann Thorac Surg*. 2013;95(1):355. doi:10.1016/j.athoracsur.2012.03.114 PMID:23272863
12. Demetrios J. First rib fracture and Horner's syndrome due to a motor vehicle collision: a case report. *Chiropr Man Therap*. 2013; 21:22. doi:10.1186/2045-709X-21-22 PMID:23830309 PMCID:PMC3706228
13. Sayan M, Celik A. The Development of Horner Syndrome following a Stabbing. *Case Rep Med*. 2014;2014:461787. doi:10.1155/2014/461787 PMID:25400668 PMCID:PMC4220569
14. Lin YC, Chuang MT, Hsu CH, Tailor AR, Lee JS. First Rib Fracture Resulting in Horner's Syndrome. *J Emerg Med*. 2015; 49 (6):868-70. doi:10.1016/j.jemermed.2015.07.031 PMID:26375810
15. Ofri A, Malka V, Lodh S. Horner's syndrome in traumatic first rib fracture without carotid injury; review of anatomy and pathophysiology. *Trauma Case Rep*. 2017;8:1-4. doi:10.1016/j.tcr.2017.01.007 PMID:29644305 PMCID:PMC5883210

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