

# Horner syndrome due to traumatic clavicle fracture

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## ABSTRACT

**Objective:** Describe a unique case of preganglionic Horner Syndrome due to middle third clavicle fracture.

**Methods:** A 40 year-old man, hemodynamically stable, presented at the emergency room with left ptosis and miosis after a car accident. Complete ophthalmological examination including external exam, pupil and extraocular movement evaluation, best corrected visual acuity, biomicroscopy, tonometry and fundus exam was performed. Further investigation included chest and pelvic X-rays and pharmacological testing of pupillary reactions.

**Results:** Ophthalmological examination showed no alterations except for ptosis and miosis on the left eye. The X-rays revealed displaced clavicle fracture, third rib and ischiopubic branch fractures on the left side. Apraclonidine and phenylephrine tests diagnosed second-order sympathetic chain lesion. One year later, ptosis persisted and conjunctivo-müllerectomy was performed.

**Conclusion:** Traumatic mild ptosis and miosis alert to sympathetic chain interruption. Pharmacological tests are essential to localize and identify its cause. We present a preganglionic Horner Syndrome due to isolated middle third clavicle fracture, which to our knowledge is reported for the first time.

**Key Words:** thoracic trauma; clavicle fracture; Horner Syndrome.

## RESUMO

**Objetivo:** Descrever um caso único de Síndrome de Horner pré-ganglionar devido a fratura do terço médio da clavícula.

**Métodos:** Caso de homem de 40 anos, hemodinamicamente estável que deu entrada no serviço de urgência por ptose e miose à esquerda após acidente de viação. Foi realizado exame oftalmológico completo que incluiu exame externo, avaliação das pupilas e movimentos extraoculares, melhor acuidade visual corrigida, biomicroscopia, tonometria e fundoscopia. O estudo complementar incluiu ainda radiografias de tórax e pélvica e teste das reações pupilares recorrendo a fármacos.

**Resultados:** O exame oftalmológico não mostrou outras alterações à exceção de ptose e miose do olho esquerdo. Os exames radiológicos revelaram fraturas deslocada da clavícula, terceira costela e ramo isquiopúbico à esquerda. Testes com apraclonidina e fenilefrina permitiram diagnosticar lesão de segunda ordem da cadeia simpática. Por persistência da ptose após um ano de seguimento, o doente foi submetido a conjuntivo-müllerectomia.

**Conclusão:** Ptose e miose traumáticas devem alertar para a possibilidade de lesão da cadeia simpática. Os testes farmacológicos são essenciais para localizar e identificar a sua causa. Apresenta-se pela primeira vez um caso de Síndrome de Horner devido a fratura isolada do terço médio da clavícula.

**Palavras-chave:** trauma torácico; fratura da clavícula; Síndrome de Horner.

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## INTRODUCTION

Oculosympathetic paresis – Horner Syndrome (HS) - results from a lesion of the three neuron sympathetic chain along its course from the hypothalamus to the eye. A variety of causes emerge depending on the affected neuron. First-order neuron starts on the posterior hypothalamus, descends uncrossed to the brainstem and ends in the ciliospinal Budge Centre, in the intermediolateral horn of the spinal cord, between C8 and T2. Thus, its syndrome is frequently caused by lateral medullary infarction. The second-order neuron is closely related to the apical pleura and brachial plexus and can be affected by tumoral or traumatic lesions involving the spinal cord, thoracic outlet or lung apex. Third-order syndrome often indicates lesions of the internal carotid artery.

Classic clinical features include mild ptosis, miosis and anhidrosis. Prompt evaluation is necessary to detect and treat life-threatening conditions.

## CASE PRESENTATION

A 40 year-old man, hemodynamically stable, was admitted in the emergency room two weeks after a car accident in Congo. He complained of pain and swelling of the left shoulder, incapability of walking due to intense pelvic pain and apparent left enophthalmos. Chest and pelvic x-rays revealed a displaced middle third clavicle fracture (**Figure 1**) and third rib and ischiopubic branch fractures on the left side. After fractures stabilization, ophthalmological examination was performed.



Figure 1 - Chest x-ray revealing left displaced middle third clavicle fracture (circle).

The patient presented a left 1-2 mm superior lid ptosis with good elevator function (15 mm) and a 0.5 mm inverted inferior lid ptosis. Pupil examination revealed mild anisocoria, greater in dim light: left pupil was smaller by 1 mm in light and by 1.5 mm in dim light. External ophthalmological exam is summarized in **Table 1**. History of anhidrosis was negative. Ocular movements were full, without fatigability or diplopia; irises were isochromatic. Best corrected visual acuity was 20/20 bilaterally. The fundus examination was normal and no alterations were detected in the neurological exam.

Table 1

		Right Eye	Left Eye
External Exam	Palpebral Fissure	10 mm	8-9 mm
	Margin Reflex Distance-1	4 mm	2-3 mm
	Margin Reflex Distance-2	6 mm	5.5 mm
	Levator Function	15 mm	15 mm
	Superior ptosis	-	1-2 mm
	Inverted inferior ptosis	-	0.5 mm
Pupils	Anisocoria prominent in dim light, dilation lag, no relative afferent pupillary defect		

## INVESTIGATION AND OUTCOME

The hypothesis of oculosympathetic paresis arose and in order to confirm it, pharmacological tests were performed. One drop of 0.5% apraclonidine, an alpha-adrenergic receptor agonist, was instilled in both eyes.

Thirty minutes later, the affected pupil had dilated with consequent reversal of anisocoria (**Figure 2**) and diagnosis of Horner Syndrome. Phenylephrine 1% test was then performed to localize the affected neuron. As dilation of the affected pupil was not observed, this test was negative, thus a preganglionic HS caused by a clavicle fracture was diagnosed.

One year after the trauma, the patient maintained upper lid ptosis and was subject to conjunctivo-müllerectomy with anatomic success and patient satisfaction.



Figure 2 - A: Left mild ptosis and miosis with inverted inferior lid ptosis; B: Reversal of anisocoria thirty minutes after 0.5% apraclonidine instillation.

## DISCUSSION

First rib, clavicle and scapula are structures very well protected by the overlying deep soft tissue in the cervical root, making them difficult to damage, unless severe injuries occur. This explains why first rib and clavicle fractures are rare after upper thoracic trauma and consequently, Horner Syndrome caused by this type of fractures is even rarer. The most vulnerable portion of the sympathetic chain in upper thoracic trauma is located between the superior cervical ganglion and the stellate ganglion, forming a loop anterior to the subclavian artery where the stellate and middle cervical ganglia connect. Here they are relatively close to the clavicle and first rib and more susceptible to trauma. Harming of these structures can cause an interruption of the second-order neuron, leading to a preganglionic Horner Syndrome, characterized by ipsilateral mild ptosis, miosis and anhidrosis.

Only few cases of traumatic preganglionic Horner Syndrome are reported in the literature, most of them caused by severe thoracic trauma<sup>1,3-5</sup>, both in adults and children. These reports described combined first rib and clavicle fractures that occurred after a speedboat accident<sup>1</sup>, a traffic accident<sup>4</sup> and a lorry knock<sup>3</sup> with ipsilateral miosis and ptosis attributed to first rib fractures. One case described a 2 meter-high fall with first to ninth ribs fractures, with preganglionic Horner Syndrome also being attributed to first rib fracture<sup>5</sup>. Most of them recovered spontaneously as soon as the hematoma surrounding the sympathetic chain resolved<sup>1,3,4</sup>. However, none of these cases was caused by clavicle fracture.

Regarding non-traumatic lesions, a unique case of neoplastic Horner Syndrome caused by a large chondrosarcoma<sup>2</sup> of the middle end of the clavicle was described. One year after complete lesion excision, no recurrence occurred but ptosis persisted.

To our knowledge, this is the first case of preganglionic Horner Syndrome caused by traumatic clavicle fracture described in the literature, with persistent ptosis successfully treated by upper lid conjunctivo-müllerectomy.

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