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Horner's syndrome as a complication in thoracic surgical practice

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Abstract

Objective: To determine the incidence, reasons and prognosis about Horner's syndrome in thoracic surgical patients. **Methods**: In this prospective clinical study, 933 adult patients were assessed between the years of 1998 and 2002. All patients who underwent chest tube insertion (n: 662 patients) or thoracotomy (n: 342 patients), or who had thoracic trauma (n: 268 patients) were routinely examined to detect of Horner's syndrome. The patients with Horner's syndrome due to the invasion of malignant tumour to sympathetic chain were not included in the study. **Results**: Horner's syndrome was detected in twelve patients from these 933 patients (1.3%). The considered etiologic factors were chest tube pressure in five patients, operative complication in two patients and trauma in five patients. In patients with chest tube pressure were fully recovered from Horner's syndrome but the remaining did not. **Conclusions**: Malposition of the chest tube is an important aetiological factor of Horner's syndrome, and it is reversible if the tube position is corrected urgently.

Keywords: Thoracic surgery; Complication; Horner's syndrome

1. Introduction

Horner's syndrome caused by any segment of the three-neuron oculosympathetic pathway injury is consisted of pupillary miosis, eyelid ptosis, enophthalmos and facial anhidrosis on the same side of the face. The second neuron of oculosympathetic pathway can be injured in upper thoracic cage as a complication of some thoracic surgical procedures or trauma resulting in Horner's syndrome [1–6]. This study aimed to evaluate etiologic factors, prognosis and determine the incidence of Horner's syndrome in thoracic surgery.

2. Materials and methods

A total of 933 patients were evaluated prospectively in order to detect the components of Horner's syndrome in Pamukkale University Hospital and Dr Suat Seren Chest Disease and Thoracic Surgery Hospital between 1998 and 2002. All patients who underwent chest tube insertion (n: 662 patients) or thoracotomy (n: 342 patients), or who had thoracic trauma (n: 268 patients) were routinely examined to detect of Horner's syndrome. None of the patients had any neurological disease previously. The patients with Horner's syndrome caused by malignant invasion of sympathetic chain were not included in the study.

The definite diagnosis and topographical differential diagnosis of the Horner's syndrome was established by a neurological consultant especially in the cases of multiple trauma. As a first step, evaluation of anisocoria was performed in darkness. The 'cocaine test' has become the standard diagnostic method for confirming clinically suspected Horner syndrome. Cocaine is a noradrenergic reuptake blocker that produces pupillary dilation after topical administration. Mydriasis induced by cocaine requires an intact oculosympathetic pathway, and Horner syndrome is confirmed if topical application of this agent produces less dilation, or not at all, compared with the other

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pupil. In suspected cases two drops of freshly prepared cocaine 5% were placed in both eyes for definite diagnosis. As a last step, paredrine test (two drops of hydroxyamphetamine 1% were topically placed in each eye) was done for topographical diagnosis 48 h after cocaine test [7,8]: paredrine is noradrenergic releaser that is useful for differentiation of second and third order neuron lesions. If the third order neurons are injured paredrine induced pupillary dilatation are not seen.

3. Results

The patient's characteristics were summarised in Tables 1 and 2. Horner's syndrome was detected in 12 (1.3%). Pressure injury in the sympathetic chain due to chest tube in five patients, the complications of various thoracic surgical procedures in two patients and thoracic trauma in five patients were detected as a cause of the Horner's syndrome in our series. The most frequent components of Horner's syndrome were miosis followed by ptosis in all cases (Table 2).

All patients with Horner's syndrome due to the chest tube pressure fully recovered after the chest tubes were repositioned (Figs. 1 and 2). Remaining seven patients with Horner's syndrome due to other aetiological factors showed no improvement during the follow-up period (Table 2).

4. Discussion

Although there are only few case reports on Horner's syndrome related to thoracic surgery we could not find any published report about the incidence of these complication. In our practice, the ratio of Horner's syndrome was 1.3% in patients who underwent thoracic surgery and who had thoracic trauma.

Horner's syndrome due to chest tube insertion was reported only few case reports [9–14]. Direct pressure of the tip of the chest tube on sympathetic chain in the medial portion of apex was considered as the aetiological factor of Horner's syndrome in five patients. Fleishman et al. [15] pointed out that, there is a thin endothoracic fascia between the parietal pleura and stellate ganglion. This anatomic

Table 1
Characteristics of the cases

No of case	Age/sex	Diagnosis	Surgical procedure	The cause of Horner's syndrome	The side of procedure and Horner's syndrome
Horner's syndrome due to chest tube					
1	19/M	Primary spontaneous PTX	Tube thoracostomy	Pressure of the tip of the chest tube	Right
2	34/M	Primary spontaneous PTX	Tube thoracostomy	Pressure of the tip of the chest tube	Right
3	20/M	Traumatic haemopneumothorax	Tube thoracostomy	Pressure of the tip of the chest tube	Left
4	28/F	Traumatic bronchial rupture	Primary bronchial anastomosis	Pressure of the tip of the chest tube	Right
5	16/F	Bronchiectasis	Lower lobectomy	Pressure of the tip of the chest tube	Right
Horner's syndrome due to operative complication					
6	72/M	Bronchial carcinoma	Upper lobectomy	Extrapleural apicolysis, excessive cauterisation	Right
7	38/M	Bronchial carcinoma	Upper lobectomy	Extrapleural apicolysis, excessive cauterisation	Right
Horner's syndrome due to chest trauma					
8	49/F	Whole body trauma (bilateral haemothorax)	Tube thoracostomy	Fracture of the first rib	Right
9	30/F	Whole body trauma	–	Fracture of clavicle	Right
10	49/F	Whole body trauma	–	Fracture of clavicle	Right
11	72/F	Whole body trauma	–	Fracture of clavicle	Left
12	38/M	Penetrating neck, thoracic trauma (associated with first rib and clavicle fracture and PTX)	Primary repairing neck and tube thoracostomy	Direct injury of the cervical sympathetic chain	Left

Table 2
The components and outcome of Horner's syndrome in the cases

No of case	Miosis	Ptosis	Enophthalmos	Anhidrosis	Diagnosis time	Resolution/follow up
Horner's syndrome due to chest tube						
1	+	+	−	−	12 h	Complete recovery/5 days
2	+	+	−	−	24 h	Complete recovery/3 weeks
3	+	−	−	−	2 days	Complete recovery/2 weeks
4	+	+	−	−	2 days	Complete recovery/2 months
5	+	+	+	−	3 days	Incomplete recovery/2 months
Horner's syndrome due to operative complication						
6	+	+	−	−	24 h	Unimproved/2 years
7	+	+	+	+	2 days	Unimproved/3 years
Horner's syndrome due to chest trauma						
8	+	+	+	+	24 h	Unimproved/9 months
9	+	+	+	−	3 days	Unimproved/6 months
10	+	+	−	−	2 days	Unimproved/9 months
11	+	−	−	−	3 days	Unimproved/6 months
12	+	−	−	−	24 h	Unimproved/1 year

feature explains the occurrence of Horner's syndrome in the apical thorax injuries. We think that the pressure of the chest tube to apex may lead to a localised ischemia and neuropraxia of second neuronal pathway. We think that resolution of the Horner's syndrome in five of our cases with re-positioned chest tube supports the hypothesis of neuropraxia. Partial or total resolution in some patients also reported before [9]. In one patient exposed to the tube pressure longer than the rest of the group appeared enophthalmos. In the follow-up period of this patient ptosis and enophthalmos improved but miosis remained. In this group, the other four patients had only miosis and ptosis, and all patients completely recovered from the Horner's syndrome in the follow-up period. The time period of pressure seems important for recovery. Pulling the malpositioned tube 2–3 cm back as soon as possible after radiological confirmation is very important for recovery.

The remaining seven patients composed of a heterogenic group in terms of the aetiological factors of Horner's syndrome (Table 1). None of these patients showed any improvement during the follow-up period. Apical electrocautery burn was found to be the cause of Horner's syndrome in two patients who underwent thoracotomy and lung resection because of lung cancer. In these patients, there was not tumour invasion to the chest wall and no reason leading to Horner's syndrome except apical cauterisation. In the four patients with whole body trauma, intracranial or cervical pathology were not detected. It was considered that clavicle fracture or first rib fracture were responsible for Horner's syndrome in those patients. In traumatic cases the intactness of carotid artery and its blood flow was confirmed by cranial magnetic resonance imaging. On the other hand, in cases that the status of cervical sympathetic chain was not clearly determined, the paredrine

Fig. 1. Malpositioned chest tube causing Horner's syndrome (The tip of the tube is in the apex).

Fig. 2. After re-positioning the chest tube.

test was performed. The full-blown syndrome is generally seen in the lesions of preganglionic neurons [16]. We observed enophthalmos and anhidrosis more frequently in cases with severe trauma or excessive cauterisation (we used unipolar electrocauter) during surgery. Horner's syndrome due to isolated clavicle fracture has not been reported yet although rib fracture is known as an aetiological factor [17]. The possible reasons are the direct effect of fractured bone or localised haematoma.

In our study, anisocoria was the common diagnostic feature for Horner's syndrome. We also observed that the recovery of ptosis was earlier than miosis.

In conclusion, because of its reversibility, chest tube malposition is an important aetiological factor of Horner's syndrome in thoracic surgical practice and the chest tube should be re-positioned as soon as possible when the anisocoria is seen.

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