Horner’s Syndrome in an Infant with Complicated Pneumonia

Boris Knyazer MD, Jaime Levy MD, Eli Rosenberg MD, Tova Lifshitz MD and Isaac Lazar MD

Departments of Ophthalmology and Internal Medicine A, and Pediatric Intensive Care Unit, Soroka University Medical Center, Beer Sheva, Israel

Departments of Faculty of Health Sciences, Ben-Gurion University of the Negev, Beer Sheva, Israel

KEY WORDS: Horner’s syndrome, empyema, pediatric intensive care unit, chest tube, pneumothorax, iatrogenic complications

Horner’s syndrome consists of the classic triad of unilateral miosis, eyelid ptosis, and facial anhydrosis. It occurs as the result of a lesion anywhere along the oculosympathetic pathway. Horner’s syndrome as an acquired condition is very uncommon in pediatric neuro-ophthalmology practice and is rarely seen in the pediatric intensive care unit. We present the case of a girl who developed Horner’s syndrome during her hospitalization in the PICU for the management of necrotizing pneumonia.

PATIENT DESCRIPTION
The parents gave their informed consent for this case presentation. A 7 month old girl was admitted with the diagnosis of right-sided pneumonia. Chest X-ray showed a large pleural effusion with pneumothorax and partial lung collapse. Computed tomography scan confirmed the diagnosis and a CT-guided thoracostomy tube was inserted. She developed severe hypoxic respiratory failure and had to be intubated and ventilated. During the next 2 days, three additional thoracostomy tubes were inserted due to recurrent tension pneumothoraces. A percutaneous right internal jugular vein catheter was placed and the catheter position was confirmed using standard chest X-ray. Cultures from the pleural fluid grew Staphylococcus aureus. On the fifth day of admission, mild anisocoria (1–2 mm) was observed and pediatric neurology and ophthalmology specialists were consulted. On the tenth day of admission the chest drains were removed. The child was extubated with no complications. She was weaned off heavy sedation and slowly returned to normal activity.

Three days after the removal of the drains, a right upper lid ptosis together with the anisocoria were noticed. Ophthalmic examination revealed a right upper eyelid ptosis with slight elevation of the lower lid and anisocoria (the left normal pupil was 3 mm and the right pupil 2 mm in diameter) with increased anisocoria in darkness and mild anhydrosis on the right side of the face. Ocular movements were within normal range. Both pupils were reactive to light. The posterior segment was unremarkable in both eyes. Neurological examination of the cranial nerves and the upper limbs were normal. Instillation of freshly prepared 4% cocaine solution showed the left (normal) pupil dilate to 6 mm and the right pupil to only 4 mm [Figure A], confirming right-sided Horner’s syndrome.

At the 6 month follow-up visit in the ophthalmology outpatient clinic, a slight ptosis in the right eye could still be noticed. The anisocoria and anhydrosis were completely resolved.

COMMENT
We present a case of an infant who developed Horner’s syndrome while being treated for complicated pneumonia in the PICU.

Horner syndrome was first described in animals (in 1852) by the French physiologist Claude Bernard. In 1869, a Swiss ophthalmologist, Johann Friedrich Horner, was the first to give a complete description of this syndrome in humans. The oculosympathetic palsy called Horner’s syndrome appears when the sympathetic innervation of the eye is interrupted by an injury to the neuronal pathway connecting the hypothalamus through the spinal cord to the eye. Mild-to-moderate upper lid ptosis, slight elevation of the lower lid, and pupillary miosis are found in all patients regardless of the severity of the injury. Depending on the level of the lesion, impaired flushing and sweating may be found ipsilaterally. Iris heterochromia (with the affected eye being hypopig-

![Image A](image_url)

PICU = pediatric intensive care unit
Chest radiograph of our patient during her acute illness shows a right-sided consolidation with diffuse air space disease and four chest drains marked with white numbers 1-4. The dashed arrow points to the right internal jugular vein catheter. The thick white arrow points to the location of the tip of the chest tube (#4) and the internal jugular catheter, both adjacent to the anatomic location of the sympathetic chain and the stellate ganglion.
Early recognition and prompt removal of possible injurious iatrogenic hardware might prevent future permanent disability, which may persist long after the fact is forgotten that the child’s life was saved in the PICU. This may also have medico-legal implications for the medical team.

In conclusion, we describe a rare case of Horner’s syndrome developing during hospitalization in the PICU. We stress the importance of recognizing this entity. Prompt diagnosis and immediate repositioning of chest drains may prevent irreversible iatrogenic damage. We recommend daily evaluation of pupillary size and presence of ptosis in patients at risk of developing Horner’s syndrome (such as the tip of the chest tube at the apex of the lung and its proximity to the internal jugular catheter) in order to prevent missing the correct diagnosis.

Corresponding author
Dr. I. Lazar
Pediatric Intensive Care Unit, Soroka University Medical Center, P.O. Box 151, Beer Sheva 84101, Israel
Fax: (972-8) 640-0322
email: ilazar@bgu.ac.il

References

Functional regeneration of respiratory pathways after spinal cord injury

Spinal cord injuries often occur at the cervical level above the phrenic motor pools, which innervate the diaphragm. The effects of impaired breathing are a leading cause of death from spinal cord injuries, underscoring the importance of developing strategies to restore respiratory activity. Alllain et al. show that after cervical spinal cord injury the expression of chondroitin sulphate proteoglycans (CSPGs) associated with the perineuronal net (PNN) is upregulated around the phrenic motor neurons. Digestion of these potently inhibitory extracellular matrix molecules with chondroitinase ABC (denoted ChABC) could, by itself, promote the plasticity of tracts that were spared and restore limited activity to the paralyzed diaphragm. However, when combined with a peripheral nerve autograft, ChABC treatment resulted in lengthy regeneration of serotonin-containing axons and other bulbospinal fibers and remarkable recovery of diaphragmatic function. After recovery and initial transection of the graft bridge, there was an unusual, overall increase in tonic electromyographic activity of the diaphragm, suggesting that considerable remodeling of the spinal cord circuitry occurs after regeneration. This increase was followed by complete elimination of the restored activity, proving that regeneration is crucial for the return of function. Overall, these experiments present a way to markedly restore the function of a single muscle after debilitating trauma to the central nervous system, through both promoting the plasticity of spared tracts and regenerating essential pathways.

Nature 2011; 475: 196
Eitan Israeli

Broad antigenic coverage induced by vaccination with virus-based cDNA libraries cures established tumors

Effective cancer immunotherapy requires the release of a broad spectrum of tumor antigens in the context of potent immune activation. Kottke et al. show that a cDNA library of normal tissue, expressed from a highly immunogenic viral platform, cures established tumors of the same histological type from which the cDNA library was derived. Immune escape occurred with suboptimal vaccination, but tumor cells that escaped the immune pressure were readily treated by second-line virus-based immunotherapy. This approach has several major advantages. Use of the cDNA library leads to presentation of a broad repertoire of (undefined) tumor-associated antigens, which reduces emergence of treatment-resistant variants and also permits rational, combined-modality approaches in the clinic. Finally, the viral vectors can be delivered systemically, without the need for tumor targeting, and are amenable to clinical-grade production. Therefore, virus-expressed cDNA libraries represent a novel paradigm for cancer treatment addressing many of the key issues that have undermined the efficacy of immuno- and virotherapy to date.

Nature Med 2011; 17: 854
Eitan Israeli