CLINICAL REPORT

Minor's Test: Objective Demonstration of Horner's Syndrome

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Abstract To highlight the Minor's test, which is useful in demonstrating anhidrosis of Horner's syndrome. A 39 year old female presented to us with a slow growing neck swelling which was provisionally diagnosed as a probable case of cervical sympathetic chain (CSC) Schwannoma. Intra operatively, the mass was found arising from the CSC which was sacrificed. Post operatively, Horner's syndrome was expected, but was difficult to demonstrate clinically. On performing the Minor's test, the presence of anhidrosis, and thus Horner's syndrome was confirmed. Minor's test is a simple objective test to demonstrate Horner's syndrome, especially because diagnosis from the eye signs can be difficult.

Keywords Horner's syndrome · Minor's test · Anhidrosis · Schwannoma · Cervical sympathetic

Introduction

Horner's syndrome first described by Bernhard Horner is characterized by ptosis, miosis, anhidrosis and enophthalmos and is caused by a loss of cervical sympathetic output. This can occur due to central and peripheral causes such as cerebrovascular events, cervical and apical lung tumors. Usually, the ophthalmological signs of Horner's syndrome are more often sought, than anhidrosis. Anhidrosis, which is accompanied by flushing of the involved skin, due to unopposed parasympathetic activity, is more easily demonstrated in Western subjects than in Indians owing to the lighter skin tone of the former. Hence, anhidrosis may not be readily appreciable in Indian subjects. We present a simple test, called Minor's test that can be used to confirm qualitatively, the presence of anhidrosis, and thus confirm the diagnosis of Horner's syndrome.

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Case Report

Preliminary Workup

A 39 year old female presented with an 8 month history of slowly progressing, painless, left sided neck swelling. Clinical examination of the neck revealed a large, 7 × 6 cm, solitary, firm left sided neck mass, deep to the left sternocleidomastoid muscle. Ultrasound scan of the neck suggested an enlarged mass measuring 6 × 7 cm. FNAC was suggestive of spindle cell neoplasm possibly a schwannoma.

Contrast Enhanced CT scan showed a well circumscribed, oval, heterogeneous lesion with mild enhancement seen in left carotid space extending from C2 to C5, causing anterolateral displacement of common carotid artery

Fig. 1 Left sided cervical sympathetic chain Schwannomma

(CCA) and internal jugular vein (IJV). There was mild separation of CCA and IJV, with compression of IJV. No significant enlarged neck nodes were seen.

Surgery

The options of management were discussed with the patient and she elected to proceed to surgical intervention. The Greater auricular and Spinal accessory nerves were identified and preserved. The Vagus nerve was found to be normal and was preserved. The IJV was stretched over the mass. A firm, smooth mass was found extending from the level of the carotid bifurcation inferiorly to the level of C2 superiorly, posterolateral to the CCA and posteromedial to IJV, arising from the cervical sympathetic chain (CSC) (Fig. 1). The CSC had to be sacrificed as it was found completely involved by tumour. Histopathological examination of the excised specimen confirmed a Schwannoma.

Post-operative Examination

Post operatively, careful examination revealed a Horner's syndrome, although the patient had no complaints. As the patient had narrow palpebral fissures on both sides, the eye signs, specifically, the ptosis and apparent enophthalmos were difficult to appreciate. There was relative dryness of the skin of the forehead on the affected side, but flushing on the affected side could not be made out due to the dark skin tone of the patient. At this point, the diagnosis of Horner's syndrome was based more on the premise that the CSC was sacrificed, rather than on the clinical signs.

Then, a Minor's test (description in the discussion section) was performed over the skin of the forehead. Once the patient started sweating, a dramatic, dark blue to black color developed on the normal side. The affected side did not exhibit this color change, thus objectively confirming anhidrosis (Fig. 2).

Fig. 2 Demonstration of Horner's syndrome- Blue-black discoloration on the right forehead indicates intact innervation to sweat glands. Anhidrosis on the left side is demonstrated by a lack of colour development on that side

Discussion

Horner's syndrome is a rare condition referring to a collection of signs caused by the disruption of the sympathetic supply to the eye and the face. It is a known complication in excision of tumors arising from the CSC. [1, 2].

The main components of Horner's syndrome include ipsilateral miosis, partial ptosis, apparent enophthalmos and anhidrosis. The loss of the sympathetic drive to the dilator iris muscle results in miosis as a result of unopposed parasympathetic action. Partial ptosis of the upper lid and elevation of lower lid occur from loss of sympathetic innervation of the Muller's muscle. The resultant reduction in size of the palpebral fissure causes an apparent enophthalmos [3].

Our patient had naturally narrow palpebral fissures on both sides and the eye signs were not readily apparent and had to be looked for, closely, to confirm the presence of Horner's syndrome.

Anhidrosis results in facial flushing and dryness of the affected skin [4]. While lighter skinned subjects may demonstrate flushing on the affected side, it is almost impossible to demonstrate facial flushing in a majority of the dark skinned Indian population.

In such cases, the Minor's test can be used to easily demonstrate the anhidrosis, to definitively confirm the presence of Horner's syndrome.

This test (Starch–Iodine test) was demonstrated by Victor Minor in 1928 [5]. It is a qualitative test of sudomotor function [6]. It is also useful in establishing the diagnosis of Frey's syndrome. In a paper published in 1940 Guttman used this test in some of his subjects, to study the disturbances of sweat secretion after extirpation of different sympathetic cervical ganglia [7].

A solution of commercially available tincture iodine which is an alcohol based weak iodine solution containing elemental iodine along with Sodium or Potassium iodide, is used. A layer of this solution is painted on the patient's forehead and allowed to dry. The forehead is then dusted with a thin film of starch, such as corn flour. Otherwise healthy subjects may be asked to perform mild exercises to encourage sweating. As our patient was subject to testing on the second post-operative day, exercise was not performed. Within minutes, as the sweat comes in contact with the starch iodine mixture, the colour changes from white to a dark blue–black, allowing sweat production to be visualized easily. Complete colour change occurs within 20–30 min. There is no colour change on the affected side. For quicker onset of sweating, air conditioning and ceiling fans can be turned off and windows kept shut. Alternatively Pilocarpine can be injected to stimulate sweating, in cold weather. This test confirms anhidrosis, thus, confirming Horner's syndrome in suspected cases. This is an objective test and there is little chance of inter-observer variation in interpretation of results, unlike the eye signs whose interpretation is highly subjective. As it is a non-invasive test, patient compliance is good.

The serious implications associated with a suspicion of Horner's syndrome merits ophthalmological referral whereupon confirmatory pharmacological testing may be undertaken along with other diagnostic tests, e.g. chest X-ray. This is a condition which optometrists need to be alert to. Topical cocaine is used to confirm or deny the presence of Horner's syndrome. Cocaine is a sympathomimetic that blocks the reuptake of norepinephrine. While normal pupils dilate (mydriasis), Horner's syndrome pupils do not dilate as the three neuron pathway has been interrupted. Topical hydroxyamphetamine 1 % (Paredrine®) can also be used to confirm 3rd neuron damage. Hydroxyamphetamine stimulates the release of norepinephrine from neurons. Central or preganglionic lesions dilate as the 3rd neuron is intact but Post-ganglionic lesions do not dilate [8].

Conclusion

The Minor's test which is used to diagnose other anhidrosis related diseases can be applied in Horner's without the hassle of a Cocaine or apraclonidine test with the same results. The results become easily demonstrable to the observer, especially non ophthalmologists and less experienced, younger clinicians who may have difficulty in appreciating the subtleties of pupil dilation.

Minors test is far simpler as it does not cause the gamut of side effects seen with cocaine and apraclonidine and it can be used alternatively to the above two tests. With Minor's test the Hydroxyamphetamine. It is safe to use in the pediatric population. The only possible complication could be a contact dermatitis to the constituents of tincture iodine [9].

Thus, Minor's test is recommended when there is doubt or difficulty in diagnosing Horner's Syndrome. It is a simple, quick, effective and inexpensive test, useful especially when the other features of Horner's Syndrome are not easily appreciated.

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