

Ross syndrome with generalized anhidrosis and localized disabling compensatory hyperhidrosis

Naeem Raza,^a Nasser Dar,^a Sajid Mustafvi,^b Omar Zafar^c

From the Departments of ^aDermatology, ^bInternal Medicine and ^cOphthalmology, Combined Military Hospital, Karachi, Pakistan

Correspondence and reprints: Naeem Raza · Department of Dermatology, PAF Hospital Faisal, Shahrah Faisal · Karachi 95000 Pakistan · T: +92219545249 · naeemraza561@hotmail.com · Accepted for publication April 2007

Ann Saudi Med 2008; 28(1): 53-54

Ross syndrome is a progressive degenerative disorder of cutaneous sensory and autonomic innervation. Since Ross' first description in 1958, approximately 40 cases have been described.¹ It is clinically characterized by a triad of anhidrosis, tonic pupil and deep tendon areflexia. Anhidrosis may be accompanied by compensatory hyperhidrosis and other alterations of the autonomic nervous system.^{2,3} It has been suggested that sweating disorder results from progressive impairment of heat production and heat dissipation through both loss of sweating and loss of cutaneous blood flow regulation.¹ The pathophysiology underlying Adie's pupil is post-ganglionic denervation of cholinergic fibers between the ciliary ganglion and the iris sphincter muscle. Initially there is dilatation of the pupil, but later, due to aberrant re-innervations of the iris or to the hypersensitive pupillary sphincter muscle, the pupil becomes constricted and tonic. In tonic pupils the near reaction is usually better than the light reaction accommodation reflex. Depression of deep tendon reflexes is due to dorsal root ganglionic degeneration or spinal interneuron loss.

We report a patient with Ross syndrome who presented with generalized anhidrosis and socially disabling localized compensatory hyperhidrosis along with tonic pupil and deep tendon hyporeflexia.

CASE

A 34-year-old male presented with a 7-year history of excessive and continuous sweating from the right side of the face, neck, shoulder and left lower back, whereas other body areas were progressively failing to sweat on exposure to hot and humid conditions. He had no other symptoms suggestive of autonomic dysfunction. Clinical observation and iodine starch testing confirmed areas of hyperhidrosis and anhidrosis reported subjectively. There was an irregular area of the skin on the right shoulder, neck and right side of the

face that showed continuous sweating. A similar patch was seen on the left lower back (Figure 1). The rest of the skin was anhidrotic. There was no postural drop in blood pressure and Valsalva response was normal. Examination of the eyes revealed a constricted pupil on the right measuring 2 mm as compared to the left pupil, which measured 4 mm (Figure 2). Light reflex was absent on the right side and was sluggish on the left side. Accommodation reflex was reduced on the right side. Slit lamp examination revealed segmental paralysis of iris sphincter at 9-11 O'clock position on the right side. Both pupils constricted with topical 0.1% topical pilocarpine. The rest of the eye examination was within normal limits. Examination of the motor system revealed absent knee and ankle jerks on both sides. The rest of the examination was unremarkable. Investigations including blood counts, erythrocyte sedimentation rate, urea, electrolytes, blood glucose, liver function tests, plasma VDRL (Venereal Disease Research Laboratory, test for syphilis), antinuclear antibody X-ray of the chest, ECG and a CT scan of the brain were within normal limits. Neurophysiological monitoring of Valsalva, nerve conduction studies and autonomic studies like beat-to-beat variation and sympathetic response would have been helpful, but unfortunately the facilities and expertise were not available in our setting. Based on the association of a bilateral Adie's pupil, areflexia and bilateral progressive anhidrosis, the diagnosis of Ross syndrome with compensatory hyperhidrosis was made. The patient was counseled about the progressive nature of the problem and advised to maintain adequate fluid intake and to avoid excessively hot and humid conditions.

DISCUSSION

The presenting complaint in our patient was a socially disabling localized hyperhidrosis involving one side of the face, neck, shoulder and lower back. Although he



Figure 1. A localized area of compensatory hyperhidrosis in Ross syndrome.



Figure 2. Adie's tonic pupils in a patient with Ross syndrome.

had noticed a progressive failure to sweat from the rest of the body in hot and humid conditions, there were no complaints of febrile episodes or inability to perform routine activities as he was sweating excessively from localized areas. In the medical literature, very few cases of Ross syndrome have been described and the majority of these had localized anhidrosis with little or no compensatory hyperhidrosis.⁴ Development of

anhidrosis in Ross syndrome is slow and progressive. When anhidrosis is widespread, as in our patient, the remaining areas of functioning eccrine glands show compensatory hyperhidrosis.

The combination of tonic pupil and tendon areflexia is known as Holmes-Adie syndrome and differs from Ross syndrome by the presence of normal sweating.⁵ On the other hand, a combination of unilateral loss of sudomotor and vasomotor activity without loss of ocular sympathetic innervation is called Harlequin syndrome.⁶ In fact, all these clinical syndromes overlap and the combination of Holmes-Adie syndrome and Harlequin syndrome has been called Ross syndrome. As the disorder involves the autonomic nervous system, other alterations of the system such as Horner's syndrome and cardiac autonomia may be seen.^{2,3}

Subjectively, the most disturbing symptom is compensatory hyperhidrosis. Few cases of patients treated for compensatory hyperhidrosis are described in the literature. The therapeutic options included video-assisted thoracoscopic sympathectomy,⁷ iontophoresis⁸ and local instillation of botulinum toxin type A.⁹ The last two treatments are free of side effects, but the resulting improvement is usually partial and transitory. Thoracic sympathectomy is the definitive treatment for localized hyperhidrosis but may have associated morbidity. Our patient presented a therapeutic dilemma as he had extensive anhidrosis and any attempts to block the sweating in localized areas of compensatory hyperhidrosis could lead to attacks of hyperpyrexia due to complete lack of sweating. The significance of our patient with Ross syndrome centers on the recognition of the skin lesions that led to its diagnosis. Awareness and a high index of suspicion are the key factors for diagnostic such rare cases.

REFERENCES

1. Nolano M, Provitera V, Perretti A, Stancanelli A, Saltalamacchia AM, Donadio V. Ross syndrome: a rare or a misknown disorder of thermoregulation? A skin innervation study on 12 subjects. *Brain*. 2006; 129 (Pt 8):2119-31.
2. Shin RK, Galetta SL, Ting TY, Armstrong K, Bird SJ. Ross Syndrome plus: beyond Horner, Holmes-Adie, and harlequin. *Neurology*. 2000 Dec 26; 55(12):1841-6.
3. Chemmanam T, Pandian JD, Kadyan RS, Bhatti SM. Anhidrosis: a clue to an underlying disorder. *J Clin Neurosci*. 2007; 14 (1): 94-6.ref
4. Weller M, Wilhelm H, Sommer N, Dichgans J, Wietholter H. Tonic Pupils, Areflexia, and segmental anhidrosis: Two additional cases of Ross syndrome and review of literature. *J Neurology*1992; 239:231-4.
5. Mak W, Cheung RT. The Holmes-Adie plus syndrome. *J Clin Neurosci*. 2000; 7 (5): 452.
6. Kalapesi FB, Krishnan AV, Kiernan MC. Segmental facial anhidrosis and tonic pupils with preserved deep tendon reflexes: a novel autonomic neuropathy. *J Neuroophthalmol*. 2005; 25 (1): 5-8.
7. Serra Mitjans M, Callejas Perez MA, Valls Sole J, Grimalt Santacana R, Rubio Garay M, Iglesias Senti M. Surgical treatment for compensatory hyperhidrosis in Adie syndrome. *Arch Bronconeumol*. 2004 Feb; 40(2): 97-9.
8. Reinauer S, Schauf G, Holzle E. Ross syndrome: treatment of segmental compensatory hyperhidrosis by a modified iontophoretic device. *J Am Acad Dermatol* 1993; 28: 308-12.
9. Bergmann I, Dauphin M, Naumann H, Flache-necker P, Mullges W, Koltzenburg M, et al. Selective degeneration of sudomotor fibers in Ross syndrome and successful treatment of compensatory hyperhidrosis with botulinum toxin. *Muscle & Nerve* 1998; 21: 1790-3.