Alternating Horner's syndrome and hyperhidrosis due to dural adhesions following cervical spinal cord injury

Case report

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Alternating Horner's sign and hyperhidrosis appeared in this patient 8 years after a spinal cord injury at C6-7. An intramedullary cyst was suspected but was not found at operation. There was a striking improvement in both symptoms after adhesions between the spinal cord and the dura mater were freed.

Key Words • alternating Horner's syndrome • spinal cord injury • syringomyelia • hyperhidrosis • spinal cord cyst • poromyelia • dural adhesion

FREEMAN and Russell reported in 1955 that the late manifestation of transient alternating Horner's syndrome following cervical spinal cord injury can be relieved by evacuating intramedullary cystic cavities. They postulated that movement of cystic fluid within the cavity as the patient changes position stimulates the sympathetic nervous system, causing Horner's syndrome to alternate. The patient reported in this paper had significant improvement in hyperhidrosis and Horner's signs after adhesions between the damaged spinal cord and dura mater were released. This case suggests an additional cause and possible treatment for these symptoms.

Case Report

This 30-year-old man had been quadriplegic since he was thrown from a horse on September 11, 1967. He was treated initially with Crutchfield tongs. Laminectomy at C6-T1 was performed on September 21, 1967, and an intramedullary hematoma was evacuated. There was no recovery of neurological function.

In 1975, the patient began to experience hyperhidrosis, mainly on the right side of the face and neck, but occasionally on the left side. This required him to change his clothes several times a day. He was admitted to Indiana University Hospital on April 25, 1978, because of the hyperhidrosis and a decubitus ulcer in the right ischial region.

Examination. On admission, the patient was conscious. There was slight sweating of the right face and neck, and anisocoria (7 mm on the right, 4 mm on the left). Pupillary responses were brisk bilaterally. Voluntary biceps function was weak bilaterally. There was no triceps contraction on either side. Dorsiflexion was slight at the wrists bilaterally, and both hands were maintained in flexion due to spasticity. There was a complete sensory deficit up to the C-7 dermatome bilaterally. Results of tendon reflex testing are shown in Table 1.

Operations. Surgery for the decubitus ulcer was performed on May 10, 1978. Subsequently, the patient experienced many attacks of hyperhidrosis of the face and upper chest, mainly on the right side, but occasionally on the left (Fig. 1). During an attack of
A repeat laminectomy of C6–T1 was carried out on June 15, 1978, with the expectation of evacuating an intramedullary cyst. Dense adhesions were found between the dura mater and spinal cord. The dura mater was thickened at the C-7 level (Fig. 3). An exploratory spinal cord puncture was carried out in several areas at the C-7 level, but no cystic fluid was found. There was no sign of intramedullary cavity formation. The adhesions between the spinal cord and the dura mater were freed.

**Postoperative Course.** Following surgery, the patient noticed a striking improvement in the frequency and the amount of sweating (Fig. 4). He no longer had to change clothes frequently each day. His left hand was more relaxed so that the physical therapists were able to manipulate it more easily than before surgery. His decubitus ulcer remained well healed, even though he sat on it up to 6 hours at a time.

One year postoperatively the patient has no hyperhidrosis. The anisocoria recurs on occasion, the right pupil usually larger than the left. His hands are less spastic, and he has returned to teaching horsemanship from his electric wheelchair.

**Discussion**

Lowenstein and Levine reported that periodic paralysis of the third cranial nerve has been observed...
Horner's syndrome and hyperhidrosis after cervical injury

frequently since it was described in 1884 by Rampoldi. In 1974, Furukawa and Toyokura added three cases of alternating Horner's syndrome to the five they found in the literature. Their three patients had syringomyelia, Shy-Drager syndrome (progressive encephalomyelopathy), and radiation myelopathy. These authors attributed the first recognition of the relationship between spinal cord injury and alternating Horner's syndrome to Roussy and Cornil, who reported it in 1918. Freeman and Russell later described temporary and alternating ptosis, miosis, and anhidrosis. They thought that the fluid in an intramedullary cystic cavity stimulated the sympathetic nervous system by shifting with changes in the patient's position to produce the alternating signs. Dense adhesions between the spinal cord and the dura mater were found in at least one of their patients. They did not use the term "alternating Horner's syndrome."

The incidence of intramedullary cyst as a complication of spinal cord injury is quoted as 1% to 1.4%. Zur suggested that Horner's syndrome occurs because the lateral tectotegmentospinal tracts, situated near the surface in the preserved white matter around the spinal cord cavity, continue to project impulses into the intermediolateral and intermediomedial columns. Instead of shifting cystic fluid, the traction and relaxation of the adherent dura mater caused by change in posture appears to have triggered overactive sympathetic impulses and produced the alternating Horner's syndrome and contralateral hyperhidrosis in our patient. Nerve fibers in the C7-T1 segments of the spinal cord, and progressing from it to the sympathetic ganglia, were undoubtedly bound by the adhesions, which were released at surgery. Even though hyperhidrosis is a common symptom in patients with spinal cord injury, its mechanism is not clearly understood. Involvement of sympathetic nerve fibers in dural adhesions appears to have caused this symptom in our patient.

Late appearance of neurological symptoms after spinal cord injury in humans has been reported by several authors. More frequently, the cystic cavity appeared to be within the spinal cord parenchyma. The term "syringomyelia" is applied both to dilations of the central canal of the spinal cord, and to cysts in the parenchyma. Surgery is reported to help patients with parenchymal cysts, but not patients in whom central canal dilation was presumed to have occurred. Ballantine, et al., credited the first use of the term "syringomyelia" to Ollivier's 1827 monograph, in which pathological dilation of the central canal was

FIG. 3. Operative exposure showing dense adhesions between the spinal cord and the dura mater. The dura mater was thickened at the C-7 level.

FIG. 4. The Quinizarin sweat test performed after operation showed no hyperhidrosis. The pupils were equal.
described. Since its introduction, the term has been used both for enlargement of the central canal and also for cavity formation in the substance of the spinal cord. The term “poromyelia” is suggested for cavities formed within the spinal cord parenchyma, because of its pathological resemblance to porencephaly in the cerebrum. Ballantine, et al., 1 suggested as a classification “‘True’ Syringomyelia (Syringo-hydromyelia-Syringo-myelic type),” “Hydromyelia (Syringohydromyelia-Hydromyelic type),” and “Acquired Syringomyelia (Traumatic, infectious, due to tumor).” This classification could be modified to retain “syringomyelia” to describe dilation of the central canal of the spinal cord only, as hydrocephalus is used exclusively to describe dilation of the cerebral ventricles. “Poromyelia” could be used for cysts in the parenchyma of the spinal cord, just as porencephaly is used to describe cystic cavities in the cerebral parenchyma.

Conclusions

Freeing the spinal cord from adhesions to the dura mater at operation produced a striking improvement of hyperhidrosis, with some decrease in alternating Horner’s signs which started 8 years after spinal cord injury. This suggests a possible mode of therapy for hyperhidrosis after spinal cord injury. Late appearance of transient alternating Horner’s syndrome can be caused by dense adhesions between the spinal cord and the dura mater, as well as by intramedullary cysts, in the lower cervical region. The term “poromyelia” to describe cavities in the spinal cord parenchyma is suggested in the hope of decreasing the confusion associated with the use of the term “syringomyelia” for all spinal cord cysts. “Syringomyelia” should be reserved to identify dilatation of the central canal of the spinal cord, as originally intended by Ollivier.10

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References


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