Spinal Subpial Lipoma
A Case Report and Review of the Literature

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Abstract:
Spinal subpial lipoma is a rare entity and comprises only 0.9% of spinal cord tumours (1). It arises from premature dysfunction of the cutaneous ectoderm during neural tube formation (2). We present a case of a 44-year-old male who presented with the symptoms attributed to this lesion, together with pathology, neuroimaging characteristics and management strategies.

Case Report:
A 44-year-old Indian male presented to the neurosurgical unit with a three-year history of progressive heaviness of legs, increasing difficulty in walking and what he described as funny sensations affecting the lower trunk and legs. Further questioning failed to reveal any bladder, bowel or sexual dysfunction. His past medical history was insignificant and there was no history of a fall, night sweats or evening rise of temperature.

General physical examination was unremarkable but he had a marked ataxic gait. Lower limb examination revealed spastic paraparesis, power being in the range of 3-4/5. The weakness was more pronounced in the proximal group of muscles than in the distal group. Deep tendon reflexes were pathologically exaggerated, with up going planters and un-sustained clonuses bilaterally. He had asymmetrical sensory level at left D6 and right D9, with impairment of touch and joint position sensation; sphincters were intact as was perianal sensation and there were no cerebellar signs. Laboratory blood investigations were within normal limits.

X-ray of the cervico-thoracic spine showed widening of the interpedicular distance opposite the seventh cervical vertebra. MRI of the same area revealed an intradural mass on the posterior aspect of the spinal cord (Figure 1). The cord was severely compressed and displaced forward. No cleavage plane was seen between the mass and the cord except at its upper and lower borders. The signal characteristics of the lesion were consistent with a lipoma (Figure 1, 2).

Figure 1: Sagittal T1 weighted, spin echo sections showing intradural high signal intensity mass posterior to the cervical cord. The mass extends from the level of the sixth cervical to the upper half of the second thoracic vertebra. There is an area of mixed signal intensity in the middle of the mass with no clear cleavage plane with the cervical cord.

The patient underwent laminectomy from C6 to D2, and, as the dura was opened, a yellow greasy mass was seen in subpial location. This was firmly adherent to the cord with no clear plain of cleavage and was surrounded by adjacent dorsal nerve roots (Figure 3). Debulking was performed using Cavitron Ultrasound Surgical Aspiration (CUSA). Approximately 80% of the lesion was removed while gently dissecting and saving the...
dorsal nerve roots. The patient made an excellent post-operative recovery with near compete resolution of his neurological symptoms. The diagnosis of lipoma was confirmed by histopathology.

Discussion:

Gowers published the first paper on intradural lipomas in 1897(3). Their association with spinal dysraphism has been well known for a long time. Intradural lipoma without spinal dysraphism is rare, and usually presents in the 2nd and 3rd decade of life(4). A common location for these leisions is the thoracic spine; followed by the cervico-dorsal region and only 12% are restricted to the cervical cord alone(4,5). They most frequently involve the posterior aspect of the cord, therefore the dorsal column deficits are first to appear, leading to gait disturbances, and numbness. It is interesting that symptoms in women gradually deteriorate during pregnancy or after delivery(2). As the tumour grows further, compromise of other neural elements leads to motor weakness as well as bladder and bowel involvement. Pain when present is not radicular but rather localised to the area involved(6). Rare presentation with signs of raised intracranial pressure has also been reported(7) and may be due to the simultaneous occurrence of intracranial lipomas(8). Most patients are symptomatic for two years before seeking medical advice(4,8,9). In our case it was three years of progressive symptoms.

In the pre-imaging era, the diagnosis of an intra-spinal lipoma was rarely made preoperatively (10). CT scan may depict the diagnosis when it shows the very low density of fat within an intra-spinal mass. Fat density is less than the zero attenuation value of water, characteristic of CSF(11). MRI remains as the examination of choice in those cases because of its multiplaner capabilities and the characteristic signal changes seen within fat-containing structures. Fat is seen as high signal intensity on T1 and low signal on T2 weighted, spin echo images (12). On T2 weighted fast spin echo images, fat shows intermediate to high signal intensity(12,13). High T1 signal changes can also be seen in methemoglobin, sometimes in high protein containing structures and some stages of calcification(14). In the case of fat the high signal will characteristically drop when the fat suppression effect is added on the imaging sequence(12).

The gross intra-operative appearance of a subpial lipoma is of a soft yellow, fusiform tumour. Although the tips of the lesion are easily separable from the spinal cord, the intraparachymal margins are indistinct and firmly attached to the neural tissue. The nerve roots traverse the periphery of the lesion predominantly(15).

Microscopically, subpial lipomas represent either a benign neoplasm or hamartoma although their growth characteristics suggest a true neoplasm(9,16,17).

The management strategy of intraspinal lipomas remained controversial in the past. The spectrum ranged from conservative treatment (strict diet control) on one end to an aggressive complete removal of the lesion on the other. Since the fat of the lipoma is metabolically identical to normal body fat, in the past people had advocated the conservative measures, like aggressive weight loss and scrupulous control of diet(18) but this was queried by those who observed rapid growth of intradural lipoma at the conus despite strict weight control(19).
Surgery in the form of decompressive laminectomy and subtotal resection has been found safer and effective\(^9\). Of seven operative reports available for review on the surgery of these lesions, the two patients who had complete removal were rendered paraplegic and incontinent (neither of whom were paraplegic preoperatively). On the contrary, the five patients treated by subtotal resection showed either improvement or minimal deterioration\(^6,20\). Crosby has made similar observations\(^{21}\).

**References:**