CASE REPORT

Prostatic Metastasis Mimicking a Ligamentum Flavum Cyst in Thoracic Spine: A Case Report

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ABSTRACT

A rare finding of a prostatic carcinoma metastasized in a ligamentum flavum at thoracic spine causing posterior column spinal cord compression. We reported a man with prostatic carcinoma presented with ataxic gait. Magnetic resonance imaging revealed an extradural cystic mass adjacent to the T4 intralaminar region indenting on the spinal cord. T4 posterior decompression via en bloc excision of the ligamentum flavum cyst and laminectomy was performed. Histopathology confirmed glandular tissue within the cyst wall which corresponds to prostatic adenocarcinoma cells. Two months post-operative, patient showed improvement in his muscle strength on left L2 myotome. The preoperative diagnosis is a challenge because of the ligamentum flavum cysts rarity in the thoracic spine and non-specific clinical signs and symptoms. To our best knowledge, this is the first report of metastatic adenocarcinoma of the prostate found as ligamentum flavum cysts.
Malaysian Journal of Medicine and Health Sciences (2023) 19(4):368-370. doi:10.47836/mjmhs19.4.52

Keywords: Prostatic carcinoma, Metastasis, Ligamentum flavum cyst

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INTRODUCTION

Ligamentum flavum cysts (LFC) are rarely reported, up till today there are 68 cases reported after the first report in 1967. LFC is extremely rare lesions in the thoracic spine and is unusual cause of radiculopathy and spinal compression (1). LFC is one of the juxtafacet cysts located around the facet joints or emerge from or develop into the ligamentum flavum. Juxtafacet cysts are further classified into three categories according to location: facet cyst, flavum cyst such as LFC, and posterior longitudinal ligament cyst (1). Histologically, juxtafacet cysts are divided into two types: ganglion cysts without a synovial lining membrane and synovial cysts with a membrane lining the synovium (1). Majority of ligamentum flavum and PLL cysts are ganglion cysts (1). Up to date, prostatic carcinoma metastasis forming a cyst in ligamentum flavum has not been reported (1).

CASE REPORT

A 64-year-old man presented with 9 months history of unsteady gait leading to a fall which cause a pathological fracture at right femur in 2014. The fracture was fixed with locking plate and intramedullary bone cement over his right femur shaft. Post fixation, he has been bed bound for 1 month with no contracture. He has no complaints of bowel or micturition disturbances. He was diagnosed with stage 4 prostastic carcinoma with multiple spine and lung metastasis since 2012. T10 laminectomy was done in September 2013 for cord compression due to spine metastasis.

On examination, he had sensory level at T5, loss of proprioception and vibratory sense over bilateral lower limb leading to waddling gait and weakness over the left hip flexion (L2 myotome) that was grade 3 and great toe extension is found to be grade 4. The rest of the muscle grading were noted in Table 1. Other sensory tests were unremarkable. Bilateral patellar, achilles tendon reflexes and Barbinski tests were normal. Digital rectal examination findings were normal anal tone, perianal and deep sensation and able to voluntarily contract his anal sphincter.

Magnetic resonance imaging (MRI) revealed an oval hyperintense mass with a size of 8x5mm compromising the spinal canal at level of T4, displacing the dural sac and indenting on the spinal cord posteriorly on T2 weighted image (Fig. 1a). Together with hypertrophied ligamentum flavum, the mass was excised via T4

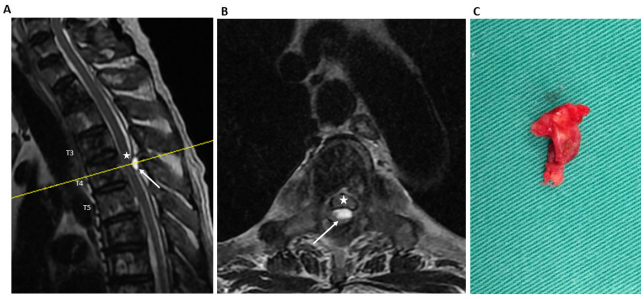

Fig. 1: (a) Sagittal and (b) cross section of T2 weighted MRI images showing a round hyperintense extramedullary extradural cystic lesion (arrow) compressing onto the posterior column of the spinal cord (star) at the level of T4. (c) Post excision photo showed the cyst from ligamentum flavum at level of T4.

laminectomy. An LFC was noted on the internal part of the T4 lamina compressing on the dura and spinal cord. The cyst was dissected easily from the dura with minimal adhesions. The excised cyst was approximately 8x5mm, oval, yellowish, partly cystic and had a smooth surface, buried in the ligamentum flavum and had no attachment to the facet joint (Fig. 1b).

Histopathological examination (HPE) showed a predominantly solid sheets, nests and individually dispersed tumour cells with prominent nucleoli within cellular fibrous tissue in between irregular spicules of bone (Fig. 2a, 2b). Cribriform glands were seen (Fig. 2b). Mitotic figures and tumour necrosis also present. The tumour cells were positive for prostatic specific antigen (PSA) (Fig. 2c, 2d). The findings are consistent with metastatic adenocarcinoma from the prostate.

His final diagnosis was posterior cord syndrome, secondary to prostatic metastasis in a form of ligamentum flavum cyst at the level of T4 spine. At 2 months post operatively, the patient was able to ambulate with a walking stick. After 6 months, he had improvement on the proprioception and vibratory sense over bilateral lower limb and therefore, improved the stability of the gait. The muscle strength of left hip flexion improved (Table I).

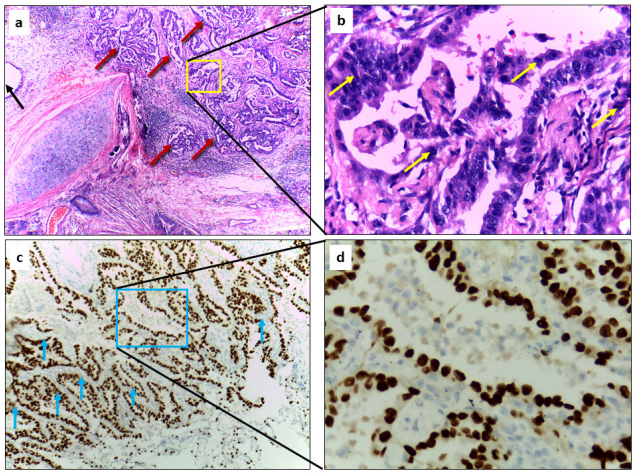

Fig. 2: Histopathology examination of the removed cyst. (a) Cystic space (black arrow); Glandular acini (red arrows) (H&E, x10), Yellow box: magnified x100 (as in figure 2b) (b) Abnormally large nuclei (yellow arrows) (H&E, x100)(c) Multiple glandular acini seen with PSA stain uptake (blue arrows) (PSA, x40), Blue box: magnified x40 (as in figure 2d).

Table I: Comparison of Medical Research Council's scale (MRC) of muscle power before and after laminectomy.

Myotome (nerve root level)	MRC grading of right lower limb		MRC grading of left lower limb	
	Pre-operative	post-operative	Pre-operative	post-operative
Hip flexion (L2)	4 (with pain)	4 (with pain)	3	4
Knee extension (L3)	4 (with pain)	4 (with pain)	5	5
Ankle dorsiflexion (L4)	5	5	5	5
Big toe extension (L5)	4	4	4	4
Big toe flexion (S1)	5	5	5	5

DISCUSSION

Tumour cells may metastasize to the spine via several routes. One of the unique pathways for tumour cells to spread to the spine is via Batson's venous plexus which connects the valveless vertebral veins from prostate carcinoma and other main beds of venous drainage. The ligamentum flavum is attached laterally to the capsule of the articular facets, and above and below to the lamina. It has been reported that hypermobility segment of the spine is the causation of stress to the ligamentum flavum attachment and cyst formation (2). However, in our case, it is situated in a fairly immobile thoracic spine. Hence, it is a red flag sign that this is not LFC.
The ligamentum flavum is clearly distinct from other spinal ligaments in terms of its anatomical disposition, histologic features, and biomechanical qualities. This structure of dense connective tissue with predominance of elastic fibre is seldom seen in other tissues except in tunica media of large arteries and vestibular folds of the larynx (3).

Differential diagnosis of imaging studies between LFC and synovial cysts are beneficial to the medical practitioner especially surgeon, as the latter are more difficult to resect as it requires exploration of the facet joint. Certain cases of synovial cysts reveals a demonstrable contact of the facet joint with enhancement of the synovial cyst wall and the adjacent facet joint. Juxta-articular cysts often demonstrate a calcified rim, but LFC don't (4). However, it can exhibit comparable radiological features in metastases, which are typically linked to osteolysis.

Cases of ossified ligamentum flavum (OLF) associated with a bone tumour are extremely uncommon.

Only one article reporting 3 cases of osteoblastoma metastasize to OLF and there is another article reporting metastatic prostate cancer in OLF (5). There is no report of metastatic tumour in LFC has been published. The surgery aim is decompression of posterior spinal and cyst resection of the affected (level of T4) ligamentum flavum. If the cyst is completely excised, there won't be any recurrence. Adhesions to the dura are known to be the primary cause of inadequate resection and recurrence. The neurological prognosis following surgical therapy is favourable, with improvements in strength, pain and gait.

CONCLUSION

We reported a prostate adenocarcinoma metastasis in the ligamentum flavum of thoracic spine (T4 level) causing spinal cord compression with neurological deficit, which was successfully treated by surgical excision. With HPE confirmation, it was the first report of metastatic adenocarcinoma of the prostate showing LFC-like clinical manifestation and imaging findings. However, there is no previous reports have described a specific pathway on how prostate adenocarcinoma can metastasis to ligamentum flavum of thoracic spine, suggesting a future study.

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