

Spinal Synovial Cysts as a Cause of Radiculopathy

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Abstract

Synovial cysts are found around any synovial lined joint: they are called true synovial cysts when synovial lined and ganglion cysts when this lining is absent. The spinal location is uncommon. However, it is typically a process that usually happens in the lumbar spines. The aim of this work was to present our experience in patients with synovial cysts who were operated for different forms of radiculopathy. It had included 12 patients, 11 were correctly diagnosed by MR while the last one was diagnosed as sequestered disc fragment which was found at surgery to be synovial cyst with hemorrhage causing altered signals of this cyst. Complete improvement of all patients occurred after surgery except one with partial improvement. We can conclude that synovial cyst should be included in the differential diagnosis of patients with radiculopathy.

Key Words: Synovial cysts, Radiculopathy, synovial lined

Introduction

SYNOVIAL cysts are found around any synovial-lined joint, they are called true synovial cysts when synovial lined and ganglion cysts when this lining is absent, the synovial lining is present when there is joint communication. The spinal location is un-common^[1,2,3,4].

Spinal synovial cysts arise in relation to the facet joints in association with degenerative disease of the spine in elderly individuals^[5]. The accepted pathogenesis of such cysts is the excessive joint mobility with herniation of the synovium through the degenerative joint capsule, this theory is supported by the fact that most of these cysts occur at the L 4/5 level being the most mobile segment of the spine followed by L 3/4 and L5/SI levels with equal incidence for both while thoracic and cervical locations are by far rare^[1,3,6].

The association between synovial cysts with trauma, rheumatoid arthritis, spondylolysis and kissing spinoous processes had been reported^[1,5].

It usually presents with radiculopathy from cauda equina or single root compression. The main differential diagnoses are migrated disc

substance, neuroma, neurofibroma, perineural cyst and metastatic disease^[1,2,7,8].

The aim of this work was to present our experience with patients with synovial cysts who were operated for different forms of radiculopathy.

Material and Methods

This study had included 12 patients with operative proven diagnosis of synovial cysts who presented to the Neurosurgery Department, Faculty of Medicine. **El-Minia University** during the period between March 2011 and May 2015 with different forms of radiculopathy.

All were subjected to the following in the work up for their symptoms and only those 12 with the operative proven diagnosis of synovial cysts were included in the study.

- (1) **Through** history taking and neurological examination
- (2) Plain x-ray study (AP, lateral, both oblique views)
- (3) MIRI study using the T₁, T₂, PD sequences in both sagittal, axial projections, followed by Gd-DTPA injection when indicated
- (4) Operative interference
- (5) Histopathological verification

Results

This study had included 12 patients, their ages ranged between 40 and 62 years (mean 48 ± 12 SD) seven were females and five were males.

All our patients had their symptoms, examinations for the lumbar spine; no dorsal or cervical affection was encountered.

The initial clinical presentations of these patients are listed in the following table:

Table I: The initial clinical presentations in our 12 patients.

Clinical presentation	No	%
Unilateral sciatica	6	50
Bilateral sciatica	1	8.33
Spinal claudication	4	33.33
Cauda equina syndrome	1	8.33
Total	12	

Plain radiography for the lumbar spine was done in AP, lateral both oblique projections all had shown marked degenerative changes at the vertebral bodies and apophyseal joints. No evidence of spondylolysis was encountered in our patients.

All our patients were examined by MR. Most of them (9 patients -75%) had the cyst located at the L 4/5 level while 2 (16.66%) were at the L5/S1 level at the remaining one (8.33%) had a cyst at the L3/4 level.

Gd-DTPA injection was given in these patients who did not show the classical signal pattern of cyst, their signal were as follows: (I) one patient had shown

isointense T₁, T₂-w signals (2) two patients had shown heterogeneous high T₁ isointense T₂-w signals, enhancement was detected in those two patients with heterogeneous T₁-w signals not in the third patient who had shown isointense signal at all pulse sequences, this was the patient with false negative diagnosis of sequestered disc fragment and was proven during surgery to be a synovial cyst. The signal pattern in these three patients was due to the presence of hemorrhage within the cyst leading to this non-classical signal pattern for a synovial cyst; this was further proven by pathological study of these lesions after operative interference.

Table II: Different MR signs encountered in our patients

MR sign	No.	%
Extradural mass-like lesion	12	100
Size		
10-20 mm	7	58.33
> 20mm.	5	41.66
Signal pattern		
Isointense T ₁ w, bright T ₂ -w	9	75
T ₁ -T ₂ -w iso-intense pattern	1	8.33
Heterogenous bright T ₁ iso-intense T ₂ -w	2	16.66
Dural sac compression		
Posterolateral aspect	8	66.66
Lateral aspect	4	33.3
Nerve root compression	12	100
Encroachment on intervertebral foramen	6	50
Associated facet degenerative changes	12	100
Post Gd-DTPA enhancement	2	16.66
Stenotic configuration of the spinal canal	6	50
Associated disc lesion at same level of cyst	2	16.66
at another level	3	25

N.B more than one sign was present in each patient

Based on MR data the diagnosis of synovial cysts was given in 11 patients (91.66%) while in the remaining patient the observed extra dural lesion was diagnosed as a sequestered disc fragment. During operative interference the MR diagnosis was verified in addition to this single misdiagnosed patient.

In this patient MR had shown a small extradural lesion with isointense signals at all pulse sequences with lack of post contrast enhancement, this signal pattern allowed the diagnosis of a sequestered disc fragment while during surgery it was found to be a cyst with narrow connection to the near-by facet joint, pathologically the cut section had shown a cystic lesion with hemorrhagic foci in between the whitish myxoid tissue, histopathologically the lesion was formed of fibrous connective tissue covered by synovial lining, with the presence of plenty of hemocidrin laden macrophages all along its texture together with foci of inflammatory reaction.

Table III: Operative findings and procedures:

Operative findings	No.	%
Cyst adherent to dura, root sleeve	5	41.66
Associated lateral recess stenosis	8	66.66
Adjacent canal stenosis	6	50
Premature cyst rupture during muscle stripping	1	8.33

Excellent results of surgery were achieved in 11 patients (91.66%) with absolute relief of radiculopathy, however, in one patient

All our patients were operated by a standard approach to the lumbar region with mild line skin incision. Careful subperiosteal muscle separation from the spinous laminae and facet complex to avoid premature collapse of the cyst (one patient) during muscle stripping away from the facet complex.

Surgery had established segmental decompression at the affected level.

In the procedure of excision of the cyst, the facet joints were violated in all patients. The cyst was adherent to the dura and root sleeve in 5 patients indicating careful dissection of the cyst in its separation without violation of neural tissues.

Associated lateral recess stenosis with short pedicle was found in 8 patients. Adjacent level canal stenosis was present in 6 patients of which four had presented with spinal claudication.

with cauda equine syndrome partial recovery of its symptoms was achieved.



Figure (1): MRI showing L3 –L4 synovial cyst



Figure (2): MRI showing L4 –L5 synovial cyst

Discussion

Synovial cysts of the facet joints occur most commonly in association with degenerative changes of the spine in older individuals. It causes symptoms and signs by direct compression of the dura^[2]. This study had included 12 patients with lumbar synovial cysts, 11 of which were diagnosed by MR prior to surgery while the last one was diagnosed to be a sequestered disc fragment and was found to be a synovial cyst during surgery.

All our patients had their ages between 40 to 62 years in accordance to the published literature who reported similarly old age groups^[1,2,9,10]. This is based on the fact that these intraspinal cysts arise in relation to facet joints with marked degenerative changes.

The higher percentage of our female patients can also be explained by their higher incidence of degenerative disease.

All our cysts were found at the lumbar region, this would agree with the published data which reported the lumbar region to be the most common region of the spine to show such cyst,^[1,11,12] and that it is much rarer in the dorsal spine. Some reports about its cervical location are also^[4,5,13] as rare occasions. The report of Zorzon et al.,^[14] described two patients with cysts related to the atlanto axial articulation located posterior to the dens in whom a CV and partial CV, hemilaminectomy with subtotal resection of the cyst provided adequate and stable decompression of the dural with smooth follow-up for one year.

The symptoms encountered in our patients are all related to lumbar dural sac or nerve root compression, like other reports^[1,3,4,15,16] who described similar pattern of clinical presentations and mentioned that these cysts cause symptoms by its size and this is aggravated by the development of hemorrhage in the cyst.

Some reports are available about some unusual locations of lumbar synovial cysts of which the report of Kemaloglu et al.,^[17] who described intra foraminal lumbar synovial cysts resulting into nerve root compression with peculiar position of the nerve in the foramen showing downward.

Displacement with the importance to adapt the surgical technique to this entity in order to avoid nerve injury.

Plain radiography had demonstrated a variety of lumbar degenerative changes in all our patients that is considered a predisposing factor for the development of synovial cysts.

Most of our patients (75%) had their cysts located at the L4/5 level while L5/S I and L3/4 levels were less affected and no cysts were found at other lumbar levels. This distribution agrees with the pattern described by other workers^[1,2,11] who attributed this high incidence at L4/5 level to that it is the level with highest mobility of the lumbar spine.

Mariconda et al.,^[11] had described a rare case of synovial cyst in relation to L5/ SI level in a patient with congenital sacralized L5 that was

expected to cause considerable segmental instability at this described level.

A variety of MR signs were found in our patients. The most common signal pattern was the T₁W isointense, T2-W high signal pattern (75%) allowing considering the diagnosis of a cyst, while the T1.T2W isointense pattern which was found in one patient kept this cyst similar to the pattern for sequestered disc fragment, this pattern was due to hemorrhage in the cyst in our patient. The total incidence of hemorrhage in the cyst in this series was 25% (one patient with T₁, T2 W isointense signals and two with heterogeneous high T₁, isointense T2-W signals) this is slightly higher than the 18% incidence given by Tillich et al.,^[1]

Encroachment on the intervertebral foramina was found in 6 of our patients (50%). The associated degenerative changes at the facet joints were found in all our patients further supporting the etiology of these cysts mentioned by other authors^[1,11,18] while the unusual foraminal location described by Kemaloglu et al.,^[17] was associated with lack of direct joint Communication.

We should not delineate direct communication to the facet joint on MR in our patients not like the description of Bandiera et al.,^[16] who could show a communication between the lesion and the joint space on MR although such a communication was not described in the other reports and Hsu et al.,^[2] stated that such communication can be demonstrated on facet arthrography or CT myelography.

Post contrast enhancement at the cyst was found in of our patients (16.66%) other reports mentioned that the possibility of post contrast enhancement in these cysts is due to inflammatory changes,^[16] histopathological study in our two patients revealed the presence of inflammatory changes in these two cysts in addition to hemorrhage.

The associated disc lesions found in our series were in the form of disc bulges not severely compressing the dural sac. Based on MR we could diagnose 11 out of those 12 patients included (91.66%), this was different from the other reports which

described 100% MR diagnosis. Our inability to predict the correct diagnosis in that patient was due to that the signal pattern of the cyst was isointense at all pulse sequences (due to its content of hemorrhage) keeping it much similar to the signal pattern of sequestered disc fragment and this was considered the for this single misdiagnosis in our series.

Surgical therapy is usually straight forward with excision of the cyst to relief the caud equina and root compression. The association of lumbar canal stenosis in our series was in 50% of the patients. This agrees with the published literature^[4,5,6,19].

In literature review isolation of the facet joints was not an issue in discussion, we believe that with cyst-excision, violation of the facet joint is a must and this was the case in all our patients with the results of surgery being 91.66% complete relief of symptoms. In the remaining one patient the improvement was partial.

Other lines of treatment for synovial cyst were described in the literature like epidural steroid injection that provided short-term pain relief and CT-guided puncture with steroid injection^[20].

From this study we can conclude that intraspinal synovial cysts (especially lumbar) although are uncommon, yet it should be included in the differential diagnosis of patients with radiculopathy with special stress on its signal pattern that can be much altered by the presence of hemorrhage. The surgical results are extremely encouraging as regards the relief of radiculopathy and correction of the neurological deficits.

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