

Diagnosis and surgical management of intraspinal synovial cysts: report of 19 cases

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Abstract

Objective—Synovial cysts of the vertebral facet joints are a source of nerve root compression. Different surgical procedures are in use, but no consensus has been formed so far as to which method should be used in synovial cysts. To clarify the role of surgical management, the efficacy of operative procedures and factors influencing the outcome in our own series of 19 patients treated between 1994 and 1998 were analysed.

Methods—Nineteen patients with a mean age of 65 years underwent surgery for medically intractable radicular pain or neurological deficits caused by synovial cysts. The patients' records were retrospectively analysed for neurological deficits, cysts diameter, operative approach, segmental hypermobility, and clinical outcome; CT and MRI were analysed for additional degenerative changes.

Results—In 17 patients an excellent result and in two patients a good postoperative result was achieved. Twelve patients were found to have hypermobility of the facet joints and six had spondylolisthesis. There was no correlation between cyst diameter, operative approach, and outcome. No intraoperative or postoperative complications occurred.

Conclusions—Age and hypermobility may play a part in the aetiology of facet joint synovial cysts. As all operative strategies showed equally good clinical outcome, total excision via a small flavectomy as the least invasive approach should be consid-

ered therapy of choice in patients with cysts causing neurological deficits.

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Keywords: facet joint; flavectomy; lumbar spine; spondylolisthesis; radicular pain; synovial cyst

Space occupying lesions of the spinal canal often cause radicular pain or neurological deficits and are most commonly caused by either disc herniation or a bony stenosis of the spinal canal. In a few cases pain in the leg and accompanying paraesthesia is caused by neurinomas or inflammatory processes. A rare source of extradural mass effects are cysts of the facet joints (accounting for an incidence of 0.8% in our institution). They are cited in the literature as synovial or ganglion cysts.¹

Synovial cysts of the vertebral facet joints mimicking lumbar disc herniation by causing nerve root compression are an entity first described by Schollner in 1967.² About 160 cases have been documented by single reports. Diagnosis of this degenerative lesion has been facilitated by the widespread use of CT and MRI. Treatment approaches are multifold, ranging from bed rest, bracing, percutaneous needle aspiration, and facet corticosteroid injection to surgical removal of the cyst. If neurological deficits are caused by synovial cysts, surgical excision is recommended. To date there have been no reports comparing the effectiveness of different diagnostic and surgical approaches. We report our experience with 19 patients with synovial cysts who had been treated by open surgery in our department.

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Age, segmental location of the synovial cysts, radicular signs and symptoms, surgical approaches, and duration of follow up for 19 patients with lumbar synovial cysts of the facet joints

No	Age	Cysts location	Pain	Sensory deficit	Cyst diameter (mm)	Motor deficit	Listhesis	Approach	Interval (months)	Outcome (Macnab ³)
1	56	L5/S1	S1	S1	15	0	yes	Hemilam	31	1
2	48	L4/5	L5	0	13	0	Yes	Flav	32	1
3	69	L3/4	L4/5	0	11	0	No	Hemilam	46	1
4	73	L4/5	L5	L5	15	Ankle	Yes	Flav	3	1
5	74	L5/s1	S1	S1	20	0	Yes	Flav	32	1
6	79	L4/5	L5	L5	15	0	Yes	Hemilam	24	1
7	78	L3/4	L5/s1	S1	14	0	No	Lamin	19	1
8	77	L4/5	L5	L5	19	0	Yes	Lamin	22	1
9	53	L4/5	S1	0	18	0	Yes	Flav	18	2
10	70	L4/5	S1	0	28	Ankle	Yes	Hemilam	20	2
11	53	L4/5	S1	S1	15	0	No	Hemilam	18	1
12	52	L4/5	L5/s1	0	13	0	Yes	Lamin	27	1
13	67	L4/5	L5/s1	0	15	0	No	Hemilam	24	1
14	56	L4/5	L5/s1	L5	11	0	Yes	Flav	27	1
15	48	L4/5	L5/s1	L5	15	0	No	Flav	33	1
16	68	L4/5	L5	L5	19	0	No	Flav	16	1
17*	65	L4/5	L5/s1	0	18	Sphincter	No	Lamin	36	1
18*	66	L4/5	L5/s1	0	18	0	No	Lamin	21	1
19	81	L4/5	L4/5	L5	18	0	Yes	Flav	6	1
20	67	L4/5	L5/s1	L5	18	0	Yes	hemilam	4	1

Flav=Flavectomy; Hemilam= hemilaminectomy; Lamin=laminectomy; Interval (months)=interval between surgery and final neurological examination.



Figure 1 Non-haemorrhagic synovial cyst at the level L4/L5. (A) Sagittal T2 weighted MR image demonstrates a round, 12 mm in maximum diameter, lesion with signal intensity slightly greater than that of CSF and a low signal intensity rim posterolateral to the thecal sac. Note associated degenerative spondylolisthesis at the level L4/L5. (B) Axial T1 weighted MR image demonstrates that the lesion with signal intensity equal to CSF adjacent to the left facet joint is barely visible. Note hypertrophy of the ligamentum flavum and fatty replacement of the bone marrow in the posterior elements. (C) Axial contrast enhanced T1 weighted MR image at the same level as (B) shows rim enhancement, so the lesion can be better depicted.

Patients and methods

Between 1994 and 1998 19 patients (seven women and 12 men) with the diagnosis of synovial cysts of the facet joints of the spine were admitted to our wards. Mean age was 65 years (range 48–81 years). Neurological examination and MRI or CT were performed on all patients before surgery. (table).

Using flavectomy, hemilaminectomy or laminectomy to approach the spinal canal, the cysts were excised. A neurological examination was performed on the 5th postoperative day and after an average of 23 months (range 3–46 months). These examinations were performed by an independent neurologist. Postoperative results were rated according to a modified rating scale of Macnab³:

(1) Excellent—complete resolution of symptoms

(2) Good—marked improvement, occasional pain

(3) Fair—some improvement, need for pain medications, significant functional restrictions

(4) Poor—no change in symptoms, or worse.

Statistical analysis was performed using the independent *t* test for comparative analysis to compare the surgical approach with the cyst diameter and one way ANOVA to compare the surgical approach with preoperative neurological deficits and the neurological outcome.

Results

NEUROLOGICAL PREOPERATIVE FINDINGS

Ten patients had a single level, nine a two level radicular pain radiating into the leg. Eleven patients presented with hypaesthesia, three with dysaesthesia, and three with paraesthesia. Two patients had a weak unilateral dorsiflexion

of the ankle and another had a cauda equina compression with resulting weakness of the anal sphincter.

Lasegue's manoeuvre was positive in 12 patients (10-60 degrees).

RADIOLOGICAL FINDINGS

Due to a recurrence of the cyst in one patient a total of 20 radiological investigations were performed. In 14 patients fast T1 (640/12; TR/TE) and T2 (4888/130; TR/TE) spin echo sequences were obtained in sagittal and axial planes on a Magnetom 1.0-T unit (Siemens, Erlangen, Germany). Gadolinium-DPTA was administered in nine patients. All cysts presented as sharply marginated, epidural masses, which were located posterolateral to the thecal sac near the facet joint in 12 patients and in the lateral recess in two patients. A communication between the cyst and the adjacent facet joint was only seen in two patients. In all these patients we found advanced degenerative changes associated with vacuum phenomena (17%), hypertrophy of the ligamentum flavum (39%), and spondylolisthesis without spondylolysis (33%) (fig 1) or fatty replacement of the bone marrow (56%).

In six patients CT (Somatom Plus 4 S, Siemens, Erlangen, Germany) was used for diagnostic purposes. The cysts imposed as space occupying lesions, which were disc isodense and sharply marginated. There was no contrast enhancement. The location in these patients was posterolateral to the thecal sac (fig 2).

Mean cyst diameter was 15.5 mm (range 11-28 mm), predominant cyst location L4/5 (15 patients (80%)). The remaining four manifested at segment L3/4 and L5/S1 respectively.

OPERATIVE MANAGEMENT

As one of the 19 patients had a recurrence of the cyst, a total of 20 surgical interventions were performed. Each type of intervention was performed by a different consultant surgeon. For the operative approach either laminectomy (n=5; cyst diameter 13-19 mm; mean 16.4 mm), hemilaminectomy (n=7; cyst diameter 11-28 mm; mean 16.8 mm), or flavectomy (n=8; cyst diameter 11-20 mm; mean 16.5

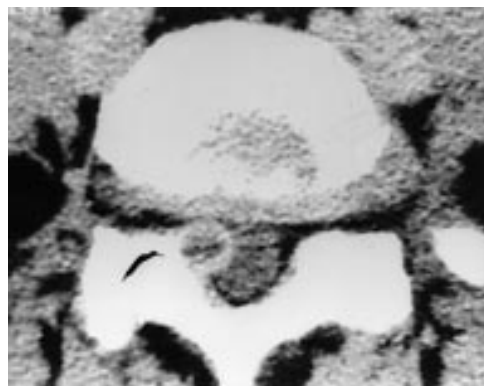


Figure 2 Synovial cyst at the level L5/S1. CT shows a round 15 mm in maximum diameter lesion adjacent to the right facet joint and posterolateral to the thecal sac. Note communication between cyst and vertebral joint.

mm) was chosen. In 12 cases hypermobility of the facet joint was found during surgery (more than 2 mm gapping of the facet joint by moving the vertebral laminae with surgical clamps). No intraoperative complications, postoperative morbidity, or mortality resulted from the procedures. All but the patient who had to undergo surgery twice had an uncomplicated postoperative course, and were discharged from the wards after 5 days.

FOLLOW UP INVESTIGATION

All nineteen patients were reassessed by standard neurological examination first on the fifth postoperative day and then after an average of 3 to 46 months (mean 22.7). Pain relief was considered excellent in 17 patients and good in two. The outcome for hypaesthesia was excellent in nine patients, good in one, and poor in one. Three patients with dysaesthesia as well as three patients with paraesthesia reported excellent postoperative improvement. Symptoms of cauda equina compression (one patient) and muscle weakness (two patients) subsided completely within 4 days after surgical intervention.

STATISTICS

On comparing the different surgical approaches with each other statistical analysis disclosed no correlations between the type of surgical approach, final outcome clinically, and cyst diameter (p values ranging from 0.703 to 0.965).

Discussion

Mechanical stresses in the lumbar spine can cause and may be a major factor in the aetiology of facet joint synovial cysts. Their predilection for the lumbar region is well described¹⁻¹¹ and confirmed by our findings. There are only a few reports about cysts of the upper spine.¹²⁻¹⁹ The preference for the L 4-5 level in 80%, the most hypermobile in the spine,^{7 16 17} spondylolisthesis in 33%, and facet joint hypermobility found in 60% of the patients suggest that hypermobility is an important aetiological factor.

The fact that our patients' ages ranged between 48 and 81 years (mean 65 years) further highlights the role of a degenerative process.

Synovial cysts can be best shown by MRI, which also gives accurate information about the connective tissues and their relation to the facet joints in a three dimensional way. Computed tomography is also useful, but the value of myelography, although mentioned by Budris,¹⁷ is low in this era of CT and MRI because of its undoubtedly high sensitivity but low specificity.⁴

Management of symptomatic synovial cysts of the lumbar spine is varied. Percutaneous cyst aspiration under CT control has been reported by Königsberg¹⁸ but follow up has been short. Bjorkengren *et al*¹⁹ treated three patients by injection of 100 mg methylprednisolone into the cyst under CT guidance. After a follow up of 6 months only one patient was totally free of symptoms and showed disappearance of the cyst in the CT. Abrahams *et al*²⁰ performed a

cystectomy via a laminectomy after an unsuccessful attempt to treat such a cyst by CT guided needle aspiration.

The various operative approaches chosen in our series have not differed from each other in a statistically significant way ($p=0.703$) and it seems that excising the cyst is the most important factor for a good outcome. The one recurrence in our series followed incomplete removal of the cyst at the initial operation.

In summary, synovial cysts are rare degenerative and space occupying lesions in elderly patients and should be considered in the differential diagnosis of disc herniation. They are easily diagnosed by CT or MRI. Hypermobility of the facet joints and spondylolisthesis seem to be the most important factors in regard to pathogenesis. In case of intractable pain or motor deficit surgical excision of the cyst proved to be both effective and safe. The smaller and less traumatic approach afforded by microneurosurgical flavectomy is probably the best technique because of its potentially lower risk for intraoperative or postoperative complications.

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