

Surgical Management of Juxtafacet Cysts

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Abstract

Background Data: Synovial cysts occur most frequently in the lumbar spine (88-99%). They are viewed as regenerative changes that are associated with hypermobility and instability of a motion segment as seen with spondylolisthesis and facet joint instability and facet degeneration. There is extensive controversy regarding the definition, prevalence, pathogenesis, risk factors, and most importantly, treatment options for synovial cysts management.

Purpose: To assess the outcome of various surgical procedures done for the treatment of lumbar juxtafacet cysts.

Study Design: Retrospective clinical case study.

Patients and Methods: The data of 26 patients (17 males and 9 females) who underwent surgery for lumbar juxtafacet cysts, during the years 2005 to 2010 was reviewed. The patients age ranged from 42 to 68 years (mean 55.9 years \pm 6). The most affected level was L4-L5 (21 patients), followed by L3-L4 (3 patients), while the least affected level proved to be L5-S1 (2 patients). Five patients had in addition, spondylolisthesis of the involved segment and four patients had hypermobile segments. All patients had signs of nerve root compression that failed to respond to conservative treatment preoperatively. Various patients groups were subject of alternative surgical modalities; as Microscopic laminotomies and medial facetectomies were performed in 5 patients (laminotomy group), formal Laminectomies and medial facetectomy in 12 patients (laminectomy group), while complete facetectomy with additional fusion for spondylolisthesis and hypermobility were performed with 9 patients (fusion group).

Results: Conservative treatment proved to be ineffective in all cases. The mean follow up duration was for 28 months (\pm 7.5) ranging from 18 to 46 months. Excellent to good outcome was achieved in 17 of 26 patients (65.4%), while 6 patients (23.1%) showed fair results and 3 (11.5%) showed poor results. Persistent low back pain was not observed at all among patients of the fusion group (0 out of 9 patients); while being more common in patients operated without fusion (laminotomy and laminectomy groups) (7 out of 17 patients). Moreover, three patients of the latter group have developed grade 1 olisthy during the follow-up duration, and hence requiring additional fusion.

Conclusion: Juxtafacet cysts can be treated effectively through different surgical modalities, which should be tailored according to the anatomical and dynamic properties of the patients' spines, as well as their presenting complaints. The presence of radiological instability even in the absence of overt slippage may necessitate the need for fusion. (2013ESJ050)

Keywords: Juxtafacet cyst, synovial cysts, ganglion cyst, spondylolisthesis, mobility, fusion, outcome.

Introduction

The term, juxtafacet, is used synonymously for both synovial and ganglion intraspinal cyst.^{13,24} The term encompasses all cysts located adjacent to the facet joints or arising from or extending into the ligamentum flavum and cysts of the posterior longitudinal ligament. More recently, they are described as spinal degenerative articular cysts.²

Histologically synovial cysts differ from ganglion cysts in the presence of synovial lining in the former and that they are in continuity with the capsule of the facet joint.^{9,12,23,24} There are multiple forms of cysts depending on their location, origin, and histological features. They are classified as synovial cysts, ganglion cysts, ligamentum flavum cysts, or posterior longitudinal ligament cysts.

There is extensive controversy regarding the definition, prevalence, pathogenesis, risk factors, and most importantly, treatment options for synovial cysts management.¹⁰ Synovial cysts occur most frequently in the lumbar spine (88-99%). They are viewed as regenerative changes that are associated with hypermobility and instability of a motion segment as seen with spondylolisthesis and facet joint instability and facet degeneration. They appear most frequently at the L4-5 interspace, which has the most mobility of any interbody space in the lumbar spine.^{18,21,23}

A juxtafacet cyst may create symptoms by compressing nerve roots and causing radiculopathy, crowding the spinal canal and causing neurogenic claudication, or compressing the spinal cord and causing myelopathy.

Patients and Methods

This study is a retrospective review of the data of 26 patients who underwent surgery in the department of Neurosurgery, Menoufia University, for lumbar juxtafacet cysts in interval between the years 2005–2012. The age of the cases ranged from 42 to 68 years (mean 55.9 years \pm 6). In the present study the reviewed cases had a male patient predominance (male-to-female ratio; nearly 2:1). The preoperative complaints included radiculopathy that was reported in all cases (100%), back pain in 23 cases (88.5%), and neurogenic claudication in 13 cases (50%). The latter were mostly those with underlying spinal stenosis and spondylolisthesis. The duration of the complaints ranged from three

months to 6 years. Detected neurological deficits included motor deficits in 9 cases (34.5%), sensory deficits in 10 cases (38.5%) and reflex abnormalities were present in 10 cases (38.5%).

All patients failed to respond to adequate medical treatment for a minimum of eight weeks; nor did they respond to physical therapy. Neurodiagnostic imaging included preoperative MRI, with or without computerized tomography, and AP, lateral and dynamic X rays. The commonest level affected was L4-5 (21 patients) followed by L3-4 (3 patients), while the least affected proved to be L5-S1 (2 patients). Four cases had bilateral cysts, five cases had spondylolisthesis, and four more cases had radiological evidence of hypermobility in their dynamic X-ray studies.

All patients with spondylolisthesis and hypermobility (nine patients) had full laminectomies, facetectomies, cyst excision, interbody fusion and transpedicular screw fixation (fusion group) (Figure 1). In five cases a laminotomy and partial facetectomy was done with cyst excision, as they suffered mainly from radiculopathy (laminotomy group). While in twelve cases full laminectomies and partial facetectomies with cyst excisions (laminectomy group) were performed due to the tightness of their canal or for proper dissection required due to adherence of the cysts to the dura (Tables 1, 2). Wherever they are addressed collectively, the latter two groups will be more conveniently referred to as the non-fusion groups. Patient outcome of this study was assessed according to Odom's criteria.¹⁹

Results

The mean follow up duration was 28 months \pm 7.5 (range, 18 to 46 months). All 26 cases proved to be true synovial cysts, after pathological analysis and were in continuity with facet joints. Extensive adherence of the cyst to the dura was found in three cases, which necessitated performance of complete laminectomies and partial facetectomy. In two of these patients dural tears occurred which were repaired on spot with no post operative CSF leak.

Cyst recurrence was observed in two cases (7.7%), both from laminotomy group. While seven cases (41%) of the non-fusion groups had persistent low back pain, three of which developed a degree of listhesis that required later surgical fusion; while the rest were managed conservatively. Although back

pain was present in four cases among the fusion group during the initial three postoperative months, all patients (100%) had their pain relieved on the long term, (table 3).

All patients had alleviation of their radicular pain in immediate postoperative course. Four cases (15.4 %) had recurrence of their radicular pain, two related to cyst recurrence in laminotomy group, one due to foraminal compromise by olisthy in the laminectomy

group, and one caused by adhesions in the Fusion group (table 3). Seventeen patients (65.4%) of the whole series had a good and excellent outcomes according to Odom's Criteria, while six patients (23.1%) had a fair outcome, and three (11.5%) had a poor outcome. The good to excellent outcomes for the individual groups were as follows; 60% for the laminotomy group, 50% for the laminectomy group and 89% for the fusion group.

Table 1. Cyst Location, and Presence of Associated Olisthy or Instability

Dynamic X-ray			
Cyst Location	No Mobility	Hypermobile	Olisthy
L3–L4	2	1	-
L4–L5	14	3	4
L5–S1	1	-	1

Table 2. Surgical Procedure performed and the presence or absence of Stenosis

Surgical Procedure	Laminotomy	Laminectomy	Fusion	N° of Cases
Stenotic canal	-	9	7	16
Non-Stenotic canal	5	3	2	10
Total N of Cases	5	12	9	26

Table 3. Long-term Complications

Group	Laminotomy	Laminectomy	Fusion
Cyst recurrence	2 (7.7%)		-
Occurrence of olisthy	1 (3.8%)	2 (7.7%)	-
Persistent back pain	2 (7.7%)	5 (19.2%)	-
Radiculopathy	2 (7.7%)	1 (3.8%)	1 (3.8%)

Table 4. Outcome According to Odom's Criteria

Group	Laminotomy	Laminectomy	Fusion	Total
Excellent	2	2	8	12 (46.2%)
Good	1	4	-	5 (19.2 %)
Fair	1	4	1	6 (23.1%)
Poor	1	2	-	3 (11.5%)
Total	5 (19.2 %)	12 (46.2 %)	9 (34.6 %)	26 (100%)

Table 5. Outcome of individual study groups according to Odom's Criteria

Outcome				
Group	Excellent	Good	Fair	Poor
Laminotomy N=5	2 (40%)	1 (20%)	1 (20%)	1 (20%)
Laminectomy N=12	2 (17%)	4 (33%)	4 (33%)	2 (17%)
Fusion N=9	8 (89%)	-	1 (11%)	-

Figure 1.

(A) Male patient presented by back pain and left sciatica due to an L4-5 cyst.

(B) After left foramintomy was performed with resolution of sciatica.

(C) Two years later patient had recurrence of the preoperative complaints, where dynamic X-rays revealed hypermobility at the operated level, and (D) MRI showing cyst recurrence. Patient was managed by fusion surgery later.



Discussion

The improvement in radiographic imaging had increased the rate of detection of symptomatic spinal juxtafacet cysts^{3,6,13} they are considered to be cystic formation of mobile spine by some authors⁷ Surgical indications of these are limited to intractable pain or progressive neurological deficits. The technique according to Khan and Girardi depends on factors such as the size, site, duration of symptoms, involvement of surrounding structures, general health, and risk of complications.^{14,16}

In 2004, Sandhu and coworkers²¹ described 17 cases in 4 years, with an average follow-up of 13 months: their patients were treated by hemilaminectomy and total medial facetectomy or bilateral decompression, and 8 developed a grade I listhesis. Although excellent results were reported in their study, the follow-up evaluation, however, did not include dynamic X-rays.

Epstein⁸ in her 2004 series performed lumbar laminectomies to excise synovial cysts and decompress 45 patients with stenosis alone and 35 patients with stenosis and Grade 1 degenerative spondylolisthesis. She reported that 5 of the former

group developed de novo grade 1 olisthy, while in 11 of the latter group the olisthy progressed to grade 2. Thus she advocated the primary use of fusion. In this series the non-fusion groups did show the occurrence of slippage of the affected segment in 3 of the cases.

Tero et al,²² surgically removed of juxtafacet cysts, through bilateral or partial laminectomies with or without partial facetectomy, without fixation. They stated that bilateral laminectomy is a safe and effective treatment providing adequate cyst exposure and symptomatic relief, but advocated concomitant spinal fixation in the presence of preoperative spondylolisthesis or facet joint destruction, in order to prevent progression of olisthy and cyst recurrence. Comparatively the present study showed that bilateral laminectomies without fixation had the worst outcome in comparison with the other groups; however it did provide proper exposure and cyst dissection and excision.

In 2010, Bydon et al,⁵ reviewed the role of spinal fusion in the treatment of synovial cysts. In a meta-analysis, the authors identified a total of 966 patients. They presented the possible treatment options, including minimally invasive and open

procedures, comparing decompression alone with decompression plus instrumented fusion. They concluded that it is fundamental to include an appraisal of any micro-instability in pre-operative planning in order to decide when to perform fusion and emphasize that fusion must be planned whenever there are signs of instability. Their results sustain the author's and others¹⁰ hypothesis that the presence of active instability makes fusion mandatory.

Christophis and co-worker⁷ described 53 cases that were operated upon by hemi and bilateral laminotomy, hemilaminectomy, and laminectomy, all without fixation; reported that 17 of their 53 patients complained of low back pain after several (10–16) months, for which MRI investigation was necessary, and revealed no recurrent cyst. However, they did not mention any radiographical assessment for increased postoperative mobility in their study.

Xu and colleagues²⁵ stated that hemilaminectomy or laminectomy remain to be one of the mainstay surgical treatments for symptomatic intraspinal synovial cysts; As majority of patients undergoing decompression/excision of synovial cysts will have immediate improvement in back and leg pain. However, within 2 years, patients receiving hemilaminectomy or laminectomy alone have an increased incidence of back pain and cyst recurrence. Their results match those obtained in this study, where decompression with instrumented fusion appears to be associated with the lowest incidences of cyst recurrence or back pain.

Recently, microsurgical and minimally invasive techniques for removal of the synovial cyst have been described.^{11,15} James et al,¹¹ resected lumbar juxtafacet with facet preservation, through a contralateral side muscle splitting, a minimally invasive surgical approach. They reported excellent improvement in visual analogue scale, where all patients had a good or excellent outcome, with no evidence of cyst recurrence in any of the patients at a mean follow-up of 14 ±9.4 months (range, 1 to 27 month). None of their patients required subsequent instrumentation or fusion.

Martha and coworkers¹⁷ reported in their 101 percutaneous rupture of lumbar synovial cysts, successful cyst rupture in 81% of cases, albeit fifty-five patients (54%) required subsequent surgery over a period averaging 8.4 months because of

inadequate symptom relief. Allen et al,¹ performed percutaneous cyst rupture, 72% percent of their patients had excellent long-term pain relief after cyst rupture. Although 12 of the 32 patients had a recurrence, 11 of the 12 were willing to repeat the rupture procedure of which 5 of 11 had complete long-term symptom relief. The remaining six underwent surgical intervention. Therefore, less than 20% of patients in this case series actually went on to surgery. Bureau and coworkers⁴ used image-guided percutaneous steroid injections for the treatment of lumbar facet joint synovial cysts. Excellent pain relief was achieved in nine (75%) of 12 patients. At follow-up imaging, the cyst completely regressed in six (67%) of these nine patients, partially regressed in two (22%) patients, and was unchanged in one (11%) patient.

Conclusion

The best way to manage juxtafacet cysts is still a controversial one. What is obviously needed is a randomized controlled trial with a considerable long-term follow-up to answer this question. Minimally invasive techniques provide an adequate alternative, especially if the patient is accepting the possible need of future surgery; or in cases with co-morbidities that prevent more aggressive procedures. However, if the patient is seeking a more definitive treatment for his condition, then formal laminectomy and facetectomy with instrumentation assisted interbody fusion seems to provide the best results with the least long term complications.

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الملخص العربي

العلاج الجراحي للتكيسات المجاورة للمفاصل الوجيهية

الهدف: تم إجراء هذه الدراسة بأثر رجعي لتقييم نتائج مختلف الإجراءات الجراحية التي تم القيام بها للتكيسات المجاورة للمفاصل الوجيهية القطنية.

الطريقة: تم استعراض البيانات من ٢٦ مريضا (١٧ من الذكور و٩ من الإناث) الذين خضعوا لجراحة للتكيسات المجاورة للمفاصل الوجيهية القطنية وذلك في الفترة من عام ٢٠٠٥: ٢٠١٠. تراوحت أعمار المرضى من ٤٢ إلى ٦٨ سنة (٥٥,٩ سنة \pm ٦). وكان المستوى الأكثر تضررا هو ما بين الفقرة الرابعة القطنية والخامسة (٢١ مريضا)، ويليه ما بين الفقرة الثالثة والرابعة القطنية (ثلاثة مرضى)، وأخيرا ما بين الفقرة الخامسة القطنية والاولى العجزية (اثنين من المرضى). هذا وكان خمسة مرضى يعانون بالإضافة إلى ذلك من الإنزلاق الفقاري في المستوى الفقري المعني، وكانت أربعة حالات أخرى تعاني من فرط الحركة في المستوى الفقري المعني. وكان لدى جميع المرضى علامات وأعراض إنضغاط جذر العصب والتي فشلت في الإستجابة للعلاجات التحفظية في مرحلة ما قبل الجراحة. هذا وقد أجري إستئصال جزئي للصفحة الفقرية وإستئصال للجزء الأنسي للمفاصل الوجيهية مجهريا لخمس من المرضى، في حين تم إستئصال كامل للصفحة الفقرية وإستئصال للجزء الأنسي للمفاصل الوجيهية في ١٢ مريضا. أما في حالة ٩ من المرضى والذين يعانون من فرط الحركة أو الإنزلاق الفقاري - فقد تم إستئصال كامل للصفحة الفقرية وإستئصال للجزء الأنسي للمفاصل الوجيهية بالإضافة إلى الإنصهار الفقري.

النتائج: لم يستجب أي من المرضى للمحاولات العلاجية التحفظية. وكان متوسط فترة متابعة المرضى ٢٨ شهرا \pm ٧,٥ حيث تراوحت ما بين ١٨ إلى ٤٦ شهرا. وقد حصل ١٧ مريضا من أصل ٢٦ مريضا (٦٥,٤%) على نتيجة ممتازة أو جيدة. فيما حصل ستة مرضى (٢٣,١%) على نتائج مناسبة وثلاث مرضى (١١,٥%) على نتائج ضعيفة. ولوحظ ان إستمرار آلام أسفل الظهر كان أكثر شيوعا في المرضى الذين لم يتم عمل إنصهار فقري لهم - حيث أنه إستمر في سبعة مرضى من أصل سبعة عشر مريضا (١٧/٧) من هذه المجموعة. وفي مقابل ذلك تحسنت الآلام في جميع المرضى الذين تم عمل إنصهار فقري لهم. وقد حدث إنزلاق فقري من الدرجة الاولى في ثلاثة مرضى ممن لم يتم عمل إنصهار فقري لهم، مما إستلزم إجرائه لاحقا.

الإستنتاج: يمكن علاج التكيسات المجاورة للمفاصل الوجيهية بشكل فعال وذلك من خلال طرق جراحية مختلفة، والتي ينبغي أن تكون مصممة وفقا لحالة كل مريض وللخصائص الديناميكية والتشريحية للعمود الفقري ووفقا للشكوى الخاصة بكل مريض. ومن الجدير بالتأكيد أنه يفضل عمل الإنصهار الفقري حتى وإن لم يلاحظ وجود فرط حركي بالفقرات بالفحص بالأشعة.