Hemorrhage into Synovial Cysts as a Cause of Acute Radicular Symptoms: Report of Seven Cases and Review of the Literature

Shih-Shan Lang1, James Mark Schuster1, Lachlan J. Smith1, Lisa Dwyer-Joyce2, William Welch1, Paul Marcotte1, Beth A. Winkelstein1 and Neil R. Malhotra1*

Abstract

Objective: Acute hemorrhagic synovial cysts are frequently misdiagnosed because the entity is rare. The purpose of this article to provide insight on the clinical presentation, diagnosis and surgical treatment of this condition.

Summary of background data: Twenty-nine cases reported in the literature were reviewed and presented in this article.

Methods: We retrospectively reviewed seven patients with MRI and exam correlated lesions that underwent resection of a synovial cyst. All patients had acute onset of symptoms, defined as less than three months, and all patients had radiographic and histopathologic evidence of hemorrhage into a synovial cyst. Presenting symptoms included paresthesias, motor loss, or pain in the distribution correlating to MRI location of the lesion.

Results: All patients showed improvement on physical exam and reduced pain. No patients required further surgical intervention during the follow-up period.

Conclusion: Synovial cyst hemorrhage was associated with a rapid clinical course and progression to surgery because of failure of non-operative modalities. Prompt diagnosis and surgical intervention leads to improved outcomes.

Keywords
Acute radicular symptoms; Synovial cyst; Hemorrhage; Lumbar spine pathology

Introduction

Lumbar facet synovial cysts (LFSC) are known, if uncommon, etiology of low back pain and radicular symptoms. The possibility of hemorrhage into the cyst should be considered with an acute onset of radicular pain, however, the entity is rare and frequently misdiagnosed (Figure 1). The purpose of this article to present seven cases of hemorrhagic synovial cysts and review the literature in order to provide insight into the clinical presentation, surgical treatment and anticipated outcomes for this patient population.

Materials

Hospital charts, clinic notes, operative reports, radiological studies and pathology reports were obtained for patients undergoing surgical intervention for acute onset of symptoms related to synovial cyst between the years 2001 and 2010. Seven patients were treated in this interval (2M: 5F, median age 56 years). Cases were discussed and evaluated by an interdisciplinary team inclusive of neurosurgeons, pathologists and neuro-radiologists.

Methods

Clinical course

All seven patients were evaluated in the neurosurgery outpatient clinic. Patient 2 and Patient 6 (Table 1) were found to have weakness corresponding to the level and laterality of the synovial cyst found on MRI. Because of the neurological deficits, these 2 patients were offered laminectomy for decompression and cyst resection without recommendation of conservative treatment. The remaining 5 patients were recommended by the neurosurgeon to attempt a course of conservative treatment including physical therapy and epidural steroid injections for 6 weeks. All 5 patients had worsening radiculopathy symptoms after this time frame and therefore the patients were then offered a laminectomy and decompression.

Radiographic features

A typical MRI study for this patient series demonstrated synovial cysts that were readily identified with connections to the same level facet joint. Synovial cysts on T1 weighted MRI were iso intense to slightly hypo intense lesions in the epidural space associated with hypo intense rim suggestive of local hemorrhage. T2 weighted MRI imaging typically demonstrated focal core hyper intensity suggestive of central hemorrhage.

Two out of seven patients did not have MRI sequencing that might have delineated acute hemorrhage as a result of site specific sequencing guidelines for spine imaging. Of the two patients who
Table 1: Composite data of patients in the literature (including current case series) having presented with pathologic proven hemorrhagic synovial cyst without concomitant trauma in the acute setting (less than 6 months). *as established by Yuh et al. [39].

<table>
<thead>
<tr>
<th>Author</th>
<th>Age at surgery (yr)/sex</th>
<th>Synovial Cyst location</th>
<th>Radiology</th>
<th>Histology</th>
<th>Preoperative Symptoms (mos)</th>
<th>Postoperative Outcome*</th>
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<tr>
<td>Pendleton et al. [10]</td>
<td>50/F</td>
<td>L3-4</td>
<td>Myelography</td>
<td>Hemosiderin</td>
<td>Radicular pain &amp; weakness (3)</td>
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<td>64/F</td>
<td>L4-5</td>
<td>Myelography</td>
<td>Hemosiderin</td>
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<td>Radicular pain &amp; weakness (3)</td>
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<td>Reust et al. [12]</td>
<td>77/F</td>
<td>L4-5</td>
<td>CT</td>
<td>Blood &amp; Hemosiderin</td>
<td>Radicular (1)</td>
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<td>Hemosiderin</td>
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<td>Blood</td>
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<td>Excellent</td>
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<td>Blood</td>
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<td>MRI</td>
<td>Blood</td>
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<td>Current Report, Pt 1</td>
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<td>MRI</td>
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<td>Radicular pain &amp; weakness(2)</td>
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</table>
did not have appropriate imaging to delineate acute hemorrhage, both demonstrated acute intracystic hemorrhage at the time of pathologic evaluation. Due to the limitations of MRI imaging, the pathological examination was vital in proving these patients had an acute hemorrhagic cyst.

**Surgical management**

Lumbar laminotomy and resection of synovial cyst was performed to decompress the thecal sac or isolated nerve root in all seven patients with acute radicular symptoms. Surgical approach consisted of microsurgical unilateral approach to the lesion via laminotomy. Operating microscope was employed for sublaminar dissection of cyst. Cysts were tracked to the attachment point in the facet from which they were removed. The medial portion of the facet was removed and bipolar cauterization of the exposed synovium was performed. Care was taken to minimize the amount of the facet joint taken. No patients showed signs of gross instability at time of operation which would have required pedicle screw fusion and no patients required subsequent instrumented fusion.

**Pathological features**

Pathologic evaluation coincided with surgical and imaging findings showing hemosiderin deposition or focal hemorrhage in all cases (Table 1). Pathologic evaluation additionally confirmed synovial lining accompanied by focal myxoid changes, as is typical of synovial cysts.

**Case Example**

A 53 year-old female presented to our neurosurgery clinic with a known history of a left L4-5 synovial cyst not associated with hemorrhage. She never had symptoms of left lower extremity radiculopathy. This was incidentally found on MRI when the patient is imaged for right sided radiculopathy from a different pathology. Eight weeks prior to presentation to our clinic the patient developed an abrupt onset of left lower extremity radiculopathy. Prior to initiating conservative treatments, a new MRI was obtained that demonstrated a significantly expanded left L4-5 synovial cyst secondary to an acute hemorrhage (Figure 2). On physical exam decreased sensation to pinprick was noted on the lateral aspect of the left lower extremity and straight leg raise was positive on the left at 45 degrees. She underwent a left lumbar L4-5 interspace synovial cyst resection with no complications. Pathology demonstrated a synovial cyst (Figure 3A) with evidence of hemorrhage (hemosiderin deposits, Figure 3B) within the cyst (Figure 3C). Post-operative course was uncomplicated and in one year follow-up noted significant sustained improvement in her left lower extremity radiculopathy.

**Results**

**Clinical features**

Preoperative onset of acute symptoms was on average 6.8 weeks. Neurological motor deficit was present in 29% (2/7) of patients at the time of presentation. No patient presented with bowel or bladder deficit. Acute trauma was not revealed in history for any patient. Lumbar spine level L4-5 was the most commonly affected level (86% or 6/7). Degenerative disease of the lumbar spine was noted on imaging for 100% of patients with 57% (4/7) having concomitant mild spondylolisthesis at the level in question. Initially, conservative therapy was recommended during the outpatient clinic evaluation included physical therapy and epidural injections. However, none of the patients improved after conservative treatment [1,2]. The indications for surgery on the 2 patients (Patient 2 and 6, Table 1) with weakness on neurological exam were the presence of neurological deficit. The indications for surgery on the 5 patients with radiculopathy and back pain were worsening pain after epidural steroid injections and physical therapy. The neurosurgeons did not believe these symptoms would improve without surgery. The size of the cyst on serial imaging had less influence on the decision to proceed with surgery.

**Results of surgical management**

Post operative courses where unremarkable and all patients were discharged on postoperative days one or two. Patients were seen in follow up at one week, one month and at 6-12 months post operatively. Patients were followed in the postoperative period for an average of nine months. All patients (7/7) showed improvement on exam, reported reduced pain and none required further surgical intervention during follow-up period.

**Discussion**

Acute symptomatic radiculopathy (<3months in our series or <6months in the literature) from a histologically proven hemorrhagic
synovial cyst is rare [3-16]. A Medline search revealed thirty-six cases (including the cases in this report) reported in the literature since 1983 (Table 1).

Clinical features

Patient presentation frequently consists of chronic low back pain, radicular pain, neurogenic claudication and in some cases neurological deficits which initially are frequently attributed to herniated disc disease [17-23]. When the literature series (our series included) is analyzed in composite, the average age at presentation is 64 years (range, 24-85) and a slight female predominance of 58% (21 females/15 males) exists. One patient (1/36) in the composite series presented with claudication syndrome (1/36) alone as opposed to radicular symptoms which affected 94% of all patients at presentation (34/36). Clinically, the symptomatology of hemorrhagic synovial cysts tend to be different from nonhemorrhagic cysts in terms of more acute onset and increased intensity of pain in hemorrhagic cysts, increasing possibility of neurological deficits, worse response to non-surgical treatment.

Pathophysiology

The increase in incidence of lumbar facet synovial cysts (LFSC) can likely be attributed to the advent of MRI [24]. LFSC are believed to be the result of synovial out pouchings through areas of weakened or destroyed capsular tissue, usually from a degenerated facet joint [25]. LFSC are often associated with same level spondylolisthesis (33-100%), and most commonly originate at the lumbar spine L4-5 level (61% in the literature review) [19,20,26-30]. This entity acts as an extradural mass of the lumbar spine, contributes to narrowing of the spinal canal and can cause lateral thecal sac and nerve root compression [31]. Hemorrhage causing cyst distention and neural compression and irritation by blood products may be the underlying physiologic reasoning as to the difference in acuity of clinical presentation in this patient population. Microtrauma associated with daily movement of the lumbar spine may further increase the risk of hemorrhage into existing intraspinal synovial cysts [7,14,17].

Surgical management

In the literature cases, conservative management did not lead to resolution of symptoms. Non acute, non hemorrhagic synovial cysts, managed conservatively on occasion have demonstrated that spontaneous remission of symptoms can occur [17,20,32]. Our hypothesis is that conservative treatment may have failed in our series of patients because of the inflammation that is caused by bleeding within the cyst. Joint aspiration may not be effective for acute hemorrhage depending on the consistency of the blood clot [33]. When surgical intervention is employed there continues to be dissent as to the appropriate degree of resection (e.g. remove enough facet cyst to prevent recurrence without causing excessive joint destabilization) [24,34]. Microsurgical and minimally invasive techniques have been argued to cause less long term joint destabilization [34-36]. Surgical intervention for LFSC results in pain resolution in 74-93% [17,23,24,35-38]. In one series 9% were fused at time of initial operation and there existed clinical signs of instability [38]. LFSC can be adherent to the thecal sac and thus resection is associated with durotomy in 9% of surgical cases [37]. Following LFSC resection there is an expected recurrence rate of 0-3% and a 2-9% chance of subsequent lumbar fusion due to joint destabilization [25,37]. Given the risks and outcomes it has been argued that synovial cysts respond well to surgical intervention [21].

Conclusion

In patients with acute onset of radicular symptoms, or with acute change in chronic symptoms, and imaging findings suggestive of synovial cyst formation, diagnosis of hemorrhagic synovial cyst should be entertained. Our series support that entity of acute hemorrhagic synovial cyst which should be at the forefront of differential diagnosis in the appropriate setting. In our experience, conservative treatments can be attempted, however, patients show the greatest improvements in pain and neurological exam by surgical intervention.

References

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