Regrowing Synovial Chondromatosis in a Cervical Facet Joint with Radiculopathy

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Synovial chondromatosis (SC) in the spine is rare. There are few reports of associated cervical radiculopathy and there has not been a case reported of regrowing cervical SC. Here we report a 21-year-old man with a SC of a cervical facet joint that extended into the intervertebral foramen and compressed the cervical nerve root. The same symptom developed three years following the first operation. Computed tomography (CT) scans and Magnetic resonance imaging (MRI) showed multiple calcified nodules anterior to the right facet joint of C6-7 that extended into the intervertebral foramen. A mass removal was performed just as in the previous operation with a subtotal facetectomy. When vertebral SC is suspected, complete removal involving the bone and synovium should be considered as the standard treatment option.

Key Words: Cervical facet • Radiculopathy • Regrowing • Synovial Chondromatosis

INTRODUCTION

Synovial chondromatosis (SC) is an uncommon disease diagnosed by the pathologic confirmation of multiple cartilaginous nodules in the synovium of a joint. The cartilaginous nodules in the joint may become calcified or ossified, and extrude to the loose bodies in the joint space or extend into extra-articular soft tissues. The calcified or ossified bodies can compress bones or nerves, and cause bone erosion or pain on movement or even at rest. It most favorably affects large joints such as the knee, elbow, hip, and shoulder like synovial cyst. SC in the spine is rare and there are few previous reports of associated cervical radiculopathy. We report a case of regrowing SC of a cervical facet joint that extended into the intervertebral foramen and compressed the cervical nerve root, We also discuss SC in the spine through pubmed-based documents.

CASE REPORT

A 21-year-old man presented with right scapular pain for seventeen months. He did not complain of weakness. He suffered from right scapular pain with numbness to the right first, second, third, and fourth finger tips for several years that gradually became aggravated over seventeen months prior to admission in the hospital. On neurological examination, the sensory and motor functions were normal. There were no abnormal signs or reflexes except for right scapular area pain on both voluntary and passive movement without tenderness, and numbness of the right second, third, and fourth finger tips. Cervical plain radiography showed an ovoid osteolytic lesion at the right C6 inferior articular process and a C7 superior articular process. Computed tomography (CT) showed multiple calcified nodules on the right C6-7 facet joint, extending into the intervertebral foramen. Magnetic resonance imaging (MRI) revealed a lobulated, heterogeneous enhancing extradural mass arising from the anterior aspect of the right C6-7 facet joint (Fig. 1).

With a clinical history, neurological examinations and findings of radiography, we could make a list of differential diagnoses such as: osteoid osteoma, synovial chondromatosis, osteochondrosarcoma, chronic infection (tuberculosis), and insidious monoarticular disease (inflammatory arthritis). A right hemilaminectomy of the C6 and right partial facetectomy of C6-7 was performed. We performed only subtotal facetectomy to save the cervical motion. A whitish and ovoid mass was identified, and the mass was found to be hard and not very vascular, it did not bleed during the surgery. It grossly resembled an osteoblastoma or chondroblastoma, and a subtotal resection was performed. The histologic examination showed irregular nesting chondrocytes beneath the synovial cell lining forming cartilaginous nodules, confirming the diag-
nosis SC. After the operation, his scapular pain was completely relieved. Although there was a small residual mass below the remaining facet joint that was seen in a postoperative CT (Fig. 2), he was discharged without residual symptoms or complications.

Three years after surgery, the same character right scapular pain again gradually developed in the same location. But the patient did not complain of numbness of his right fingertips. A cervical plain radiography, CT scan and MRI showed the same findings as previous in the same location; a right C6-7 facet joint and ipsilateral neural foramen, having a smaller mass extent, but causing foraminal stenosis (Fig. 3). Another facetectomy and total mass removal were performed, and about thirty percent of the C6-7 facet joint was left after the second surgery. We performed only subtotal facetectomy to save the cervical motion. The gross and microscopic morphology were the same as previous (Fig. 4). The histology showed the characteristic of SC too.

He was free of pain again at the last follow-up in the outpatient clinic visit after four months of the second operation.

**DISCUSSION**

SC is characterized by the formation of multiple cartilaginous nodules that could be calcified or ossified in the synovium of a joint space. This usually monoarthritic disease frequently involves large joints, the knee joints (60 to 70%), the elbow, hip, and shoulder joints are next most commonly affected. The mean age of the patients were 40 to 50 years and the male to female gender ratio is 2 to 1. The patients of SC mainly complain of pain, associated stiffness, swelling, and a limitation of motion of the affected joints for months.

Vertebral SC is even rarer and thirteen cases including our report were found to have been reported in English publications as was found in Pubmed.gov. The median age at the time of presentation was 39 years (range 21 to 60), and the male to female ratio was approximately 1:1. The most common presenting symptom was pain in nine patients and other symptoms included a growing mass, weakness and paresthesia. The lesions involved cervico-thoracic facet joints in nine of thirteen patients, lumbo-sacral facet joints in three, and a costo-transverse joint in one (Table 1).

Histologically, SC is categorized as primary and secondary; primary SC is characterized by nodules of hyaline cartilage in the connective tissue beneath the synovium which may be
Table 1. Locations and presenting symptoms of 13 reported cases of vertebral SC

| Authors            | Age/Sex | Location     | Presenting symptom                              | Treatment                                                                 |
|--------------------|---------|--------------|-------------------------------------------------|---------------------------------------------------------------------------|
| Coscia, et al.      | 1986    | Rt T5-6 facet | back pain radiating to breast                   | T5-6 facetectomy and laminectomy                                           |
| Milchgrub, et al.   | 1992    | Lt 1st costo-transverse | painless slowly-growing neck mass               | En bloc resection of segment of 1st 3 Lt ribs and contiguous tissue       |
| Burrafato, et al.   | 1998    | Lt L4-5 facet | painful lumbor mass                             | Resection of mass and L4-5 facetectomy                                    |
| Birchall, et al.    | 1999    | Lt T4-5 facet | leg weakness                                    | Resection of mass and T3-5 laminectomy                                     |
| Kyriakos, et al.    | 2000    | Lt C3-4 facet | neck, shoulder, arm pain                        | Lt C3-4 facetectomy and hemilaminectomy                                    |
| Greenlee, et al.    | 2002    | Lt C4-5 facet | shoulder, arm pain                              | Complete resection and Anterior approach                                   |
| Chiba, et al.       | 2003    | Rt C7-T1 facet | shoulder pain                                   | C7-T1 facetectomy and laminectomy                                         |
| Gallia, et al.      | 2004    | Lt C1-2 facet | neck pain                                       | 1st: Lt C1-2hemilaminectomy, Total facetectomy                             |
|                     |         |              |                                                 | Occipitocervical fusion                                                   |
|                     |         |              |                                                 | 2nd: Lt transmandibular, Circumglossal approach                            |
| Gallia, et al.      | 2004    | Lt C4-5 facet | neck pain                                       | C2-5 facetectomy and Laminectomy, C2-5 fusion                              |
| Abdelwahab, et al.  | 2008    | Lt L4-5 facet | buttlock pain                                   | L5 hemilaminectomy And complete resection                                 |
| Kim, et al.         | 2009    | Rt L5-S1 facet | low back pain, radiating leg pain               | Resection of mass and Interlaminar approach                                |
| Moody P, et al.     | 2010    | Rt C1-2 facet | neck, shoulder, arm pain                        | En bloc resection of mass                                                  |
| Present report      | 2010    | Rt C6-7 facet | shoulder pain                                   | Rt C1-2 facetectomy and Laminectomy, C1 to 4 fusion                      |
|                     |         |              |                                                 | 1st: Rt C6-7 facetectomy, C6 hemilaminectomy                               |
|                     |         |              |                                                 | 2nd: another Rt C6-7 facetectomy and complete resection                   |

They may form large masses as a result of fusion. Cytological features include hypercellularity, chondrocyte clustering, pleomorphic nuclei, and occasional mitoses.

A generally primary SC shows a benign clinical course, but with recurrence rates as high as 15% in extravertebral SC have been reported.

Secondary SCs, the most common form, has been associated with other joint disorders including osteoarthritis, rheumatoid arthritis, neuropathic arthropathy, osteonecrosis, tuberculosis, osteochondritis dissecans, and osteochondral fractures. It shows chondrocytes that tend not to cluster and usually lack cellular atypia, or binucleation. Plain radiography shows characteristic calcified or osseous bodies; however, calcification may not be seen in 5% to 30% of cases because of the lack of matrix mineralization, those had appeared as water-dense foci. A CT scan typically reveals a soft-tissue mass with multiple calcifications. In an MRI, nodules are seen using an intermediate to isointense signal on T1-weighted sequences, high signal intensities on T2-weighted sequences, and an enhancement after gadolinium administration.

Because of its recurrence and malignant transformation risk inferred from extravertebral SC, some authors recommend surgical treatment includes the removal of the loose body or mass and the complete synovectomy of the affected joints. Although the recurrence rate is very low in SC and no agreed treatment guideline is available, arthrodesis has been reported to be a successful as a salvage treatment option for recurrent SC. Despite of the regrown lesion, in our case, we performed only subtotal facetectomy and total lesionectomy to save the cervical motion. Fusion should be considered in case of recurrence when total facetectomy is inevitable. However simultaneous posterior fusion sometimes leads to extended fusion on adjacent level. If the recurrence is found in the long term follow up period, we plan to perform a total facetectomy and fusion simultaneously.

However, There were two refractory extravertebral SC in which the patients underwent operations more than four times, and one of them recurred even after an arthrodesis. To the best of our knowledge, a total lesionectomy of the involved vertebral joint including the whole synovium is treatment of choice in cases of regrowing vertebral SC. If needed, an arthrodesis with adjacent vertebra should be considered.

CONCLUSION

With a very small number of reported vertebral SCs, there has not been enough information about its natural course, recurrence rate, treatment guideline, and prognosis. We recom-
mend that for symptomatic patients with imaging studies that show a vertebral lesion with cartilage characteristics, SC has to be included in the differential diagnosis. Since treatment for extravertebral SC is an arthrodesis, the total removal of SC and arthrodesis should be considered when regrowing vertebral SC is suspected.

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