Case Report

Posttraumatic Pigmented Villonodular Synovitis of the Elbow After Occult Fracture: A Literature Review

Abstract

Pigmented villonodular synovitis (PVNS) is a disease rarely found in the elbow. In the setting of previous trauma, there are no documented reports of PVNS occurring in the posttraumatic state. We report a case of elbow PVNS in a 16-year-old male with a history of traumatic injury to the supracondylar humerus and olecranon, resulting in nondisplaced fractures, diagnosed 3 years prior to presentation. We diagnosed posttraumatic PVNS of the elbow using a combination of plain radiographs, ultrasonography, and MRI, along with an infectious, hematologic, and rheumatologic workup. This workup culminates in open elbow débridement of synovial tumor, with pathology confirming our preoperative diagnosis of PVNS. A literature search and review of PVNS in the elbow yield only 54 results, none of which is related to previous fracture. In the neurosurgery literature, however, there is a case report of a pathological fracture of the odontoid related to PVNS.

Case Report

Christopher A. Caruso, MD
Timothy P. Leddy, MD

From the Department of Orthopaedic Surgery, Rutgers-Robert Wood Johnson Medical School, Piscataway, NJ (Dr. Caruso and Dr. Leddy).

None of the following authors or any immediate family member has received anything of value from or has stock or stock options held in a commercial company or institution related directly or indirectly to the subject of this chapter: Dr. Caruso and Dr. Leddy.

JAAOS Glob Res Rev 2017;1:e018
DOI: 10.5435/JAAOSGlobal-D-17-00018
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Pigmented villonodular synovitis (PVNS) describes a benign neoplastic process involving the synovial lining of the joint. Occurrence in the elbow is a rare entity, with only 54 cases reported in the literature. The incidence of posttraumatic PVNS of the elbow is a significantly less common occurrence with no reported cases in the literature. We report a case of posttraumatic elbow PVNS along with a detailed description of the hematologic, infectious, and rheumatologic workup and an end result of elbow débridement and pathological diagnosis confirming PVNS.

A 16-year-old male presented to our emergency department with a 3-year history of painful right elbow effusions, resulting in decreased range of motion and limitation during athletic activities. He reported that these episodes were insidious; while the duration of pain and swelling varied, most episodes lasted for approximately 2 to 3 days. During the symptom-free periods, the patient was able to participate in athletic activity, namely, basketball, with no limitations on or hindrance in his performance.
In August 2012, the patient first presented to our emergency department, complaining of right elbow pain and swelling, after falling onto his elbow during a game of basketball. Plain radiographs were taken at that time, and the patient was diagnosed with a nondisplaced proximal ulnar and supracondylar humerus fracture, along with a large joint effusion, (Figure 1).

The patient was treated with a sling and a brief period of immobilization, and was symptom free after approximately 2 weeks, until February 2013, when he presented back to our emergency department, once again complaining of right elbow pain. This occurrence was associated with an opposing player bumping into the patient’s right elbow during a basketball game. Plain radiographs showed a large joint effusion, with no definite fracture (Figure 2).

The patient was treated with a sling and a brief period of immobilization once again and did well for more than 2 years, until November of 2015, when he once more presented to our emergency department complaining of right elbow pain; however, this time, it was not related to any direct trauma. The patient reported that the swelling and pain developed over a period of a few days and became progressively worse, prompting his visit to our emergency department for further evaluation.

On physical examination, the right elbow had a large effusion present and was globally tender to palpation about the entire elbow. There was no obvious limitation to range of motion on physical examination, with the patient able to achieve full extension and flexion, along with full supination and pronation. However, all these movements were associated with discomfort and pain. Plain radiographs were again obtained, which showed a large joint effusion without fracture (Figure 3).

Further imaging was also performed, including ultrasonography, which showed a large complex joint effusion with focal discrete rounded areas of hypoechogenicity, without increased flow to the region (Figure 4).

After ultrasonography and plain radiographs were completed, the decision was made to obtain an MRI of the right elbow to further identify the joint effusion. The MRI showed a large complex effusion with soft-tissue nodular synovial enhancement, consistent with synovitis. Etiologies of septic arthritis, Lyme disease, or a rheumatologic process were all considered in the differential diagnosis at this time. There was no evidence of hemarthrosis or erosions present on MRI (Figure 5).

Upon discharge from our institution, the patient was seen in the outpatient setting approximately 10 days later. At this time, the patient reported a relief in symptoms and a decrease in the swelling present around the elbow. Treatment options and likely
diagnoses were discussed with the patient and his family. The findings on MRI and reoccurrence of symptomatic outbreaks were consistent with proliferative synovitis, and the option of surgical intervention was discussed. However, before proceeding with surgery, further infectious and hematologic workup was performed. The patient’s basic metabolic panel and complete blood count showed no abnormalities. The C-reactive protein level and erythrocyte sedimentation rate were also within the normal laboratory ranges. Further laboratory testing that included antinuclear antibody titer, rheumatoid factor, and Lyme antibody panel was negative, as well.

At this point, the discussion for a right elbow open débridement of the synovial tumor was had with the patient and his family to lower the potential incidence of recurrent episodes in the future. Approximately 1 month after being seen in the office, the patient underwent right elbow open débridement. A posterior approach to the elbow was used to allow dissection into the joint space. The synovial tumor was encountered once the arthrotomy was performed, with attention directed anteriorly at first, then posteriorly to the olecranon fossa. After complete removal of the synovial tumor, the specimen was sent to our pathology department.

The pathology report showed proliferative lesions of polyhedral cells with eosinophilic cytoplasm and oval nuclei. Also seen were numerous macrophages with foamy cytoplasm and hemosiderin. There were scattered multinucleated osteoclast-type giant cells, and in some regions, stroma is hyalinized. Mitotic activity is low (up to 3 per 10 HPF [high-powered fields]). The aforementioned features are characteristic of PVNS, also known as tenosynovial giant cell tumor.

During the postoperative period, the patient was placed into a posterior ...
splint while the sutures were in place for 2 weeks. The patient was then encouraged to start active range of motion exercises once the surgical site was well healed.

Discussion

PVNS of the elbow in the pediatric population after a fracture is an entity that to our knowledge has not been described in the literature. PVNS of the elbow without the history of fracture has been described in the orthopaedic literature. PVNS has been described as a benign, locally invasive disease of the synovium. The joint surfaces are affected, and if left untreated, impairment of normal function can occur. The etiology of the disease process is unknown; however, it is frequently described as a locally aggressive neoplasm or reactive synovitis in the literature.1–3

Flandry et al described PVNS as a monoarticular condition with a variable prognosis with the overall incidence of 1 and 3 per 1,000,000.4 They described a case of a 56-year-old man with repeated pain, stiffness, and joint effusions with normal laboratory values. The patient underwent a near-total synovectomy, similar to our patient, and had no symptoms at 12-month follow-up. In 1999, Goldman et al described a case report of a 31-year-old woman who had 2 to 3 years of elbow pain and effusions and who underwent a synovectomy after an MRI was consistent with PVNS.5 Signal attenuation by the hemosiderin within a thickened synovium, along with the presence of fatty signal within the synovium due to accumulation of lipid-laden macrophages, has been described.7 Histopathological review of the lesion typically shows that the synovium appears as reddish brown with hypertrophied synovial villi, multinucleated giant cells, and hemosiderin-laden macrophages.3,5,6,8–11 These reports are consistent with the pathology from our synovial débridement.

Treatment described in the literature has been described as requiring a synovectomy to reduce the possibility of recurrence.2,3,5,6 Radiation treatment has also been described because of extensive bony involvement.12 Although there are reports in the literature on elbow PVNS and treatment, none of these discusses the presence of a fracture resulting in recurrent elbow effusions and painful symptomatic outbreaks, which occurred in our patient. Prior to the patient’s first visit to the emergency department after injuring his elbow during a basketball game, he did not report any periods of pain, warmth, or swelling in the elbow. There is a case report in the neurosurgery spine literature in 2007 by Finn et al.13 They report a case of an 82-year-old woman with neck pain and upper extremity numbness and weakness who was found to have a mixed sclerotic and lucent lesion affecting the dens and right lateral mass of C2 on CT, along with a pathologic fracture at the base of the dens. The patient underwent transarticular screw fixation with biopsy, which was reported as PVNS involving the C2 vertebra.13 It was reported as the first known case of PVNS causing a pathological fracture.

To our knowledge, this is the first case of a potential pathological fracture in the elbow from PVNS. It is possible that in 2012, when the patient first presented to our emergency department, the synovial proliferation consistent with PVNS was already present in our patient’s elbow, resulting in a pathologic fracture. The recurrent elbow effusions and periods of painful range of motion were initially related to subsequent trauma; however, at his most recent presentation to the emergency department, there was no history of recent trauma in the elbow.

In conclusion, with so few cases reported of PVNS of the elbow and no reports on elbow fractures with PVNS, it is unknown whether the presence of PVNS in the elbow joint puts the patient at risk for pathological fracture. We believe that imaging with ultrasonography, plain radiographs, and MRI, and a hematologic and infectious workup, are key in providing the patient with optimum treatment. The goal of PVNS treatment—preservation of the joint and elimination of future outbreaks—still remains.

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