Case Report

Localized Pigmented Villonodular Synovitis of the Knee

Mehmet Aşik, M.D., Levent Erlap, M.D., Levent Altinel, M.D., and Özgür Çetik, M.D.

Abstract: Localized pigmented villonodular synovitis (PVNS) of the knee is a rare, idiopathic condition presenting with symptoms that can be confused with various other intra-articular pathologies. The condition is usually monoarticular, the knee being most commonly affected. If totally excised, complete cure can be achieved and recurrence is very rarely reported. In this report, we present 4 cases of patients with different symptomatology but all with PVNS of the knee who underwent arthroscopic treatment. At short-term follow-up, all patients had complete recovery of their symptoms with no apparent recurrence. **Key Words:** Knee—Localized form—Pigmented villonodular synovitis.

Although there has been a great deal of speculation regarding the etiology of pigmented villonodular synovitis (PVNS), the cause still remains unknown. It is apparent that the lesion is not a neoplasm and probably represents an inflammatory process.[1] The forms of PVNS are classified as follows: localized, diffuse, and mixed.[2] It is a rare disorder, with an estimated annual incidence of 1.8 cases per million population, only one quarter being of the localized form.[3,4]

CASE REPORTS

Case 1

The patient was a 36-year-old preacher who had initial symptoms of swelling in the left knee and restriction of flexion 2 months previously. The symptoms subsided in 2 weeks and he had pain only while praying with excessive knee flexion. On physical examination, he had only a positive patellar grinding test. Magnetic resonance imaging (MRI) revealed a nodular mass in the infrapatellar fat pad, medial to the patella, 1 × 1.5 cm in size and hypoechogenic in all sequences (Fig 1). An arthroscopic examination was performed and a yellowish-pink colored nodule embedded in the synovium posteromedial to the infrapatellar fat pad was detected that was totally excised through shaving (Fig 2). Additionally, Outerbridge grade II chondropathy of the patella was diagnosed. Pathologic examination of the resected specimen revealed PVNS (Fig 3). The patient was totally free of symptoms after 18 months and there has been no finding of recurrence.

Case 2

A 19-year-old female medical student was admitted to our clinic with symptoms of anterior knee pain and a clicking sensation during extension. A palpable mass, 1 × 1 cm in size, medial to the patella was detected. The patient had full range of motion with pain during terminal extension. MRI revealed an intra-articular nodular mass in the posterior part of the medial retinaculum, 1.2 × 2.7 cm in size and hypoechogenic in all sequences (Fig 4). Diagnostic arthroscopy showed a grade IV medial parapatellar plica and a yellowish-pink colored nodule in the intercondylar

From the Department of Orthopaedics and Traumatology, Istanbul University, Istanbul Medical Faculty, Istanbul, Turkey.

Address correspondence and reprint requests to Mehmet Aşik, M.D., Istanbul Universitesi, Istanbul Tip Fakültesi, Ortopedi ve Travmatoloji A.B.D., 34390 -Çapa/ Istanbul, Turkey. E-mail: ozgurcetik @ hotmail.com

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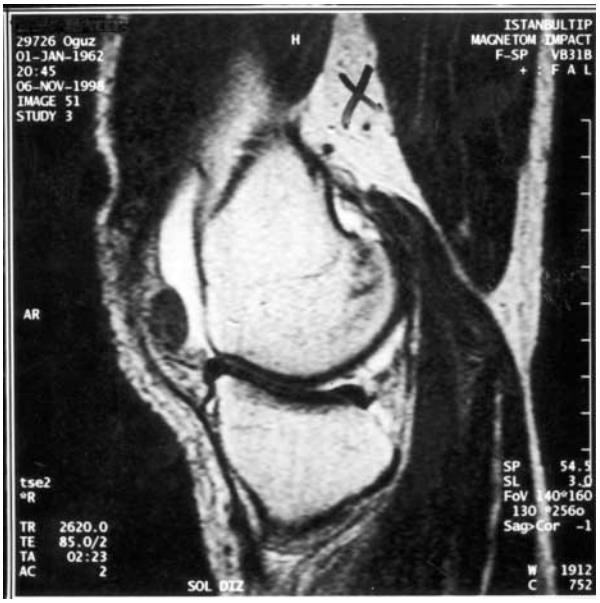

FIGURE 1. Case 1: MRI of the neoplasm (sagittal T1-weighted view).

region. The plica was resected, the nodule totally extirpated, and a grade I chondropathic area on the medial femoral condyle shaved (Fig 5). Pathologic examination of the extirpated nodule revealed PVNS (Fig 6). The patient returned to her daily activities at the end of the first postoperative week and, after 2 years, she was totally free of symptoms with was no finding of recurrence.

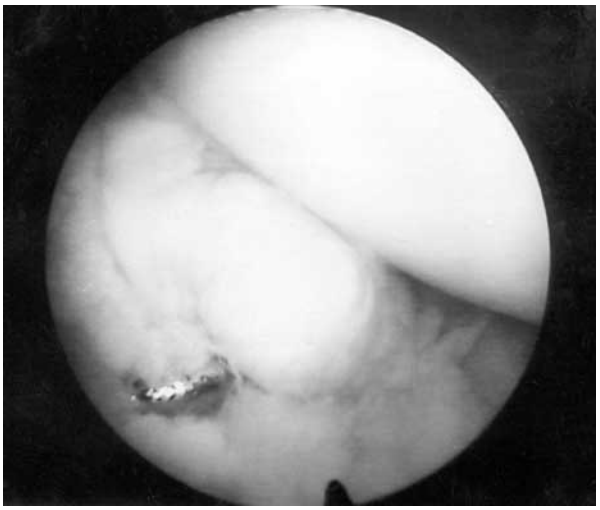

FIGURE 2. Case 1: Arthroscopic photograph of the nodule.

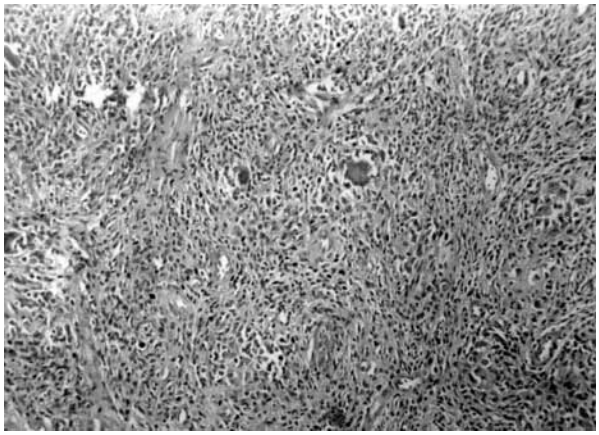

FIGURE 3. Case 1: Histopathologic specimen through the nodule (H&E, original magnification ×125).

Case 3

The third patient, a 59-year-old housewife, was admitted to our clinic with complaints of pain in the medial part of her right knee that became worse at night. Physical examination revealed a minimal effusion and crepitation with palpation and a positive McMurray test in the medial side. Conventional radiographs showed changes of medial gonarthrosis and a soft-tissue opacity in the infrapatellar region (Fig 7). MRI showed a nodular mass, 3 × 1.5 cm in size,

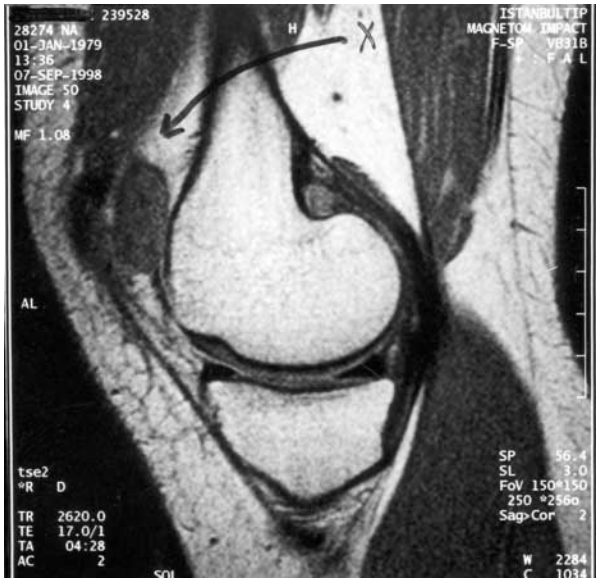

FIGURE 4. Case 2: MRI of the neoplasm (sagittal T1-weighted view).

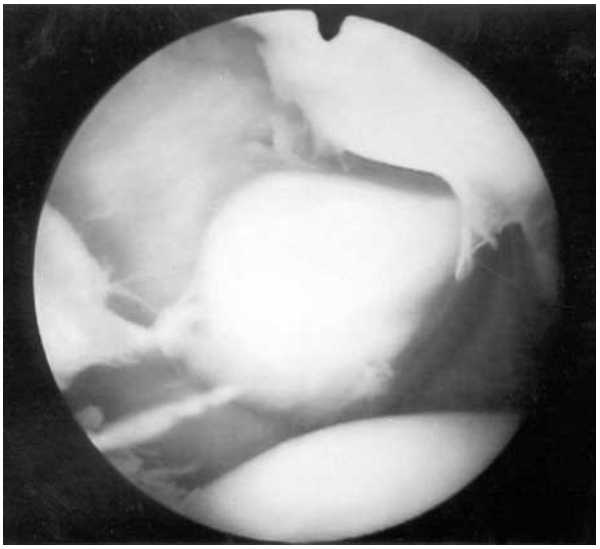

FIGURE 5. Case 2: Arthroscopic photograph of the nodule.

located between the infrapatellar and suprapatellar regions medial to the patella (Fig 8). An arthroscopic examination was performed and a yellowish-pink colored nodule embedded in the infrapatellar fat pad was detected. The nodule was displacing the patella ventrally and had unclear margins from surrounding tissues. In addition, she had grade III chondropathy on the medial femoral condyle, grade IV chondropathy on the medial tibial plateau, grade III retropatellar chondropathy, and degenerated meniscus tears on the posterior horns of the medial and lateral menisci (Fig 9). The nodule was totally extirpated through the arthroscopy portals, the chondropathic areas were debrided, and a medial and lateral partial meniscectomy performed. Pathologic examination of the extirpated nodule showed PVNS (Fig 10). After a follow-up period of 2½ years, the patient has minimal pain during and after daily activities and she has no sign of recurrence.

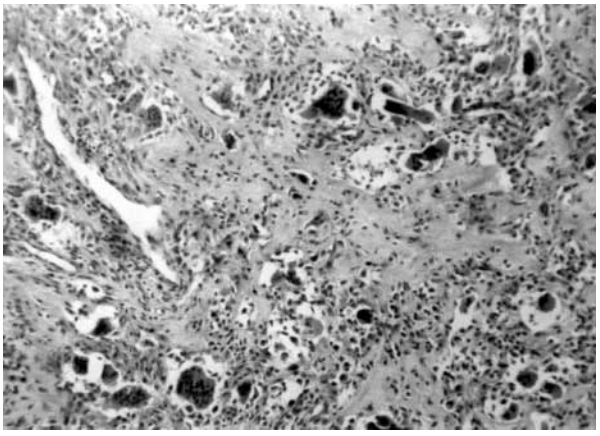

FIGURE 6. Case 2: Histopathologic specimen through the nodule (H&E, original magnification ×125).

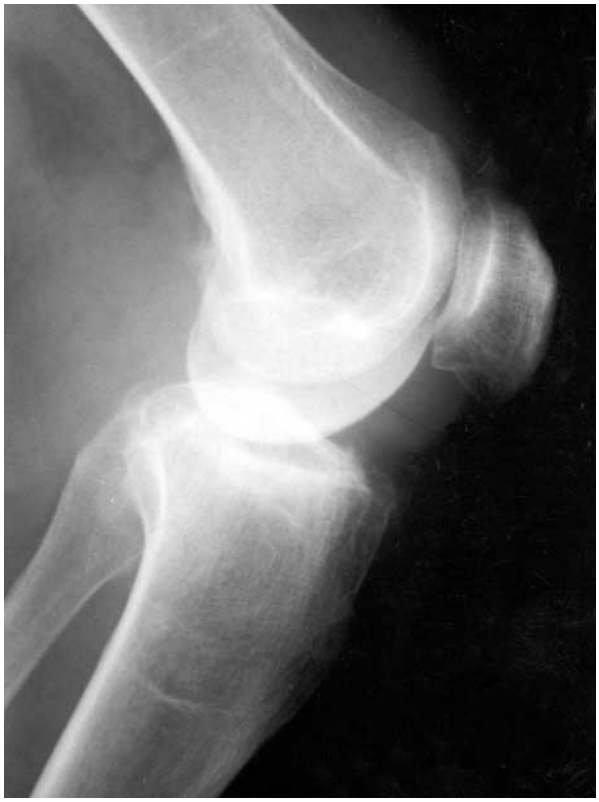

FIGURE 7. Case 3: Nodular soft-tissue density in the infrapatellar region of the knee shown in lateral radiograph of the knee.

Case 4

The last patient was a 26-year-old woman. She presented to us with a history of pain in the lateral and ventral parts of her left knee, temporary episodes of effusion, and locking sensation. Physical examination revealed diffuse synovial hypertrophy and suprapatellar pain during hyperflexion. MRI showed a nodular mass posterosuperior to the infrapatellar fat pad 1.5 × 1.5 cm in size and heterogeneously hypoechogenic in all sequences (Fig 11). Arthroscopic examination demonstrated a yellowish-red colored nodule, 1 × 1.5 cm in size, located between the suprapatellar and retropatellar regions, that was totally removed through arthroscopic resection (Fig 12). Histopathologic ex-

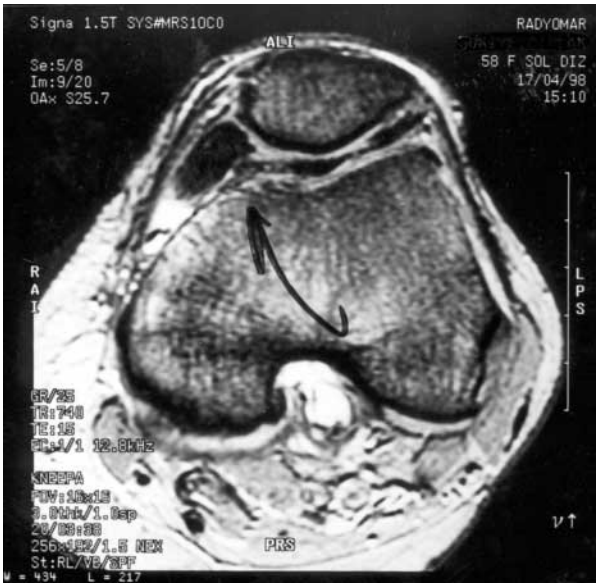

FIGURE 8. Case 3: MRI of the neoplasm. The axial image shows a mass of the medial infrapatellar region (arrow).

amination showed synovial tissue with villous hyperplasia, chronic inflammatory infiltration, and areas of necrosis surrounded by histiocytes (Fig 13). During her last follow-up visit after 2 years, the patient had complete recovery of her symptoms with no apparent recurrence.

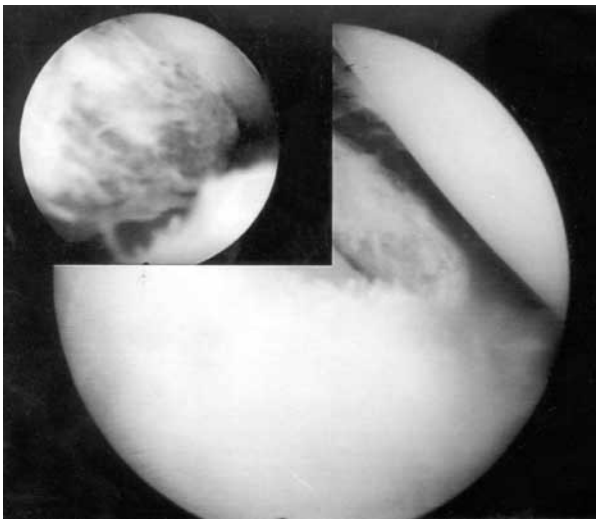

FIGURE 9. Case 3: Arthroscopic photograph of the nodule.

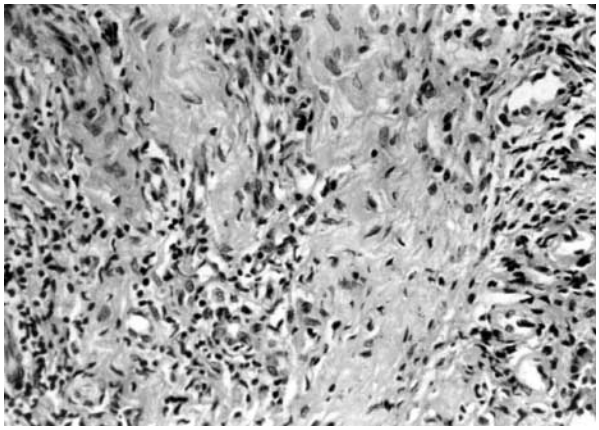

FIGURE 10. Case 3: Histopathologic specimen through the nodule (H&E, original magnification ×310).

DISCUSSION

In the early reports in the literature, the nomenclature used for PVNS is often confusing, the terms xanthoma or giant-cell tumor,[5] myeloxanthoma,[6] villous arthritis,[7] benign synovioma[8] being used. Jaffe et al.[9] introduced the term pigmented villonodular syno-

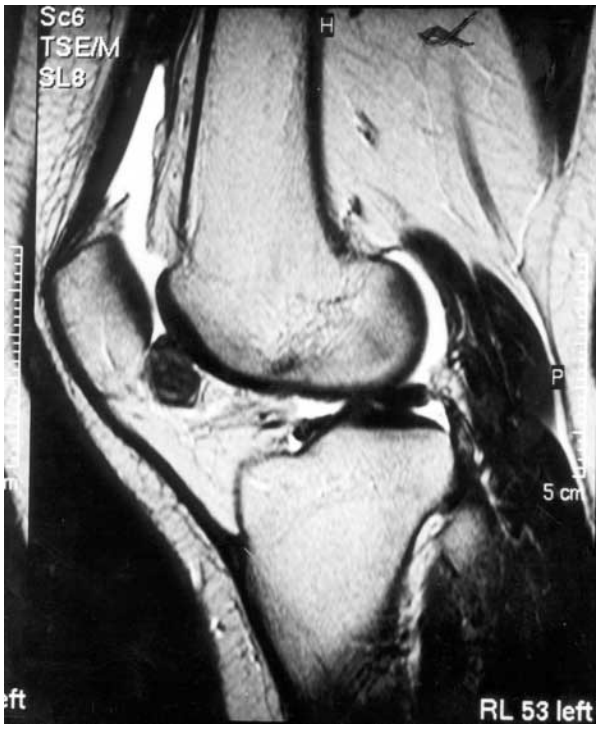

FIGURE 11. Case 4: MRI of the neoplasm (sagittal T1-weighted view).

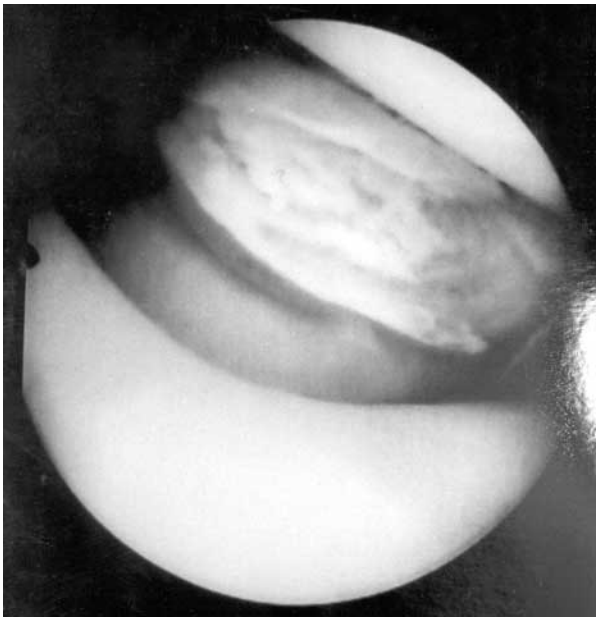

FIGURE 12. Case 4: Arthroscopic photograph of the nodule.

vitis. Fisk[10] attributed the changes of PVNS to repeated minor trauma of synovial fringes, with consequent hydrarthrosis. Young and Hudeck[11] produced changes that they regarded as similar to those of PVNS by repeated injection of blood into the knees of dogs. It has been suggested, however, that these changes are not really comparable with those of PVNS, but more closely resemble those seen in hemophilia.[12] PVNS can be classified into 3 forms; localized, diffuse, and mixed (which represents a transition between localized and diffuse forms).[2] The disease is typically a monoarticular arthritis of the knee joint that affects adults who are in the third or fourth decades of life.[2,3,13] The most common location of PVNS in the knee is the meniscocapsular junction. Other sites occurring with notable frequency are the intercondylar notch, tibial eminence, and peripatellar areas.[14] Rarely, PVNS may be localized in the posterior compartment of the knee[15] or in the patellar fat pad.[16]

Initial symptoms are generally mild or moderate episodes of knee pain and swelling. The period between the onset of symptoms and diagnosis may be quite long. In the localized form, a mass is usually palpable in the knee. This mass causes restriction of motion and locking or popping sensations in the knee.[17-19] Standard radiographic findings are rare and subtle in PVNS. Nodular soft-tissue tumefactions without any calcification are the main radiologic findings.[20] Today, MRI has become an excellent clinical tool for the evaluation of intra-articular tumors of the knee joint. In the case of PVNS, MRI is an effective means of detection and definition of size, position and extent of this discrete, nodular lesion.[21] The common pathologic features of PVNS are villous or nodular proliferation of synovial tissue and pigmentation caused by the presence of hemosiderin and lipid. Depending on the presence of intranodular hemorrhage or lipid accumulation, the degree of pigmentation ranges from a barely detectable yellow color to dark brown. On microscopic examination, synovial cell proliferation and subsynovial invasion is present. Cellular infiltration consists of polyhedral histiocytes, fibroblasts, and hemosiderin or lipid-laden macrophages (foamy cells). Although occasional mitotic cells may be present, abnormal mitosis characteristic of malignancy is never seen.[22]

The main steps of treatment are arthroscopic extirpation for the localized form and an additional synovectomy for the mixed form.[2] The best results are obtained in cases of localized PVNS with almost no recurrence. The differential diagnosis includes loose bodies, synovial sarcoma, rheumatoid arthritis, osteoarthritis, chondromalacia patellae, and meniscopathies.[21]

None of our patients had a previous trauma, which is contradictory to Fisk's explanation of traumatic pathogenesis.[2] All 4 patients in our series had monoarticular involvement. The length of time our patients experienced symptoms before seeking help varied between 2 months and 5 years, thus explaining the mild

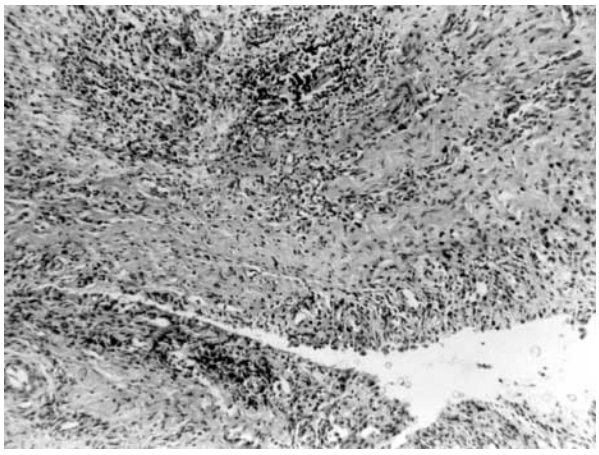

FIGURE 13. Case 4: Histopathologic specimen through the nodule (H&E, original magnification ×125).

symptomatology of this disorder. Except for the second patient in our series, PVNS nodules were coincidentally detected during MRI examinations ordered for nonspecific symptoms. The second patient had a palpable mass and, thus, MRI was performed to evaluate a mass lesion. In the localized form of PVNS, patients initially have nonspecific complaints. In a patient with a palpable mass in the knee joint or in a patient with intractable pain and/or synovitis, PVNS has to remembered in the differential diagnosis list.

There are several reasons to prefer arthroscopic surgery to arthrotomy in cases of suspected PVNS. Arthroscopy is less invasive than classic arthrotomy, allows a more accurate diagnosis, and facilitates the discovery of small localized forms of PVNS. It also allows for the specification of the size and the site of a localized mass. Arthroscopy permits the evaluation and biopsy examination of the remaining synovium in order to classify the form of PVNS present. Synovectomy might be recommended for mixed and diffuse forms of PVNS. It must be kept in mind that, in the mixed form, samples from areas showing synovial hypertrophy have to be sent for pathologic examination for verification and differentiation of subgroups.[2] Numerous papers report complete cure with in toto excision in the localized form of PVNS,[1,17,23,24] except for Panagiotapoulos et al.[25] who presented a case with local recurrence 17 years after a total synovectomy. Although our follow-up period was quite short, we have not experienced any recurrence of the symptoms or of the mass in our patients. We believe that arthroscopy has assumed a dominant role in the diagnosis, treatment, and follow-up in patients with synovial pathologies of the knee.

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