Acta Clin Croat 2025; 64:190-199
doi: 10.20471/acc.2025.64.02.02

Original Scientific Paper

LOCALIZED PIGMENTED VILLONODULAR SYNOVITIS OF THE KNEE: A CONSECUTIVE CASE SERIES AND REVIEW OF THE LITERATURE

Ivan Bojanić[1,2], Ivan Levaj[1], Damjan Dimnjaković[1] and Tomislav Smoljanović[1,2]

[1]Department of Orthopedic Surgery, Zagreb University Hospital Center, Zagreb, Croatia;
[2]University of Zagreb, School of Medicine, Zagreb, Croatia

SUMMARY – Pigmented villonodular synovitis is a rare disease that occurs on synovial tissue within and outside a joint. It can be localized or diffuse. Localized pigmented villonodular synovitis (LPVNS) can occur in any compartment of the knee joint. The aim of this study was to retrospectively analyze our consecutive series of LPVNS of the knee. From January 1999 to December 2018, 10 consecutive patients with LPVNS of the knee underwent surgical treatment at our department. All patients were arthroscopically treated by the senior author by removal of the localized mass and partial synovial resection of the area surrounding the bottom of the lesion. The series included four female and six male patients, mean age 29.5 (range, 17-60) years. Their symptoms prior to the operation lasted from 3 months to 3 years (mean, 11.8 months). At the mean follow-up of 110.9 (range, 11-239) months, none of the patients had recurrence of the disease. Our study confirms the consensus in the literature that LPVNS of the knee should be treated arthroscopically by excision of the localized mass and partial synovectomy of the area surrounding the base of the lesion.

Key words: *Pigmented villonodular synovitis; Localized pigmented villonodular synovitis; Knee; Arthroscopy*

Introduction

Pigmented villonodular synovitis (PVNS) is an uncommon disease characterized by proliferation of a synovial membrane of a joint, tendon sheath or bursa[1-4]. Several etiologies have been suggested, such as neoplastic, traumatic, inflammatory, genetic predisposition, or an anomaly of lipid metabolism[1-4]. The exact cause of PVNS is unclear to date. Although it can affect any age group, PVNS is most common between the second and fifth decade of life with equal sex prevalence[1-4]. PVNS is usually a single joint disease, most frequently affecting the knee, succeeded by the hip, ankle, shoulder and elbow to a lesser extent[1-6]. Depending on the extent of involvement of synovial membrane of a joint, a localized pigmented villonodular synovitis (LPVNS) and diffuse pigmented villonodular synovitis (DPVNS) form of this disease can be distinguished[1-4]. Microscopically, the 2 types show no clear difference[1-4]. LPVNS presents as a solitary mass of pedunculated or, less frequently, sessile nodular outgrowth of the synovial membrane and it is surrounded by normal synovium[6-20]. DPVNS affects

Correspondence to: *Ivan Bojanić, MD, PhD*, Department of Orthopedic Surgery, Zagreb University Hospital Center, Šalata 6/7, HR-10000 Zagreb, Croatia
E-mail: ivan.bojanic@mef.hr

Received March 7, 2019, accepted February 4, 2020

synovial membrane of the whole joint and is villous in nature[1-4]. The worldwide estimated annual incidence rate of LPVNS and DPVNS is 10 and 4 *per* million people, respectively[21].

LPVNS usually presents as a subacute knee problem and rarely with an acute course[7-20]. It is essential that the physician considers the possibility of LPVNS during physical examination of the patient with nonspecific symptoms. The symptoms depend on the shape of the mass and its localization within the knee. Effusion, snapping, locking, catching, giving-way, limited range of motion, localized sensitivity to palpation, pain, and/or a mass of tissue within the joint are the common symptoms accompanying LPVNS[7-20,22,23]. There is a consensus in the literature that LPVNS should be arthroscopically treated by removal of the localized mass and synovectomy of the area surrounding the base of the lesion[1-4,18,24-26].

The aim of this retrospective case study was to analyze arthroscopically treated patients with LPVNS of the knee.

Patients and Methods

Operating room logs of the Department of Orthopedic Surgery, Zagreb University Hospital Center, Zagreb, Croatia, were searched using search terms "knee", "arthroscopy", and "LPVNS". Search of patient records revealed 10 consecutive patients arthroscopically treated by the senior author (I.B.) in the period from January 1999 until December 2018. An independent examiner who was not involved in the treatment of the patients reviewed their paper and electronic clinical, radiological and histologic records. The examiner contacted all the patients for the follow-up information.

Arthroscopic excision of the localized mass in addition to partial synovectomy of the area at the base of the lesion was performed in all patients. After excision, tissue specimen was sent for histopathologic examination. Associated disorders that were encountered with LPVNS were treated at the same time using arthroscopic technique.

Arthroscopic surgery was performed in all patients with tourniquet under spinal anesthesia with the affected knee placed in the leg holder. Standard anterolateral and anteromedial portals were created and then thorough examination of the knee joint was performed. When the mass was identified within the knee, the exact localization of the base of the lesion was determined. In some patients, additional arthroscopic portals were required because of the localization of the lesion within the knee. Borders of the lesion were delineated by probing soft tissue at the base of the lesion. Arthroscopic mechanical instruments or a radiofrequency wand was used to mobilize the lesion. Once it was cut from the stalk, the mass was removed from the joint with a grasper. Partial synovectomy was then performed at the base of the lesion with the help of a shaver and a radiofrequency wand in order to achieve complete macroscopic local clearance. At the end of the operative procedure, a No. 12 closed suction drain was placed through the anterolateral portal into the joint. Following removal of the drain 24 hours after the surgery, a program of active and passive range of motion and strengthening knee exercises started. The patients were instructed to perform weight bearing as tolerated with crutches during the first three weeks after the surgery.

Results

Ten patients (four females and six males) were treated for unilateral LPVNS of the knee (Table 1). The mean patient age was 29.5 (range, 17-60) years. The mean time between the onset of symptoms to the diagnosis at surgery was 11.8 (range, 3-36) months. The most common complaint on presentation was persistent pain, followed by effusion of the joint, and loss of extension. Four patients had a history of trauma before the onset of knee symptoms, and in two of these four patients, additional pathology was found in the knee besides LPVNS. Plain radiographs were taken in all patients before surgery. In four patients, LPVNS was found incidentally during arthroscopy. Six patients had preoperative magnetic resonance imaging (MRI), but only three of them had radiological interpretation of LPVNS. In the remaining three patients who had visible masses on MRI, LPVNS was confirmed after diagnostic arthroscopy (Figs. 1 and 2).

In eight patients, the diagnosis of LPVNS was verified by histopathologic features, whereas in histopathologic specimens of two patients a necrotic tumor

Table 1. Patient descriptive data

No.	Gender/age (years)	Duration of symptoms (months)	History of trauma	Preoperative MRI (suspicion of LPVNS)	Presenting complaint	Location of LPVNS	Associated pathology	Arthroscopic portals	Diagnosis proven by histopathology	Follow-up (months)
1	F/20	9	Yes	No	Pain with loss of extension of 15°	Posterolateral	Displaced bucket-handle tear of the lateral meniscus	AL, AM, PL	Yes	239
2	F/41	3	Yes	No	Intraarticular loose body feel	In the intercondylar notch	None	AL, AM, SL	Yes	223
3	M/60	12	No	No	Pain with a loss of extension of 20°	In the intercondylar notch	None	AL, AM, SL	Yes	223
4	M/16	11	Yes	Yes (no)	Pain along the lateral joint line and occasional swelling	In the lateral gutter	Two chondral loose bodies	AL, AM, PM, PL	Yes	156
5	F/28	4	No	Yes (yes)	Constant pain unrelated to activity, occasional swelling	In the intercondylar notch and posteromedial	None	AL, AM, PM	Yes	116
6	M/19	24	Yes	No	Intraarticular loose body feel, occasional swelling	In the suprapatellar pouch	None	AL, AM, SL	Yes	52
7	M/19	4	No	Yes (yes)	Constant pain unrelated to activity and moderate swelling	In the intercondylar notch	None	AL, AM	No	50
8	M/31	36	No	Yes (yes)	Intraarticular loose body feel, occasional swelling	In the suprapatellar pouch	None	AL, AM, SL	yes	28
9	M/17	3	No	Yes (no)	Posteromedial pain and moderate swelling	Posteromedial	None	AL, AM, PM	No	11
10	F/44	12	No	Yes (no)	Pain with loss of extension of 15°	In the intercondylar notch	None	AL, AM, SL	Yes	11

F = female, M = male; AL = anterolateral portal, AM = anteromedial portal, PL = posterolateral portal, SL = superolateral portal, PM = posteromedial portal; MRI = magnetic resonance imaging; LPVNS = localized pigmented villonodular synovitis

Table 2. Presentation of basic information on patients with localized pigmented villonodular synovitis (LPVNS) of the knee treated arthroscopically (included articles presented outcome of treatment in five or more patients)

First author/ year of publication	Number of study patients (male/female ratio)	Mean age of patients at surgery in years (range)	Presenting symptoms aligned by appearance frequency (percentage)	Mean duration of symptoms in months (range)	Mean follow-up time in months (range)	Recurrence of the disease (percentage)
Kim[7] / 2000	11 (6/5)	34.6 (15-59)	Pain (100) Palpable mass (64) Locking (64) Swelling (55) Joint line tenderness (27)	14.2 (2-36)	29.9 (24-48)	0
Akgün[8] / 2003	7 (NR)	29 (13-50)	NR	NR	24 (12-33)	0
Calmet[9] / 2003	5 (NR)	36.8 (23-49)[1]	Pain (55) Mechanical symptoms (45) Palpable mass (11)[1]	27.1 (6-120)[1]	36 (12-84)[1]	0
Hernandez[10] / 2005	7 (4/3)	26.1 (5-41)	NR	NR	36.1 (12-74)	0
Özalay[11] / 2005	15 (3/12)	38.6 (18-58)	Mechanical symptoms (100) Pain (68) Swelling (37) Loss of terminal extensions (21) Palpable mass (21) Locked knee (10.5)[2]	10 (0.3-24)[2]	47.5 (6-120)	0
Dines[12] / 2007	10 (PN)	45.4 (17-68)	Pain (92) Swelling (54) Palpable mass (42) Joint line tenderness (35) Mechanical symptoms (31) Giving way/instability (23)[3]	15.9[3]	65.8 (46-123)	0
Rhee[13] / 2010	11 (9/2)	34.1 (16-72)	NR	40.3 (0.1-223)	112 (25-223)	18[4]
Loriaut[14] / 2011	20 (8/12)	46 (23-71)	Discomfort (100) Swelling (90) Mechanical symptoms (50) Palpable mass (15) Pain (10)	7 (4–14)	75 (12-144)	20[5]
Jain[15] / 2013	11 (10/1)	39 (25-52)	NR	NR	65 (36-108)	0
Georgiannos[16] / 2016	23 (13/10)	38 (17-56)	Pain (72.7) Swelling (59.1) Mechanical symptoms (50) Palpable mass (22.7)[6]	6.7	144 (60-240)[6]	0
Shekhar[17] / 2017	10 (7/3)	33 (22-46)	Swelling (100) Pain (70) Mechanical symptoms (70)	13.9 (4-36)	20.3 (9-36)	0

Included articles presented outcome of treatment in five or more patients. The articles were sorted by the year of publishing; NR = not reported; [1]data refer to all 9 patients in the study, 5 of whom were treated with arthroscopic excision of the lesion; [2]data refer to all 19 patients in the study with solitary benign intra-articular lesions of the knee, 15 of whom had localized pigmented villonodular synovitis; [3]data refer to all 26 patients in the study with LPVNS, 10 of whom were treated by arthroscopy and participated in long-term follow-up *via* the Lysholm knee scoring scale questionnaire; [4]two patients had a recurrence requiring re-excision. Both lesions were located posteromedially, behind the medial femoral condyle within the posterior compartment; [5]four patients had recurrent disease. Two patients had clinical symptoms. One underwent second arthroscopic synovectomy accompanied by adjuvant intra-articular radiation therapy (yttrium-90 synoviorthesis), while the second one refused any further surgical therapy. The remaining two patients were asymptomatic, and no additional treatment was undertaken; [6]data refer to all 44 study patients with LPVNS, 23 of whom were treated with arthroscopic excision of the lesion.

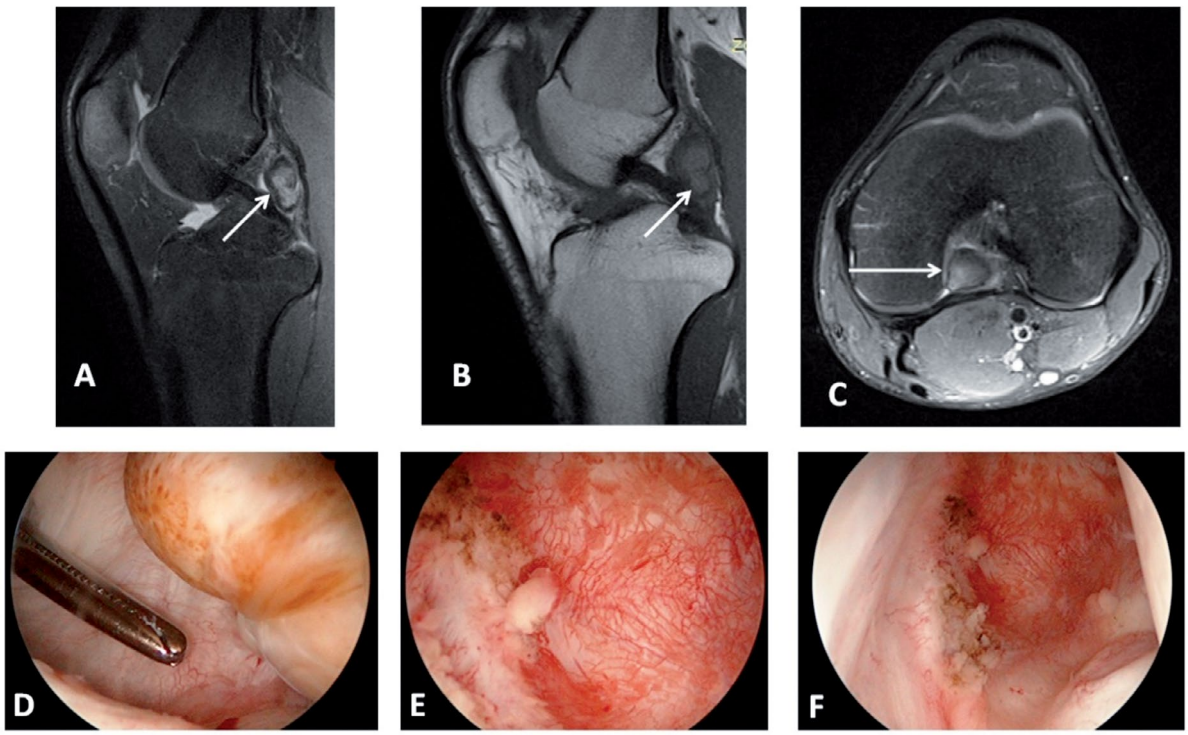

Fig. 1. Case 9, a 17-year-old male patient: (A) sagittal view on magnetic resonance image (MRI) with PD-FS technique with the arrow pointing at the well-defined, lobulated isointense lesion localized in the medial posterior compartment of the knee; (B) sagittal view on MRI with T1-FS technique with the arrow pointing at the well-defined, lobulated isointense lesion localized in the medial posterior compartment of the knee; (C) axial view on MRI with PD-FS technique with the arrow pointing at the well-defined, lobulated isointense lesion localized in the medial posterior compartment of the knee; (D) arthroscopic view from the anterolateral portal showing a nodule of pigmented villonodular synovitis posteriorly to the posterior horn of the medial meniscus. The instrument is placed into the knee through the posteromedial portal; (E) arthroscopic view from the posteromedial portal showing the area around the base of the nodule; (F) arthroscopic view from the posteromedial portal after partial synovectomy of the area surrounding the base of the lesion.

tissue was found which was unsuitable for setting a definitive diagnosis.

No complications developed during surgery. The postoperative period was uneventful, and all the patients returned to their usual daily activities. The patients who had experienced loss of knee motion preoperatively, regained full range of motion. The mean follow-up was 110.9 (range, 11-239) months. During follow-up, recurrence was suspected in two patients by the reappearance of previous symptoms that occurred at 80 (patient No. 4) and 50 (patient No. 5) months after the surgery. MRI scans did not show any residual disease or recurrence in either of these two patients, but due to persistent swelling of the knee in patient No. 4, a second-look arthroscopy was performed 82 months after the index operation. During the arthroscopic procedure, an additional posterolateral portal was performed and part of the synovial tissue that was macroscopically different from the surrounding tissue was taken for histopathologic evaluation. However, the histopathologic examination of the removed synovial tissue showed that it was not recurrence of LPVNS. Postoperatively, the patient recuperated well and returned to normal activity without restrictions. No further complications were recorded in any patient during the follow-up period.

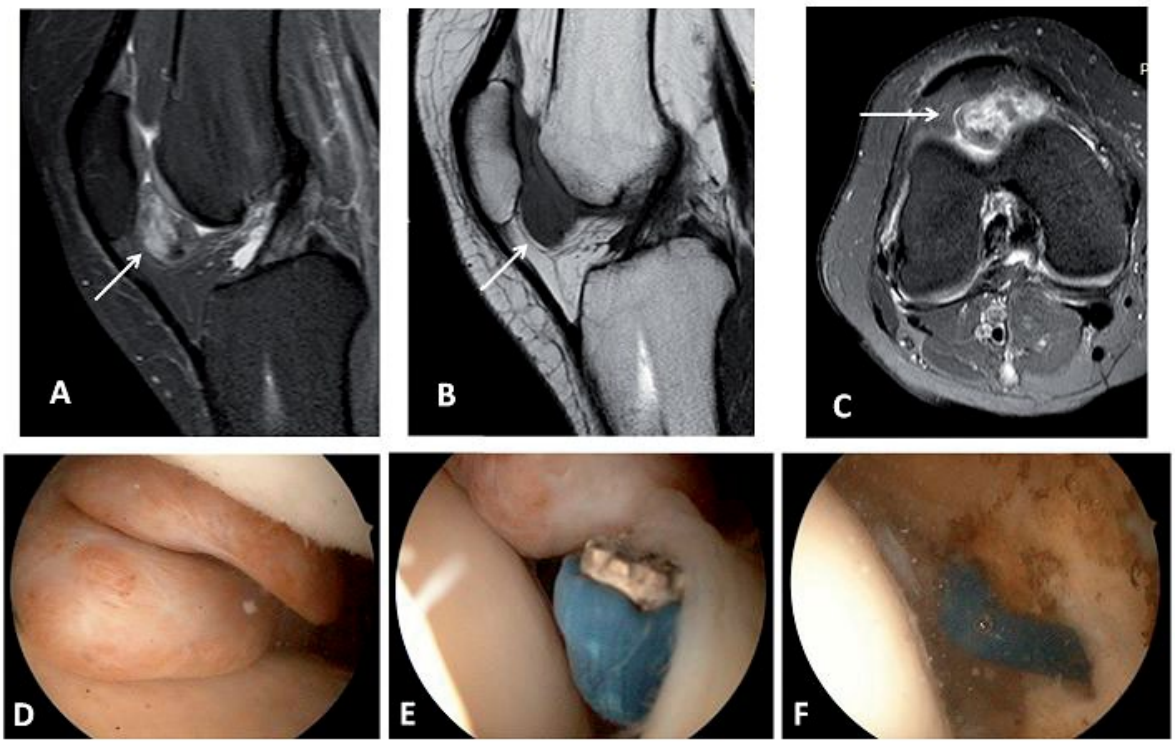

Fig. 2. Case 10, a 44-year-old female patient: (A) sagittal view on magnetic resonance image (MRI) with PD-FS technique with the arrow pointing at the well-defined, lobulated isointense lesion localized in the intercondylar notch; (B) sagittal view on MRI with T1-FS technique with the arrow pointing at the well-defined, lobulated isointense lesion localized in the intercondylar notch; (C) axial view on MRI with PD-FS technique with the arrow pointing at the well-defined, lobulated isointense lesion localized in the intercondylar notch; (D) arthroscopic view from the anterolateral portal showing a nodule of pigmented villonodular synovitis; (E) arthroscopic view from the anterolateral portal showing resection of the nodule from its stalk with a radiofrequency wand. The radiofrequency wand is placed into the knee through the anteromedial portal; (F) arthroscopic view from the anterolateral portal after partial synovectomy of the area surrounding the base of the lesion.

Discussion

This study confirmed that arthroscopic excision of LPVNS of the knee was an efficient method, with a low morbidity rate and without serious complications. Unlike the usual presentation of patients with LPVNS in their thirties or forties, 50% of our patients presented in the second decade of life. Because the clinical presentation of LPVNS is nonspecific, making the diagnosis can be challenging and may be considerably delayed. The interval between symptom onset and diagnosis was around 15 months in most published series, as was in this one[7-12,14-20]. Only in the series by Rhee *et al.*[13] and Perka *et al.*[27] the interval was around 40 months. On the other hand, due to the unexpectedness of LPVNS, the diagnosis is often revealed during arthroscopy. However, awareness of the disease is required for recognition of the typical appearance on arthroscopic inspection. Finding a LPVNS lesion during the arthroscopic procedure is often accidental, as accentuated by Kim *et al.*[7]. In our case series, LPVNS was found incidentally during arthroscopy in four of ten patients.

Diagnosis of LPVNS of the knee cannot be based only on the history and physical examination, but it also requires radiographic assessment[1-4,28]. Plain radiographs of the knee should exclude joint deformities or

bony abnormalities. The next imaging of the symptomatic joint should be an MRI as it is the most sensitive, specific and accurate noninvasive method of revealing soft tissue lesions of the joints. On MRI, LPVNS typically presents as a heterogeneous soft tissue mass with low signal intensity on T1- and T2-weighted images[1-4,28]. However, this typical MRI findings are not always present and even typical imaging finding is not entirely specific for LPVNS and could be mistaken for synovial chondromatosis, hemangioma, fibroxanthoma, and amyloid or hemophilic arthropathy[28,29]. The lesion could be undetected on MRI, despite being 4 cm in size[30]. Regardless of the mentioned possible shortcomings for the diagnosis of LPVNS, we would like to emphasize the importance of MRI to localize the lesion precisely and determine surgical strategy.

Not all patients undergoing arthroscopy of the knee have preoperative MRI. In these patients, we recommend a thorough, standardized, and systematic approach during diagnostic arthroscopy which is critical to ensure that no pathology is missed. It is especially important to examine posterior compartments of the knee. Although Ozalay *et al.*[11] emphasize that the posterior part of the knee joint is an uncommon location of solitary mass lesions, the results of recent studies show that this is more frequent. Thus, for example, Rhee *et al.*[13] report that in 3 of 11 patients, LPVNS was localized in the posterior compartments of the knee. In our study, LPVNS was localized in the posterior compartments of the knee in 4 of 10 patients, whereas Shekahar *et al.*[17] report on a group of 11 patients who had LPVNS just in the posterior knee compartment. However, we would like to emphasize that the procedure should be converted to arthrotomy if the surgeon is not able to get an impression of the entire process during arthroscopy, or if the tumor is difficult to reach.

Resection of the PVNS mass in addition to circumference of encompassing normal synovium is the most appropriate treatment of LPVNS, giving the best results and very low recurrence rates. The first report of the LPVNS arthroscopic resection results was presented by Flandry *et al.*[31] in 1986. Nowadays, arthroscopic treatment is the gold standard for LPVNS, which is corroborated by numerous studies. Knee arthroscopy allows direct visualization and thorough excision of the lesion, and concurrent treatment of additional joint pathology. A systematic review reports an average recurrence rate of 6% after arthroscopic resection and 4% after open resection (with a variable follow-up)[24]. Based on a systematic literature review and an individual participant meta-analysis by Mollon *et al.*[26], surgical approach, open or arthroscopic, does not affect the rate of recurrence in patients with LPVNS. They found a 7.1% recurrence rate (13/182 patients), taking all treatments together, i.e., open and arthroscopic synovectomy. In patients with primary LPVNS in the knee, Sharma and Cheng[32] report on 2- and 5-year recurrence-free survival rates of 91% and 73%, respectively. Verspoon *et al.*[25] report on 22% recurrence rate in 27 LPVNS patients over a mean of 7.2 years. In patients with primary LPVNS in the knee, they found 1- and 5-year recurrence-free survival rates of 89% and 80%, respectively[25]. Given the above results, it can be concluded that with a longer follow-up, the higher rate of recurrence can be expected. In the last ten years, we used a radiofrequency wand to cauterize the synovial attachment site after excision of the lesion, in order to reduce the chances of recurrence.

Histopathologic evaluation is the final step to confirm the diagnosis of LPVNS. Macroscopically, the aspect of LPVNS is characteristic with one or several well-defined nodules, sessile or pedunculated, yellowish brown in color depending on the amount of hemosiderin[1-4]. Histologically, LPVNS shows typical hemosiderin deposits, small ovoid or spindle-shaped mononuclear cells, multinucleated giant cells, and lipid-containing macrophages[1-4]. In the histopathologic specimens of our two patients, a necrotic tumor tissue was found, which was unsuitable for setting a diagnosis of LPVNS. It has been reported that these histologic features may be due to nipping of the lesion between the femoral condyle and tibial plateau, or due to torsion of the lesion pedicle[33]. This interferes with blood supply, which can lead even to infarction of the lesion. Howie *et al.*[33] report on three cases of LPVNS of the knee in which the lesion was histologically composed mainly of a necrotic, congested, hyalinized, collagenous stroma with a patchy acute inflammatory cell infiltrate and areas of hemorrhage.

Several limitations of this study were related to its retrospective case series design. These include a small number of cases and the lack of a control group. However, considering the rarity of the disease, results

of the presented patients are entirely sufficient for comparison with results of other studies[7-17]. The average follow-up of our patients was 9 years, and much longer follow-up is required for assessment of the real recurrence rate in patients.

LPVNS of the knee is a rare disease and setting the diagnosis is challenging, especially as it presents with a diversity of symptoms. Therefore, it is important to be aware of LPVNS as a possible pathology in the joint. The surgeon needs to be aware of this diagnosis and recognize the typical LPVNS appearance on arthroscopic inspection. Therefore, if a patient does not have an MRI prior to surgery, it is always necessary to perform standardized and systematic arthroscopic evaluation of all parts of the knee before performing any arthroscopic surgery. Good results and lack of complications in this case series, as well as in other series published in the literature, allow us to state that arthroscopic excision of the lesion is the recommended treatment for LPVNS of the knee.

References

1. Verspoor FG, van der Geest IC, Vegt E, Veth RP, van der Graaf WT, Schreuder HW. Pigmented villonodular synovitis: current concepts about diagnosis and management. Future Oncol. 2013;9:1515-31. doi: 10.2217/fon.13.124
2. Stephan SR, Shallop B, Lackman R, Kim TW, Mulcahey MK. Pigmented villonodular synovitis: a comprehensive review and proposed treatment algorithm. JBJS Rev. 2016;4(7). doi: 10.2106/JBJS.RVW.15.00086
3. Gouin F, Noailles T. Localized and diffuse forms of tenosynovial giant cell tumor (formerly giant cell tumor of the tendon sheath and pigmented villonodular synovitis). Orthop Traumatol Surg Res. 2017;103:S91-S97. doi: 10.1016/j.otsr.2016.11.002
4. Patel KH, Gikas PD, Pollock RC, Carrington RW, Cannon SR, Skinner JA, *et al.* Pigmented villonodular synovitis of the knee: a retrospective analysis of 214 cases at a UK tertiary referral centre. Knee. 2017;24:808-15. doi: 10.1016/j.knee.2017.03.011
5. Steinmetz S, Rougemont AL, Peter R. Pigmented villonodular synovitis of the hip. EFORT Open Rev. 2017;1:260-6. doi: 10.1302/2058-5241.1.000021
6. Kubat O, Bojanić I, Smoljanović T. Localized pigmented villonodular synovitis of the ankle: expect the unexpected. Foot Ankle Surg. 2017;23:68-72. doi: 10.1016/j.fas.2016.03.001
7. Kim SJ, Shin SJ, Choi NH, Choo ET. Arthroscopic treatment for localized pigmented villonodular synovitis of the knee. Clin Orthop. 2000;379:224-30.
8. Akgün I, Ogüt T, Kesmezacar H, Dervisoglu S. Localized pigmented villonodular synovitis of the knee. Orthopedics. 2003;26:1131-5.
9. Calmet J, Hernandez-Hermoso J, Gine J, Jimeno F. Localized pigmented villonodular synovitis in an unusual location in the knee. Arthroscopy. 2003;19:144-9. doi: 10.1053/jars.2003.50004
10. Hernandez AJ, Camanho GL, Laraya MH, FávaroI E, Filho MM. Localized pigmented villonodular synovitis of the knee: an arthroscopic treatment. Acta Ortop Bras. 2005;13:76-8. doi: 10.1590/S1413-78522005000200005
11. Ozalay M, Tandoğan RN, Akpinar S, Cesur N, Hersekli MA, Ozkoç G, *et al.* Arthroscopic treatment of solitary benign intra-articular lesions of the knee that cause mechanical symptoms. Arthroscopy. 2005;21:12-8. doi: 10.1016/j.arthro.2004.08.013
12. Dines JS, DeBerardino TM, Wells JL, Dodson CC, Shindle M, DiCarlo EF, *et al.* Long-term follow-up of surgically treated localized pigmented villonodular synovitis of the knee. Arthroscopy. 2007;23:930-7. doi: 10.1016/j.arthro.2007.03.012
13. Rhee PC, Sassoon AA, Sayeed SA, Stuart MS, Dahm DL. Arthroscopic treatment of localized pigmented villonodular synovitis: long-term functional results. Am J Orthop (Belle Mead NJ). 2010;39:E90-4.
14. Loriaut P, Djian P, Boyer T, Bonvarlet JP, Delin C, Makridis KG. Arthroscopic treatment of localized pigmented villonodular synovitis of the knee. Knee Surg Sports Traumatol Arthrosc. 2012;20:1550-3. doi: 10.1007/s00167-011-1747-y
15. Jain JK, Vidyasagar JV, Sagar R, Patel H, Chetan ML, Bajaj A. Arthroscopic synovectomy in pigmented villonodular synovitis of the knee: clinical series and outcome. Int Orthop. 2013;37:2363-9. doi: 10.1007/s00264-013-2003-5
16. Georgiannos D, Boutsiadis A, Agathangelidis F, Papastergiou S, Karataglis D, Bisbinas I. Arthroscopically-assisted mini open partial synovectomy for the treatment of localized pigmented villonodular synovitis of the knee. A retrospective comparative study with long-term follow up. Int Orthop. 2017;41:925-30. doi: 10.1007/s00264-016-3348-3

17. Shekhar A, Patil SS, Dixit C, Tapasvi SR. Localized pigmented villonodular synovitis of posterior compartment of the knee. J Orthop Surg (Hong Kong). 2017;25:2309499017727923. doi: 10.1177/2309499017727923
18. Aurégan JC, Klouche S, Bohu Y, Lefèvre N, Herman S, Hardy P. Treatment of pigmented villonodular synovitis of the knee. Arthroscopy. 2014;30:1327-41. doi: 10.1016/j.arthro.2014.04.101
19. Bojanic I, Ivkovic A, Dotlic S, Ivkovic M, Manojlovic S. Localized pigmented villonodular synovitis of the knee: diagnostic challenge and arthroscopic treatment: a report of three cases. Knee Surg Sports Traumatol Arthrosc. 2001;9:350-4. doi: 10.1007/s001670100231
20. Kubat O, Mahnik A, Smoljanović T, Bojanić I. Arthroscopic treatment of localized and diffuse pigmented villonodular synovitis of the knee. Coll Antropol. 2010;34:1467-72.
21. Mastboom MJL, Verspoor FGM, Verschoor AJ, Uittenbogaard D, Nemeth B, Mastboom WJB, *et al*. Higher incidence rates than previously known in tenosynovial giant cell tumors. Acta Orthop. 2017;88:688-94. doi: 10.1080/17453674.2017.1361126
22. Bouguenneca N, Meyera A, Graveleaub N. Localized form of pigmented villonodular synovitis of the knee: the meniscal mime. Orthop Traumatol Surg Res. 2014;100:255-8. doi: 10.1016/j.otsr.2013.09.017
23. Yotsumoto T, Iwasa J, Uchio Y. Localized pigmented villonodular synovitis in the knee associated with locking symptoms. Knee. 2008;15:68-70. doi: 10.1016/j.knee.2007.09.001
24. van der Heijden L, Gibbons C L, Hassan A B, Kroep J R, Gelderblom H, van Rijswijk C S, *et al*. A multidisciplinary approach to giant cell tumors of tendon sheath and synovium: a critical appraisal of literature and treatment proposal. J Surg Oncol. 2013;107:433-45. doi: 10.1002/jso.23220
25. Verspoor FG, Zee AA, Hannink G, van der Geest IC, Veth RP, Schreuder HW. Long-term follow-up results of primary and recurrent pigmented villonodular synovitis. Rheumatology (Oxford). 2014;53:2063-70. doi: 10.1093/rheumatology/keu230
26. Mollon B, Lee A, Busse JW, Griffin AM, Ferguson PC, Wunder JS, *et al*. The effect of surgical synovectomy and radiotherapy on the rate of recurrence of pigmented villonodular synovitis of the knee: an individual patient meta-analysis. Bone Joint J. 2015;97-B:550-7. doi: 10.1302/0301-620X.97B4.34907
27. Perka C, Labs K, Zippel H, Buttgereit F. Localized pigmented villonodular synovitis of the knee joint: neoplasm or reactive granuloma? A review of 18 cases. Rheumatology (Oxford). 2000;39:172-8.
28. Sharma H, Jane MJ, Reid R. Pigmented villonodular synovitis: diagnostic pitfalls and management strategy. Curr Orthop. 2005;19:215-22. doi: 10.1016/j.cuor.2005.02.013
29. Murphey MD, Rhee JH, Lewis RB, Fanburg-Smith JC, Flemming DJ, Walker EA. Pigmented villonodular synovitis: radiologic-pathologic correlation. Radiographics. 2008;28:1493-518. doi: 10.1148/rg.285085134
30. Parikh SN, Chen AL, Ergas E. Localized pigmented villonodular synovitis: arthroscopic diagnosis and management of an "invisible" lesion. Arthroscopy. 2002;18:E31.
31. Flandry F, Hughston JC. Pigmented villonodular synovitis. J Bone Joint Surg Am. 1987;69:942-9.
32. Sharma V, Cheng EY. Outcomes after excision of pigmented villonodular synovitis of the knee. Clin Orthop Relat Res. 2009;467:2852-8. doi: 10.1007/s11999-009-0922-7
33. Howie CR, Smith GD, Christie J, Gregg PJ. Torsion of localized pigmented villonodular synovitis of the knee. J Bone Joint Surg Br. 1985;67:564-6.

Sažetak

LOKALIZIRANI PIGMENTIRANI VILONODULARNI SINOVITIS KOLJENA: PRIKAZ UZASTOPNE SERIJE BOLESNIKA I PREGLED LITERATURE

I. Bojanić, I. Levaj, D. Dimnjaković i *T. Smoljanović*

Pigmentirani vilonodularni sinovitis rijetka je bolest koja se javlja na sinovijalnom tkivu unutar ili izvan zglobova. Promjena može biti lokaliziranog ili difuznog oblika. Lokalizirani pigmentirani vilonodularni sinovitis (LPVNS) koljena može se javiti u bilo kojem dijelu koljenskog zgloba. Cilj ovog istraživanja bio je retrospektivno analizirati našu seriju bolesnika koji su liječeni zbog LPVNS koljena. Od siječnja 1999. do prosinca 2018. godine 10 uzastopnih bolesnika operirano je u našoj Klinici. Kod svih bolesnika je iskusni operater tijekom artroskopskog zahvata u potpunosti odstranio tvorbu te oko baze promjene načinio djelomičnu sinovektomiju. Srednja dob 4 bolesnice i 6 bolesnika bila je u času zahvata 29,5 (raspon, 17-60) godina. Vrijeme od pojave prvih simptoma do zahvata kretalo se od 3 mjeseca do 3 godine (srednja vrijednost, 11,8 mjeseci). Srednje vrijeme praćenja bolesnika bilo je 110,9 (raspon, 11-239) mjeseci tijekom kojega se recidiv nije pojavio niti u jednog bolesnika. Naše istraživanje potvrđuje konsenzus iz literature kako je LPVNS koljena najbolje liječiti artroskopskim zahvatom tijekom kojega valja u potpunosti odstraniti tvorbu te oko baze promjene načiniti djelomičnu sinovektomiju.

Ključne riječi: *Pigmentirani vilonodularni sinovitis; Lokalizirani pigmentirani vilonodularni sinovitis; Koljeno; Artroskopija*