Arthroscopic T-capsulotomy for Excision of Pigmented Villonodular Synovitis in the Hip

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Abstract: Pigmented villonodular synovitis (PVNS) is a benign synovial tumor of unknown etiology with a predilection for the large joints of the appendicular skeleton. The poor prognosis for patients with hip disease is partially imparted by current surgical techniques. Recent advances in hip arthroscopy technique and instrumentation may enable arthroscopic treatment for PVNS in the hip. The authors report the first case where hip arthroscopy was used to surgically excise a biopsy-confirmed local PVNS lesion in the hip. Using selected capsular releases and accessory portals, the authors achieved adequate visualization and instrument mobilization to successfully excise the entire PVNS tumor with no identifiable complications. [Orthopedics. 2015; 38(4):237-239.]

Pigmented villonodular synovitis (PVNS) is a rare benign proliferative disorder of the synovium. It has a predilection for large joints of the appendicular skeleton such as the knee and ankle, occurring less frequently in the hip. Although its etiology is unknown, it demonstrates characteristics such as chromosomal abnormalities, local tissue invasion and destruction, and the ability for malignant transformation that are consistent with a neoplastic process. These aggressive tendencies necessitate early surgical removal to limit local intra-articular destruction and the potential for recurrence. Unfortunately, many cases of PVNS in the hip require total hip arthroplasty (THA) secondary to the severity of joint damage at the time of diagnosis.

The efficacy and utility of arthroscopic treatment of PVNS in joints other than the hip has been widely demonstrated. Although arthroscopic technique is used to remove other benign synovial tumors of the hip such as synovial osteochondromatosis, open synovectomy remains the treatment of choice for primary PVNS in the hip.

The purpose of this article is to describe an arthroscopic surgical technique for focal PVNS biopsy, local synovectomy, and tumor excision in the hip using a safe and low-morbidity approach.

Institutional review board approval for a case report was not required; however, the patient gave verbal consent for this case report.

Case Report

A 24-year-old woman reported the insidious onset of groin pain over a 1-year period with an acute exacerbation over the 3-month period prior to presentation. Her examination was notable for pain localized to the groin, exacerbated by hip external rotation and extension. She displayed a positive FABER (flexion, abduction, external rotation, and 

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and an anterolateral portal was created under fluoroscopic guidance. A 70° scope in a 5.0-mm cannula demonstrated a normal central compartment. An anterior portal was created under direct visualization, and a 5.0-mm cannula was inserted. An interportal capsulotomy was performed with a Samurai Blade (Pivot, Sunnyvale, California). Using the Samurai Blade, a T-capsulotomy was performed, incising the capsule inline with the anterolateral femoral neck from a midanterior accessory portal. The T-capsulotomy was undertaken to aid in visualization to the inferior capsule and to facilitate tumor excision. A Wissinger rod was placed in the anterior portal and used to retract the inferior aspect of the capsule for access to the tumor. The soft tissue mass was then identified in the anteroinferior quadrant of the hip capsule (Figure 2). Soft tissue was released to enable visualization of the tumor margins and allow access to remove the tumor with minimal contamination. Using the midanterior portal, the mass was excised using a 4.0-mm suction shaver and tissue grasper (Figure 3). An 8.25-mm cannula was placed in the midanterior portal to enable a capsular closure. Six 2-0 nonabsorbable sutures were used to repair the T-capsulotomy. The portals were irrigated and closed with deep nonabsorbable sutures, after which sterile bandages were applied.

**Surgical Technique**

The patient was placed in the supine position, and the right hip was placed under gentle traction until 1 cm of joint distraction was obtained. The site was prepped and draped in the usual fashion, and an anterolateral portal was created. The mass measured 3 cm from medial to lateral, and with low signal on T1 and T2 MRI, it raised suspicion for PVNS. A computed tomography (CT)-guided biopsy documented fibrous connective tissue with pigment-laden macrophages consistent with PVNS. The decision was thus made to proceed with arthroscopic synovectomy and mass excision.

**Discussion**

The authors report the first case of hip arthroscopy as a method to surgically excise a biopsy-confirmed local PVNS lesion of the hip. Using selected capsular releases and accessory portals, the authors achieved adequate visualization and instrument mobilization to successfully excise the entire PVNS tumor. The patient was able to achieve a rapid recovery postoperatively, with a return to full activities within 2 weeks.

The open surgical treatment for PVNS of the hip has modest results compared with the knee and ankle. Poor outcomes in the hip are likely a manifestation of the tumor characteristics, particularly the subtype of PVNS (nodular vs diffuse); however, the morbidity of the open surgical approach to the hip may also be a contributor. It should be noted that the diffuse subtype of PVNS tends to have more aggressive characteristics and has proven more resistant to treatment, perhaps related to the difficulty in performing an adequate synovectomy. Mankin et al highlighted these results when he reported on the Massachusetts General Hospital experience. Pigmented villonodular synovitis of the hip tumors had poor results, with 11 (92%) of 12 patients eventually requiring THA.
Vastel et al. reported comparable outcomes in PVNS of the hip, demonstrating a high rate of THA, subsequent surgeries, and nearly uniform progression to osteoarthritis.

As arthroscopy techniques progress and treatment outcomes are published, there is a growing push toward arthroscopic treatment for select PVNS cases. Proponents argue that arthroscopic management of PVNS enables a more thorough evaluation of the joint and synovium, better access for surgical synovectomy, and decreased postoperative morbidity. Within the knee, arthroscopic treatment of local PVNS resulted in a complete and persistent regression of the pathology; however, among the patients affected by the diffuse form of PVNS, an open-extended synovectomy resulted in improved clinical outcomes and a lower recurrence rate. In a recent long-term outcome analysis, arthroscopic treatment resulted in lower recurrence rates across all joints. This was attributed primarily to improved joint visualization for tumor eradication.

**Conclusion**

Although PVNS is a benign tumor, it can result in significant joint destruction. In the hip, this can be compounded by the invasive nature of traditional open approaches. As the current case illustrates, hip arthroscopy techniques and equipment have evolved to the point where PVNS can adequately be treated in a minimally invasive manner. Advancements in new arthroscopic portals, the use of large capsule releases (eg, T-capsulotomy), and improved instrumentation to perform adequate capsular repair are essential developments that have made arthroscopic resection of PVNS a possibility.

Specific to the current case, the authors feel that T-capsulotomy enabled improved nodule visualization and soft tissue retraction to enable surgical exposure and mass resection. Moreover, a midanterior portal enabled an arthroscopic grasper and shaver to directly biopsy and excise the lesion while avoiding damage to important surrounding structures. The evolution of capsular management in hip arthroscopy enables better visualization, better instrument management, and a complete diagnostic evaluation of the entire capsule. As practitioners become more facile with hip arthroscopy, outcomes are likely to improve and the risk of complications may diminish. This has been demonstrated in a recent systematic review, which revealed a low risk of morbidity and risk for complications in hip arthroscopy.

Caution should be exercised in the setting of diffuse PVNS because an arthroscopic synovectomy may not be sufficient treatment. In the authors’ case, given the nodular appearance of the mass, it was felt that an arthroscopic synovectomy would eradicate the lesion. In addition, they would recommend against an arthroscopic approach in patients with a tumor in the posterior capsule of the hip. These masses may be more appropriately resected in an open manner, depending on the surgeon’s level of expertise with hip arthroscopy. Both the location and the characteristics of the mass (ie, nodular vs diffuse) highlight the importance of appropriate preoperative workup, including MRI, when one is concerned about the possibility of PVNS.

Moving forward, with even greater advancements in techniques and equipment, arthroscopic treatment may become the standard of care in this potentially devastating disease process. However, further work is needed to fully characterize the arthroscopic treatment of PVNS in the hip.

**References**