Case Report
Arthroscopic Treatment of Pigmented Villonodular Synovitis of the Elbow

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Pigmented villonodular synovitis (PVNS), today also known as tenosynovial giant cell tumor (TSGCT), is a proliferative disorder affecting the synovium of tendon sheaths, bursal membranes, and synovial joints; the most affected joint is the knee followed by the hip [1]. The traditional standard treatment of PVNS is synovectomy achieved by open or arthroscopic surgery [2], adjuvant with postoperative radiation [3, 4] to decrease the recurrence, although this is discussed controversially. Open surgical excision of PVNS is associated with the risk of infection, wound dehiscence, joint stiffness and persistent pain, and longer surgery time and hospital stay [5–7]. PVNS of the elbow is much less documented in the literature. This article presents a case of a 36-year-old male with biopsy-verified PVNS of the elbow who was treated arthroscopically and resulted in excellent outcome at 6-month follow-up.

1. Introduction

Pigmented villonodular synovitis (PVNS), today also known as tenosynovial giant cell tumor (TSGCT), is a proliferative disorder affecting the synovium of tendon sheaths, bursal membranes, and synovial joints; the most affected joint is the knee followed by the hip [1]. The traditional standard treatment of PVNS is synovectomy achieved by open or arthroscopic surgery [2], adjuvant with postoperative radiation [3, 4] to decrease the recurrence, although this is discussed controversially. Open surgical excision of PVNS is associated with the risk of infection, wound dehiscence, joint stiffness and persistent pain, and longer surgery time and hospital stay [5–7]. PVNS of the elbow is much less documented in the literature. This article presents a case of a 36-year-old male with biopsy-verified PVNS of the elbow who was treated arthroscopically and resulted in excellent outcome at 6-month follow-up.

2. Case Presentation

A 36-year-old male patient, middle eastern descent, presented with left elbow swelling, persistent pain, and gradual restriction of range of elbow motion for 8 months. Prior to that, he had visited a series of other facilities and had an open biopsy, done in another facility, which had already confirmed the diagnosis of PVNS. There was no history of injury or trauma, and his past medical history was uneventful.

Physical examination showed a healed scar from the open biopsy on the extensor side of his left elbow. The range of motion was restricted from 5 degrees of extension to only 90 degrees of flexion, (FE: 90.5.0), in comparison to the contralateral side with 0-degree extension to 140-degree flexion (FE: 140.0.0). Pronation and supination were free, he did not have any signs of ligament instability, and his neurovascular status was normal.

Radiographs were normal, and MRI revealed a soft tissue tumor in the anterior joint compartment with extension to
the olecranon fossa and the radiocapitellar joint, with the signal intensity consistent with PVNS. There were no osteo-
lytic lesions or osseous erosions visible on MRI.

As the suspected diagnosis of PVNS was already con-
ﬁrmed via biopsy, elbow arthroscopy, tumor excision, and
synovectomy were indicated.

3. Procedure

Under general anaesthesia, the patient was positioned in
prone position with the left elbow supported and free for
mobilisation. Tourniquet was not used. Under routine
antibiotic coverage and surgical site preparation, antero-
medial, anterolateral, posterolateral, and posterior portals
were established. The anterior compartment was addressed
ﬁrst. Arthroscopic exploration showed a large soft tissue
tumor, exactly as the MRI demonstrated, with the typical
appearance of a nodular form of PVNS (Figure 1). The
synovium showed a diﬀuse form of PVNS. Firstly, we
removed the tumor-like nodules, followed by total syno-
vectomy, which was performed with an arthroscopic
shaver and with a radio frequency ablation device to keep
bleeding to a minimum. The joint cartilage showed grade
2 changes on the distal humerus as well as on the radial
head. The annular ligament was intact. After the anterior
compartment was ﬁnished, the posterior compartment
was addressed in a similar manner. There was some scar
tissue which needed to be debrided due to the open
biopsy that had been done previously. Then, a total syno-
vectomy was performed in the same way as for the ante-
rior compartment. A drain was put in the anterior
compartment, the wounds were closed, and the arm was
immobilised in a sling for comfort.

The postoperative course was uneventful; rehabilitation
was initiated in the ﬁrst week after a few days of rest,
focus on gain of passive and active range of motion.
The patient presented with a little pain but showed local
swelling that persisted for two weeks. Range of motion
was near normal at the end of the sixth week postopera-
tively (Figure 2). At the most recent follow-up six months
postoperatively, the patient was pain free and had regained
full range of motion, and the follow-up MRI did not
reveal any recurrence (Figure 3).

4. Discussion

PVNS (pigmented villonodular synovitis), ﬁrst described by
Chassaignac in 1852 [8], is a benign, locally aggressive
monoarticular proliferative disease of the synovium that
rarely turns malignant and whose etiology is unknown. If
left untreated, it can induce bone erosion and subsequently
osteoarthritis or even amputation [9]. The synovium is a
thin connective tissue layer that lines the joint, bursa, and
tendon sheath and contains two types of synoviocytes:
macrophage-like synoviocytes (type A) which remove debris
from synovial ﬂuid and ﬁbroblast-like synoviocytes (type B)
which produce hyaluronan-rich synovial ﬂuid that lubricates
the cartilage and facilitates tendon movement. [10] PVNS is
characterized by a pigmented synovium with excessive hya-
luronan production [11]. The pigmentation is secondary to
the deposition of hemosiderin which is an iron-containing
pigment derived from partially digested ferritin, originating
from an erythrocyte breakdown, when they are phagocyted
by macrophage-type A synoviocytes. The outgrowing of type
B synoviocyte produces large amounts of hyaluronan and
synovial ﬂuid, causing eﬀusion and swelling and making
joint movement painful [12]. PVNS can be villous, nodular,
or both (villonodular) [13]. It can be localised, with limita-
tion to synovium of the bursa or tendon sheath, or it can
be diﬀuse, typically affecting the synovial membrane around
joints [14].

Patients with PVNS most commonly report symptoms
of pain, swelling, and decreased range of motion of the
affected joint. On physical examination, a palpable mass
with or without tenderness may be present; also, mechanical
symptoms such as locking or clicking are commonly
reported [15].

PVNS is diﬃcult to be diagnosed radiologically, as
scans such as X-ray, CT, and ultrasound reveal a vague
irregular mass with or without bone erosion. MRI is
usually done to raise the suspicion of PVNS, with charac-
teristic presence of hemosiderin precipitate within the
nodules, and is also the standard diagnostic tool to moni-
tor an eventual recurrence at a later stage. As a result, a
biopsy is the gold standard investigation needed to con-
ﬁrm the diagnosis [16] Histologically, PVNS is a tenosyn-
ivial giant cell tumour, characterized by proliferation of
two cell types, mononuclear cells and macrophages over-
loaded with hemosiderin [17]. In the case reported here,
an open biopsy had been in another facility.

PVNS is best treated with total or a near total synove-
tomy. This can be achieved open or arthroscopically and can
be followed by adjuvant therapy to minimize the recurrence
rate which was documented to be around 40% after
synovectomy of the knee joint [8]. Radiation therapy has
been shown to reduce PVNS recurrence postsurgical syno-
vectomy signiﬁcantly [3, 4] but also carries the risk of serious
complications such as malignant transformation [18]. Open
synovectomy has been linked to an increased risk of
infection, suture dehiscence, and joint stiffness [6, 7]. As a
consequence, arthroscopic tumor resection and synove-
tomy seem to be the preferred treatment modality for PVNS
in all large joints. Recently, CSF-1 receptor modulators,
emactuzumab and pexidartinib, have shown promise for
treatment of PVNS. Pexidartinib was approved by the FDA.
for patients who are not likely to benefit from surgical intervention [18, 19].

The elbow is rarely affected by PVNS. In a recent literature review, only 27 patients with surgically treated PVNS of the elbow were reported; among them, only 4 patients were treated arthroscopically with good outcome reported for both treatment modalities [15]. The overall recurrence rate after the synovectomy of the elbow joint was around 17.4% [15]. Interestingly, nonrecurrence occurred in arthroscopically treated patients. Due to small number (4/27), the authors could not draw any strong conclusion. The literature for PVNS of the knee, where the numbers are higher, shows a similar reoccurrence rate after open and arthroscopic synovectomy [20], but with higher complication rate after open synovectomy [6, 7].

In this reported case, we used an entirely arthroscopic approach, which resulted in an excellent outcome with no recurrence after six months. However, a prospective study with a larger number of patients and longer follow-up duration is needed to fully establish the ideal treatment of PVNS of the elbow.

5. Conclusion

Arthroscopic synovectomy for a patient with PVNS in the elbow is a safe and effective procedure with good functional outcome.

Data Availability

All data are available in the database of the hospital and from the author.

Consent

The authors affirm that participants provided informed consent for publication of the images and data, and it is available any time.

Conflicts of Interest

The authors have no competing interests to declare that are relevant to the content or any material discussed in this article.

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