

# Synovial Lipomatosis; A Clinicopathological Study of a Rare Entity

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## ABSTRACT

**Objective:** This study was conducted to analyse the clinicopathological and radiological features associated with Synovial lipomatosis.

**Patients and Methods:** Cases diagnosed as Synovial lipomatosis from 2008 to 2018 were retrieved and clinical information and histology were reviewed.

**Results:** Thirteen cases of Synovial lipomatosis were diagnosed between 2008 and 2018. Most common site was knee joint and mean age of presentation was 28.6. About 62% of subjects were males and mostly presented with joint pain and swelling. Two of the subjects had significant history of trauma and disease was bilateral in one of the cases. Microscopically, villous proliferation of synovium with infiltration of mature adipocytes was noted. Focal synovial hyperplasia and inflammatory infiltrate were other findings in some of the cases.

**Conclusion:** Synovial lipomatosis should be considered in the differential diagnosis of joint pain and swelling and should be distinguished from Pigmented villonodular synovitis, Synovial haemangioma and intra-articular synovial lipoma (IASL) using radiological and histological features.

**Key words:** Synovial hyperplasia, Synovial haemangioma, Synovial lipomatosis

### Author's Contribution

<sup>1</sup> Conception, synthesis, planning of research and manuscript writing Interpretation and discussion

<sup>2-4</sup> Data analysis, interpretation and manuscript writing, Active participation in data collection.

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## Introduction

Synovial Lipomatosis, also known as Lipoma Arborescens, is a rare pseudotumor, which arises from the synovial lining of the joints. It usually involves the knee joint, particularly the supra-patellar pouch, but can affect any joint in the body, even the tendon sheath and bursa, which have the synovial lining.<sup>1</sup> The exact etiology is still unclear. Peak incidence is between fifty and seventy years and there is a slight predilection for males.<sup>2</sup> Patients present with joint pain, swelling and effusion. Synovial lipomatosis can be bilateral in some cases.<sup>3</sup> Radiologically, synovial lipomatosis presents as a frond-like mass along with joint effusion arising from the

synovium with subcutaneous fat-equivalent signal on all pulse sequences of MRI.<sup>3</sup> Histologically, there is synovial hyperplasia with synovial membrane lined villous structures infiltrated by mature adipocytes. Mild chronic inflammation is present as well.<sup>4</sup> Treatment options include open and arthroscopic synovectomy.<sup>5-9</sup>

As it is a rare entity with less than 100 cases reported so far, the clinical, radiological and pathological data available is very limited and varied.<sup>3</sup> The purpose of our study is to contribute to the literature the clinical details (age, gender, clinical presentation), radiological and

**Table 1: Bio data and significant clinical details**

Serial No	Age	Gender	Site	Laterality	Duration	Size (mm)	Significant History	Clinical Presentation
1.	19	Male	Knee	Bilateral	2 years	42	Fever (on and off)	Pain and swelling
2.	60	Female	Wrist	Left	Not known	30	Not known	Ganglion on wrist
3.	26	Female	Knee	Left	18 years	35	Not known	Swelling
4.	20	Male	Ankle	Right	Not known	20	Not known	Not known
5.	60	Male	Knee	Right	Not known	85	Not known	Pain and swelling
6.	40	Male	Knee	Right	Not known	-	Not known	Swelling
7	15	Female	Dorsum of hand	Not known	Not known	18	Not known	Swelling
8.	30	Male	Knee	Left	6 months	3	Trauma 3 years ago	Pain
9.	16	Male	Knee	Left	Not known	55	Not known	Pain and swelling
10.	10	Female	Knee	Right	4 years	65	Trauma 4 years ago	Pain, Swelling and restricted mobility
11.	40	Female	Knee	Right	Not known	11	Not known	Pain
12.	15	Male	Knee	Right	Not known	35	Not known	Not known
13.	21	Male	Knee	Left	9 years	143	Not known	Pain and Swelling

histological features of the cases reported at our centre in the last decade and provide a better understanding of this condition to physicians, radiologists and pathologists.

### Patients and Methods

The cases of Synovial Lipomatosis, diagnosed on histological examination, between 2008 and 2018 at Shaukat Khanum Cancer Hospital and Research Centre were retrieved. All the relevant information e.g. age, gender, site, size, significant history and clinical findings were analysed. Case slides were reviewed and pertinent histological findings were re-confirmed and additional findings like vascular proliferation, fibrosis and inflammation were looked for. All the biopsy proven cases of Synovial Lipomatosis were included in the study. Cases like Intra-Articular Synovial lipoma, pigmented villonodular synovitis and Synovial hemangioma which may mimic synovial lipomatosis but do not fulfil the histological criteria were excluded from the study.

### Results

Thirteen cases of Synovial Lipomatosis were diagnosed at our centre in the last decade from 2008 to 2018 (Table

1). The age of presentation ranged from 10 years to 60 years with mean age of presentation 28.6 years. Eight of the thirteen patients (61.5%) were males. Knee joint was the site of involvement in 10 (76.9%) cases and wrist joint, ankle and dorsum of hand in the other three cases respectively. Bilateral joint involvement was observed in only one case (7.7%). Two of the thirteen patients (15.4%) had a history of trauma. Presenting complaint of nine patients (69.2%) was swelling of the joint and seven (53.9%) amongst them felt pain as well. Two cases (15.4%) had restriction of movement of joint, as a result of swelling and the pain. The size of the lesion ranged from 3 mm to 143 mm with mean size of 45mm. Microscopic examination of the cases revealed villous proliferation of hyperplastic synovium with infiltration of mature adipocytes.

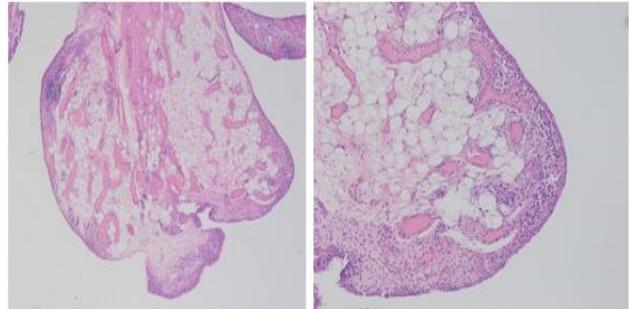
### Discussion

Synovial Lipomatosis, also called as Lipoma Arborescens and Hoffa disease, is a rare tumor-like condition of synovial lining of the joints characterized by villous proliferation of synovium with infiltration of mature adipose tissue. It was first described by Albert Hoffa in 1904, as a

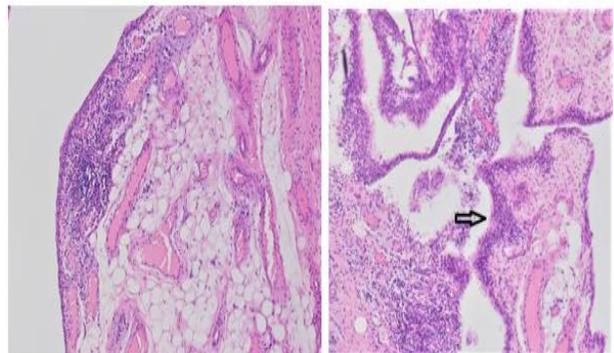
condition involving the infrapatellar fat pad of athletes, and later in more detail by Arzimanoglu in 1957.<sup>1,3,7</sup> Less than 100 cases have been reported so far mostly as case reports.<sup>2</sup> The exact etiology is unclear but association with trauma resulting in a reactionary inflammation and synovial hyperplasia has been proposed.<sup>1,3</sup> Moreover, association with inflammatory joint diseases like osteoarthritis, rheumatoid arthritis, psoriasis and uveitis has been reported in the literature.<sup>3,4</sup> A peculiar association with short bowel syndrome was reported by Siva et al in a case with multiple joints involvement of a patient with short bowel syndrome, suggesting that it results from abnormal deposition of fat in joints as a result of reduced fat absorption in resected small bowel.<sup>10</sup> In our study, only two subjects had a history of trauma and that too more than 5 years ago.

Synovial Lipomatosis occurs commonly between 50 to 70 years with mean age of 45.6 years and a predilection for male gender.<sup>1</sup> In a study by Rao S *et al.* of 8 cases, subjects ranged from 1 to 73 years with mean age 45.2.<sup>1</sup> In our study, the mean age of presentation was 28.6 years and subjects ranged from 10 to 60 years. In both the studies, more than 60% of the patients were males. Although, the lesion usually involves the knee joint but it can present in any joint of body, even the tendons and bursae as they are also lined by synovium.<sup>1</sup> Involvement of hip, elbow, wrist and shoulder joints has been noted as well. Bilateral/multiple joint involvement is uncommon. Knee joint was commonest site of involvement in our subjects (76.9%) and the rest had diseases of ankle, wrist joint and dorsum of hand. One patient had bilateral knee joint involvement as well. Clinically, patient presents with pain and swelling of joint with limited mobility. Joint effusion and crepitus are also noted sometimes.<sup>1,3</sup> Effusion causes pressure effect leading to the swelling and pain in the joint. The sign and symptoms in our study were almost the same as those reported in literature. Swelling of the joint(s) was the most common presentation followed by pain and limited mobility of joint. The diagnosis of Synovial Lipomatosis requires a combination of radiology and histopathological examination. Magnetic Resonance Imaging (MRI) remains the gold standard modality and shows an intra-articular frond-like synovial mass with fat equivalent high signal intensity (Both T1 and T2) which is suppressed using fat

suppressed sequences.<sup>4,6,11</sup> Other findings include joint effusion, bone erosions, synovial cyst and degenerative changes. Arthroscopy of joint also reveals villous proliferation of the synovium. On gross examination, the lesion of Synovial Lipomatosis is pale yellow, soft to firm with villous architecture. Microscopic examination is essential for definite diagnosis. Histologically, there is villous proliferation of synovium with infiltration of mature adipocytes (Fig 1a and 1b).<sup>1-3</sup> Synovial hyperplasia, mild inflammation, dilated blood vessels and fibrosis can be present.<sup>3,9</sup> The differential diagnoses of Synovial Lipomatosis include Synovial lipoma, Pigmented villonodular synovitis, Synovial haemangioma and intra-articular synovial lipoma (IASL). The later presents as a solitary nodular lesion in contrast to multiple villous projections in Synovial lipomatosis.



**Figure 1: Biopsy from knee joint. (a) Villous structure lined by synovial membrane infiltrated by mature adipocytes. (Hematoxylin and Eosin, 20x). (b) Adipocytes and congested vessels in sub epithelial tissue. (Hematoxylin and Eosin, 20x)**



**Figure 2 (a) Synovial tissue with infiltration of mononuclear inflammatory infiltrate and mature adipocytes. (Hematoxylin and Eosin 20x) (b) Synovial lining of villi showing focal hyperplasia (arrow). (Hematoxylin and Eosin, 20x)**

Histologically, IASL is composed of mature adipose cells covered by thin fibrous layer. Unlike Synovial lipomatosis, villous proliferation of synovium is absent in Intra-articular synovial lipoma.<sup>1,3,9</sup>

Pigmented villonodular synovitis (PVNS) is characterized by papillary projections of hyperplastic synovium composed of foamy cells and hemosiderin-laden macrophages. There are large pseudoglandular spaces lined by synovial cells, epithelioid cells and multinucleated giant cells. Absence of hemosiderin laden macrophages is a major differentiating feature of Synovial lipomatosis from PVNS.<sup>1,3</sup> Synovial hemangioma shows synovium with dilated and congested vascular spaces. Lack of fat infiltration, villous architecture and synovial hyperplasia separates it from Synovial lipomatosis.<sup>3</sup> The treatment of choice for Synovial lipomatosis is arthroscopic synovectomy especially when the disease is limited to one compartment. Larger lesion, however, requires open synovectomy. Recurrence is uncommon after synovectomy.<sup>1,5,8,9</sup>

## Conclusion

Synovial lipomatosis is a rare pseudotumor, of unknown etiology, arising from synovial lining of joints characterized by villous proliferation of synovium with infiltration of adipocytes. Clinical presentation can vary but MRI and histopathological findings are characteristic and help in definite diagnosis. Treatment by arthroscopic or open synovectomy is enough with very low rates of recurrence.

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