

## Diagnostic value of arthroscopic synovial biopsy in joint diseases : a retrospective study



### Medical Science

**KEYWORDS :** Arthroscopic synovial biopsy, Joint diseases

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#### ABSTRACT

*Arthritis is an important cause of morbidity in clinical practice and affects all the ages and both sexes . It can present as monoarticular or polyarticular lesion . Arthroscopic synovial biopsy can be useful in arriving at specific diagnosis . Tuberculous synovitis is the most common etiology of joint swellings . The next most commonly observed specific cause associated with joint related morbidity was rheumatoid synovitis followed by chronic nonspecific synovitis . Monoarticular joint involvement predominated over polyarticular joint involvement [ 82 % ] . Knee joint is the most commonly involved joint in both monoarticular as well as polyarticular arthritis , when cases of joint diseases affecting lower extremities are reviewed , the commonest etiology being rheumatoid synovitis followed by tuberculosis . Wrist joint is the most commonly involved joint , when the cases of joint diseases affecting upper extremities are reviewed , the commonest etiology being tuberculosis .*

#### Introduction:

Arthroscopic synovial biopsy is an important diagnostic adjunct in joint diseases , which can provide a conclusive diagnosis in cases of equivocal clinical diagnosis.<sup>[1]</sup> Arthritis can involve a single joint , the usual etiology being trauma or infections , while multiple joints are involved commonly in rheumatoid arthritis . Specific diagnosis is not possible by clinical as well as radiological examination in many cases of arthritis and probably leads to indiscriminate use of NSAIDS . Arthroscopic synovial biopsy helps in arriving at a specific diagnosis and proper treatment . Needle arthroscopy of joint allows gross inspection and selective sampling of synovium and can provide definitive diagnosis in many cases.<sup>[2]</sup> The major draw-back of blind needle biopsy is the potential for sampling errors. In general, histological results are the same, regardless of the method used.<sup>[3]</sup>

#### Aims and Objectives :

To study the histopathological features of synovium in various joint diseases and to evaluate the efficacy of arthroscopic synovial biopsy as a diagnostic aid .

- To study age , sex , site distribution of various joint diseases
- To study gross appearance of synovium in various joint diseases

#### Materials and methods

The material for the present study included synovial biopsies in patients of arthritis , sent in 10 % buffered formalin solution in the Department of Pathology , Bharati Vidyapeeth Deemed University Medical College and Hospital Sangli , India from Sept 2013 to Aug 2015 and purposive information including age , sex and clinical presentation were noted from the requisition forms sent along with the specimens and relevant clinical data was collected from medical records department of Bharati Vidyapeeth Deemed University Medical College and Hospital Sangli for study of retrospective cases. The histopathological criteria evaluated included synovial hyperplasia - proliferation of synoviocytes , presence of villi , presence of fibrin and its location [ superficial or deep ] , capillary proliferation , Types of inflammatory cells and their distribution - polymorphs , lymphocytes , plasma cells and hemosiderophages, presence of bone and cartilage fragments with or without inflammation , pannus formation , presence of hemorrhage and hemosiderin deposition. Criteria for specific histopathological diagnosis of various joint diseases were followed as proposed by Goldenberg DL and Cohen AS.<sup>[4]</sup> Synovial biopsies were further evaluated for tophaceous deposits and granulomas

with or without caseous necrosis . 20 % ZN stain was done in cases with granulomatous inflammation.

#### Observations and Results :

Arthroscopic synovial biopsy is an important diagnostic tool to assess the etiology of various joint diseases .

#### Abbreviations used in the tables :

- CNS - Chronic nonspecific synovitis,
- TS - Tuberculous synovitis,
- RS - Rheumatoid synovitis,
- PVS - Pigmented villonodular synovitis,
- OA - Osteoarthritis,
- SA - Septic arthritis.

Synovial biopsy diagnosis	No of cases		Total no of cases n = 230
	Lower extremity	Upper extremity	
CNS	21	49	70
TS	36	45	81
RS	29	09	38
PVS	02	00	02
Gout	06	00	06
OA	08	00	08
SA	22	03	25
Total no of cases	124	106	230

**Table 1 : Histopathological diagnosis of synovial biopsies**

Amongst the various causes of synovitis , tuberculous synovitis is the most common etiology of joint swellings [ 35.21 % ] and incidence of tuberculous synovitis was noted in the age group 41 – 60 yrs [ 46.9 % ] as compared with 0 – 20 yrs [ 9.8 % ] , 21 – 40 yrs [ 28.4 % ] and > 61 yrs [ 14.8 % ] . 20 % Zn stain was positive for acid fast bacilli in only 7 % cases of tuberculosis affecting joints . The next most commonly observed specific cause associated with joint related morbidity was rheumatoid synovitis [16.5 %] . Chronic nonspecific synovitis without any specific etiology was observed in 30.4 % cases.

**Table 2 : Distribution of joint diseases in lower extremity**

Synovial biopsy diagnosis	Knee	Hip	Ankle	Small joints of feet
CNS	04	05	10	02
TS	18	14	04	00
RS	19	02	05	03
PVS	02	00	00	00

Gout	00	00	01	05
OA	06	01	01	00
SA	12	10	00	00
Total	61	32	21	10

Monoarticular joint involvement predominated over polyarticular joint involvement [ 82 % ]. Knee joint is the most commonly involved joint in both monoarticular as well as polyarticular arthritis, when cases of joint diseases affecting lower extremities are reviewed , the commonest etiology being rheumatoid synovitis followed by tuberculosis . The most common etiology of polyarticular arthritis was rheumatoid arthritis , while that of monoarticular arthritis was tuberculosis.

**Table 3 : Distribution of joint diseases in upper extremity**

Synovial biopsy diagnosis	Elbow	Shoulder	Wrist	Small joints of hand
CNS	14	02	32	01
TS	02	00	42	01
RS	00	00	05	04
PVS	00	00	00	00
Gout	00	00	00	00
OA	00	00	00	00
SA	02	01	00	00
Total	18	03	79	06

Wrist joint is the most commonly involved joint , when the cases of joint diseases affecting upper extremities are reviewed , the commonest etiology being tuberculosis accounting for 53.2 % .

**Table 4 : Age wise distribution of joint diseases**

Synovial biopsy diagnosis	0 - 20 yrs	21-40 yrs	41-60 yrs	> 60 yrs
CNS	11	35	12	12
TS	08	23	38	12
RS	04	22	06	06
PVS	00	00	02	00
Gout	00	04	02	00
OA	00	00	03	05
SA	02	05	06	12
Total	25	89	69	47

Increased incidence of joint diseases is seen in the age group of 21 – 40 yrs , while low incidence is seen in the age group of 00 – 20 yrs .

**Table 5 : Sex wise distribution of joint diseases**

Synovial biopsy diagnosis	Males	Females
CNS	42	28
TS	45	36
RS	10	28
PVS	00	02
Gout	05	01
OA	02	06
SA	09	16
Total	113	117

The morbidity associated with joint diseases was observed slightly more in females [ 50.8 % ], the commonest etiology being tuberculosis.

**Table 6 : Histological patterns in various joint diseases**

Histological patterns	CNS	TS	RS	PVS	Gout	OA	SA
synovial hyperplasia	21	20	24	2			
presence of villi	08		38	2			
Superficial fibrin deposits	09	25	04	1		2	13
Deep fibrin deposits	01	10	01	1		3	4
Capillary proliferation	38					5	
bone and cartilage fragments						7	
pannus formation						6	
hemorrhage and hemosiderin deposition			2			1	
Tophaceous deposits					6		
Granulomas without caseous necrosis		49					

Granulomas with caseous necrosis		32					
Predominant cells Polymorphs		12					25
Predominant cells Lymphocytes and plasma cells	70	69	38	0	6	8	
Predominant cells hemosiderophages		0	2				

The term chronic nonspecific synovitis was used for cases in which no specific histological features suggesting etiology were observed and revealed nonspecific histological changes . Tuberculous synovitis was characterised by presence of granulomas with or without caseous necrosis . Rheumatoid synovitis was characterised by presence of hypertrophic villi with or without fibrin deposits and perivascular nodular aggregates of lymphocytes surrounded by plasma cells . Pigmented villonodular synovitis revealed villi , haemorrhage and hemosiderophages and multinucleate giant cells containing intracytoplasmic hemosiderin . Osteoarthritis was marked by presence of bone and cartilage fragments with or without inflammation , pannus formation and fibrin deposits . Gout cases revealed multiple amorphous pink or pale deposits of tophi surrounded by numerous mononuclear cells , few histiocytes and many foreign body type of giant cells , while septic arthritis showed prominent polymorphonuclear cell infiltration and fibrin deposits .

The present study revealed 81 cases of tuberculous arthritis . Only granulomas accounted for 49 cases , while granulomas with caseous necrosis was noted in 32 cases. Acid fast bacilli were detected in six cases. All 38 cases of rheumatoid synovitis were characterised by hypertrophic villi engulfed by lympho-plasmacytic infiltrates and lymphoid follicles. All 25 cases of septic arthritis showed polymorphonuclear cell infiltration. Gram stain and culture identified staphylococcus , E coli and Klebsiella species as etiologies in 12 cases. Out of 8 cases of osteoarthritis , 7 cases revealed bone and cartilage fragments in synovial biopsies. 6 cases revealed tophaceous deposits with foreign body granulomatous reaction confirming gout as etiology of arthritis , while 2 cases of pigmented villonodular synovitis expanded villi with osteoclastic giant cells and hemosiderophages .

**Discussion :**

Arthritis is an important cause of morbidity , affecting all age groups and both sexes . The morbidity associated with joint diseases was observed slightly more in females, the commonest etiology being tuberculosis . Synovial biopsy helps in arriving at specific diagnosis and proper management of the underlying cause . Multiple tissue samples can be readily obtained using closed needle biopsy, usually from the suprapatellar pouch. Although needle arthroscopy is considerably more expensive , provides larger samples which can be selected under direct vision. [5] In cases of undifferentiated arthritis, visualization of the affected joint and sampling of synovial tissue can facilitate the diagnostic process. [6]

Needle arthroscopy of the knee allows good macroscopic evaluation of synovium and selective sampling of the diseased synovium . The present study revealed that tuberculous synovitis is the most common etiology of joint swellings and increased incidence of tuberculous synovitis was noted in the age group 41 – 60 yrs . The next most commonly observed specific cause associated with joint related morbidity was rheumatoid synovitis . Similar results were obtained by Abhyankar et al with tuberculous and rheumatoid arthritis accounting for 68 % of cases. [7]

Knee joint is the most commonly involved joint , when cases of joint diseases affecting lower extremities are reviewed , the commonest etiology being rheumatoid synovitis followed by tuberculosis. Early rheumatoid arthritis may not be unequivocally diagnosed in all cases, based on clinical and serological criteria alone.

[8] Assessment of synovial histology helps in these cases. The microscopic characteristics of rheumatoid synovitis are present in joints that have not yet become overtly inflamed. [9]

Wrist joint is the most commonly involved joint, when the cases of joint diseases affecting upper extremities are reviewed, the commonest etiology being tuberculosis. Other causes of arthritis that can be diagnosed by analysis of synovial histology are gout, pigmented villonodular synovitis, osteoarthritis and septic arthritis etc. We evaluated synovial biopsy as a diagnostic tool and found that synovial biopsy yields specific diagnosis in most of the cases and contributes to diagnostic classification of inflammatory arthritis.

#### Conclusion :

Synovial biopsies, gained either by blind needle biopsy or minimally invasive arthroscopy, offer additional information in certain clinical situations, where routine assessment has not permitted a certain diagnosis. Early and specific diagnosis of rheumatoid arthritis, tuberculosis as well as other pathologies associated with arthritis is possible by histological assessment of synovial biopsies.

#### Conflict of interest : Nil

#### Contribution of Authors :

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