



STUDY OF ANALYSIS OF SYNOVIAL BIOPSY OF KNEE JOINT FOR VARIOUS DISEASES AND ITS CORRELATION WITH LABORATORY AND CLINICAL FINDINGS

Orthopaedics

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ABSTRACT

OBJECTIVES: Synovial membrane biopsy is of great importance in the assessment of joint diseases synovial conditions & it is the final tool for diagnosis. The present study was mainly to assess the incidence of various joint diseases and diagnosis the joint diseases by histopathological and so clinical parameters and to correlate the clinical findings with histopathological study to minimize the number of non specific synovitis.

MATERIALS AND METHODS: The present study was carried on a total of 15 patients, Whose knee joint was involved at tertiary care Hospital research center Surat between September 2015 to March 2018, by open and arthroscopic biopsy.

RESULTS: Most of the cases were diagnosed as chronic non specific synovitis (6), followed by tubercular synovitis (2), septic arthritis (1), Rheumatoid arthritis (1), Gouty arthritis (1) osteoarthritis (1), synovial osteochondroma (1), GCT of tendonsheath (1), & synovial sarcoma (1). Those histopathological features which were not specific of any disease in 6 patients were labelled as nonspecific synovitis; Definitive histological diagnosis was given in remaining cases. The concordance between clinical, histopathological diagnosis was 60% and discordance between the two was 40%.

CONCLUSIONS: From the results of present study after comparison with study of synovial membrane in various other series. It is evident that synovial biopsy is an important adjuvant together with clinical details for giving a definitive histopathological diagnosis.

KEYWORDS

Knee joint; Synovial biopsy

INTRODUCTION

The synovial membrane biopsy is of aid in the assessment of joint diseases synovial conditions. It is the final diagnostic procedure. The synovial membrane behaves as a mirror to the joint diseases and examination of synovial membrane often reveals a myriad of features suggestive of specific diseases entities. **Jaffe, Lichenstein** and **Sutri** (1941) regarded the synovium of tendon sheath, bursa and joint to be an anatomic unit that could give rise to a common family of lesions.

Diarthrodial or synovial (Paracelsus: first used the term synovia; viz; joint oil) joints are the joints most commonly affected by diseases in the human body. The joints are open tissue spaces communicating directly with periarticular tissues. The capsule is lined by synovial membrane, which also covers soft structures within the joints and forms bursa. The articular cartilage and menisci are not covered by synovial membrane. The synovial membrane is composed of an inner secretory zone lined by a discontinuous layer of specialized cells with both secretory (synovial fluid) and phagocytic function. Under certain circumstances perform antigen-processing function similar to those of macrophages.

The symptom complex of pain, swelling and stiffness of joints is labeled as arthritis and is a common problem often encountered in clinical practice. These are the afflictions of all age groups and are prevalent in either sex. Arthritis may be classified as mono-articular, pauci-articular or poly-articular when it involves one joint, four or less, or more than four joints respectively. Irrespective of the type of arthritis failure of timely institution of specific therapy, because of delay in diagnosis often leads to an increase in morbidity.

Common conditions such as rheumatoid arthritis rarely cause diagnostic problems when presented typically. Difficulties arise when atypical clinical presentation is associated with non contributory preliminary investigations. Some time even fairly specific investigations which helps to differentiate between specific arthritis are unhelpful, eg; rheumatoid factor (RF) may be negative in late cases of rheumatoid arthritis or RF is positive in two to seven percent of patients with connective tissue disorders other than rheumatoid arthritis Under such circumstances synovial membrane biopsy is of value in the diagnosis of joint disorders. This is especially so in chronic mono arthritis, where synovial biopsy is most useful as an aid to diagnosis or exclude potentially remediable condition's.

Different techniques are applied for synovial membrane biopsy. Open biopsy has an accessibility of joints other than the knee. Availability of larger specimen, gross inspection of the joints and opportunity to obtain cartilage in addition to soft tissues. Before the era of advanced surgical techniques, pathological material for the study of joint was almost exclusively obtained from postmortem samples¹.

In addition to routine H & E stained sections under light microscopy, special staining techniques, electron microscopy and immunocytological techniques were evolved for accurate diagnosis of synovial lesions.

AIMS AND OBJECTIVES

1. To assess the incidence of various joint diseases in the present study.
2. To correlate the clinical findings with histopathological and laboratory findings in different diseases and to evolve a simple diagnosis.
3. To know the pattern of histopathological appearance of synovial membrane in each disease.
4. To correlate the arthroscopic, clinical and histopathological studies in the diagnosis of the disease.
5. To evaluate the importance of synovial biopsy as a diagnostic aid in various joint diseases.
6. To give specific treatment based on specific diagnosis.
7. To minimize the number of lesions of non specific synovitis by histopathology, as clinical findings of many diseases resemble.

Materials and Methods

SOURCE OF DATA:

The present study was carried on a total of 15 patients, whose knee joint was involved at tertiary care Hospital research center Surat between September 2015 to March 2018, by open and arthroscopic biopsy. The patients were informed about study in all respects and informed written consent was obtained.

Inclusion Criteria:

- a) Patients having synovial swelling of the knee joint for which Biopsy is indicated.
- b) Patients of any sex and having age group 10-60 years.
- c) Patients who are fit for biopsy under general or spinal anesthesia.
- d) For confirmation of clinical and histopathological diagnosis when

laboratory findings are not helpful.

Exclusion Criteria:

- In traumatic conditions where there is bony injury of the joint occurred.
- Patients having poor general health.
- Patients whose skin condition over the joint is poor or not suitable for incision.
- Conditions where diagnosis is very obvious by other methods.
- Patients who are unfit for anesthesia and Biopsy.

Type of study: Prospective observational study

Source of Funding: Nil

Conflict of Interest: Nil

Method:

Cases were diagnosed on history, clinical examination and investigations (Histopathological findings and laboratory analysis). Statistical data included is name, age, sex, ward, occupation, chief complaint, history, general examination, local examination, investigations, biopsy technique and biopsy results.

Research included study of 15 cases of synovial (knee) joint swelling diagnosed by clinical and histopathological findings and correlation of clinical and histopathological findings.

Biopsy material for histopathological study consisted mainly of the synovial membrane obtained either by open arthrotomy and excision biopsy or arthroscopic biopsy.

Specimens received were examined for gross findings like size, shape, color, consistency, fixed in 10% formalin and tissues were processed routine paraffin embedded technique. Routine H and E and special stains such as Touluidine blue, PAS, perl's and Ziehl nelson, Knyoun's method of stain for Acid fast bacteria were used where required.

The H&E stained sections of the specimen were each analyzed with regard to histological criteria of which synovial hyperplasia, fibrosis, proliferating blood vessels, perivascular infiltrates of lymphocytes, Focal aggregates of lymphocytes and diffuse infiltrates of lymphocytes as done by **Goldenberg** (1978) and **cooper et al** (1981) in their studies. The remaining features like polymorphonuclear infiltration. Surface fibrin and specific changes such as granulomatous type of giant cells, lymphoid follicles were noted. The changes in the each diagnostic category were then summarized and the clinical groups compared.

The synovial membranes were then matched the clinical diagnosis according to the above described and arrived at the following histopathological diagnosis.

01. Septic Arthritis	(01)
02. Chronic non specific synovitis	(06)
03. Tuberculous arthritis	(02)
04. Rheumatoid arthritis	(01)
05. Gout	(01)
06. Osteoarthritis	(01)
07. Synovial (osteo) chondromatosis	(01)
08. Giant cell tumor of tendon sheath.	(01)
09. Synovial sarcoma	(01)
TOTAL	15

The other laboratory investigations were done are (where ever necessary):

Blood routine, Urine routine profile, Blood urea, serum creatinine, serum uric acid, serum rheumatoid factor, ASLO titre, synovial fluid analysis for biochemical findings and cytological analysis. X-ray of the involved knee joint. HIV, HBS Ag tests.

INTERVENTIONS INCLUDED :

a) Anaesthesia :

Biopsy procedures were conducted under general and regional anesthesia depending on patients general conditions.

Approach to the joint by open or Arthroscopic technique.

Hospital stay for each patients was 2 to 7 days, depending on the techniques of biopsy.

RESULTS

The present study was carried on a total of 15 patients, Whose knee joint was involved at tertiary care Hospital research center Surat between September 2015 to March 2018, by open and arthroscopic biopsy.

Table 1 : incidence of various lesions of synovial membrane

Sl.No.	Lesions	No. of Cases	Male	Female
1.	Septic arthritis	1	1	0
2.	Chronic non specific synovitis	6	4	2
3.	Tubercular arthritis	2	1	1
4.	Rheumatoid arthritis	1	0	1
5.	Gout	1	1	0
6.	Osteoarthritis	1	0	1
7.	Synovial osteochondroma	1	1	0
8.	GCT tendon sheath	1	0	1
9.	Synovial sarcoma	1	1	0
	Total Cases	15	9	6

Male: Female ratio – 1.5 : 1

DISCUSSION

Joint disease is one of the commonest orthopaedic problems and affects both sexes and nearly all age groups without distinction. Usually a detailed clinical examination, radiological and serological aid is enough to diagnose the problems. However these findings are equivocal at times and therefore need arises for specific tests for confirmation of diagnosis. Review of literature and the present study have highlighted the usefulness of histological study of synovial membrane in the diagnosis of various joint diseases and correlation between the clinical and histopathological findings in disease diagnosis.

NON SPECIFIC SYNOVITIS :

In the present study histopathological changes in 6 (40%) cases were not specific for any disease entity nor did they, when correlated with clinical findings to suggest a diagnosis. These cases showed varying degree of villous hypertrophy, proliferation of synovial lining cells, capillary proliferation, chronic inflammatory cell infiltrate and slight synovial or sub synovial fibrosis.

Various authors have given widely varying degree of lesions, which they have included under 'unclassified' category or under 'non-specific synovitis'. **Misgar**⁴⁷ and **Schumacher**⁴⁸ have reported figures of 22% and 27% respectively. **Cooper**¹⁵ and **Abhayankar**⁴⁹ have given figures of 9% and 3%, while **Goyal** (1988) has given figures of 16%. The figures in the study are quite high.

TUBERCULOUS SYNOVITIS :

Tuberculous arthritis was encountered in 2 cases (13.33%) in this study. **Misgar**⁴⁷ was reported figures of 30% while **Abhayankar**⁴⁹ has revealed figures of 42.5% in her study of 200 cases, and **Sant**⁵¹ in her study of 251 cases showed a figure of 27.8%. These figures are uniformly higher than those given by western authors **Wallace** and **Goldenberg**⁵⁰. These reasons are obvious, the incidence and prevalence of tuberculosis as a whole being much higher in this continent as compared to the west.

OSTEOARTHRITIS :

The synovial membrane biopsy in one case (6.67%) was diagnostic of OA showing degenerating cartilage. This is less than the number of cases given by **Misgar**⁴⁷ and **Abhayankar**⁴⁹ who have reported figures of 16% and 12.5% in their studies respectively. The lower incidence is due to reluctance of the clinicians for to subject patients for synovial biopsy. The patient of 45 yrs old with male gender, while

Goldenberg⁵⁰ and **Abhayankar**⁴⁹ found highest incidence in the 5th and 6th decades respectively.

SYNOVIAL (OSTEO) CHONDROMATOSIS

Nodules of metaplastic cartilage within the synovial membrane associated with loose bodies within the joint cavity were found in 1/1 (100%) of the cases of present study.

In the present study patient is a male, 38 yrs old. On gross examination there were 2 loose bodies, while other authors have reported 1 – 10 loose bodies.

GIANT CELL TUMOR OF TENDON SHEATH (GCT)

Only one case of giant cell tumour was found in the present study. This is nodular. Patient is a 32 yr old female. Rao et al⁴ observed gender ratio (M : F) at 1 : and common during 5th decade.

SYNOVIAL SARCOMA :

One case (6.67%) in this study revealed typical features of synovial sarcoma from Lt. knee joint in a male 26 yrs (i.e. in 3rd decade of life). The patient presented with pain and swelling of Lt. knee joint. x-ray of the region showed pathological fracture at lower end of Lt femur at metaphysis with new bone formation and loose soft tissue shadow and displacement of patella.

CONCLUSION

In the present study the concordance between clinical and histopathological diagnosis was 60% and discordance between the two was 40%. From the results of the present study after comparison with the study of synovial membrane in various other series, it is evident that synovial biopsy is an important adjuvant together with clinical details for giving a definite histopathological diagnosis. It is also evident that the synovial biopsy examination, at times gives a conclusive diagnosis.

Even in the best hands , clinical diagnosis itself may well be “misclassifying” an indeterminate proportion of cases. Synovial membrane biopsy is valuable in diagnosis of joint inflammatory diseases no doubt that clinical, haematological , radiological studies help to wards a correct diagnosis but sometimes these are inconclusive. Synovial biopsy is a useful and very reliable method of diagnosis.

But most of the times the routine histopathological study of synovium may not be able to give definite diagnostic conclusion. To eliminate the “nonspecificity” the other supportive diagnostic method like immunohistological methods are in the hope of achieving a better specific diagnosticity.

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