International Orthopaedics (SICOT) (1998) 22:189–192

International Orthopaedics

Synovial biopsy

A comparative study from Saudi Arabia and Malaysia

M. Sankaran-Kutty[1], **P.K. Das**[2], **M. Kannan Kutty**[3]

[1] Department of Surgery, Faculty of Medicine, UAE University, P.O. Box 17666, Al Ain, United Arab Emirates
[2] Department of Pathology, University Science Malaysia, Kubang Kerian, Kota Bahru, Malaysia
[3] Department of Pathology, Subang Jaya, Medical Centre, 47500 Petaling, Jaya Selangor, Darul Ehsan, Malaysia

Accepted: 8 May 1997

Summary. *A comparative study of synovitis in Saudi Arabia and Malaysia was made with a view to determining any geographic variation in the incidence and pattern of the arthritides. The diagnostic spectrum in both series included pyogenic arthritis, rheumatoid arthritis, brucellar and tubercular arthritis, gout, pigmented villonodular synovitis, synovial chondromatosis and acute rheumatic fever. Date-palm thorn synovitis was observed only in the Saudi Arabian series. While brucellar and tuberculous arthritis were predominantly seen in Saudi Arabia, the incidence of rheumatoid arthritis, pigmented villonodular synovitis and acute suppurative arthritis was almost equal in both countries.*

Résumé. *Une étude comparative des arthrites a été réalisée en Arabie Saoudite et en Malaisie en vue d'établir une variation géographique, tant pour l'incidence que pour l'origine. Les étiologies communes aux deux séries sont l'arthrite septique, l'arthrite rhumatoïde, la brucellose, la tuberculose, la goutte, la synovite pigmentée villo-nodulaire, la chondromatose synoviale et le rhumastime articulaire aigu. L'arthrite par inoculation par épine de palmier n'a été observée qu'en Arabie Saoudite. Alors que la brucellose ou la tuberculose ont été observées de façon prédominante en Arabie Saoudite, l'incidence de l'arthrite rhumatoïde, de la synovite pigmentée villonodulaire et de l'arthrite septique aiguë était à peu près égale. Dans les deux séries, parmi les articulations le genou était la plus concernée et le coude la moins concernée.*

Reprint requests to: M. Sankaran-Kutty, Faculty of Medicine & Health Sciences, UAE University, P.O. Box 17666, Al Ain, United Arab Emirates

Introduction

With the increasing number of biopsies which are performed in joint conditions, the geographical distribution and relative frequency of arthritic diseases becomes clearer. The range of possible diagnoses in biopsy specimens, some of which can easily be overlooked, has not been highlighted in the orthopaedic literature. Owing to the concentration of certain conditions which some institutions experience, the misinterpretation of unfamiliar appearances can have serious consequences, but the danger of a false positive diagnosis is equally important. The arthritic conditions diagnosed on synovial biopsy in Saudi Arabia (Middle East) and in Malaysia (Far East) are reviewed and compared in this paper.

Material and methods

This study included all synovial biopsy material from July 1984 to June 1989 registered in the Department of Pathology, King Fahd University Hospital (KFUH), Al Khobar, Saudi Arabia and in the Department of Pathology, Subang Jaya, Medical Centre (SJMC) and University Science Malaysia (USM), Kubang Kerian, Malaysia between January 1991 and December 1995. The specimens were received in 10% formol-saline and were processed using a routine paraffin system. All sections were cut at 3 μm and at least three levels were taken from each specimen. Routine haematoxylin and eosin (H & E) staining was performed in all instances; special stains including Zeihl-Neelsen were only undertaken when indicated.

Results

A total of 70 biopsies were examined, 38 at KFUH and 32 at SJMC/USMH during the five year periods under review. The age distribution of the patients is shown in Table 1 and the histological diagnosis in Table 2.

Table 1. Age distribution of the subjects investigated

Age (years)	Saudi Arabia	Malaysia
<10	2	3
11–20	2	3
21–30	11	5
31–40	10	10
41–50	6	7
51–60	2	3
61–70	2	1

Table 2. Combined aetiology/histology of synovial lesions

Cause/lesion	Saudi Arabia	Malaysia
Tuberculosis	7	2
Rheumatoid arthritis	6	6
Pyogenic	2	3
Gout	2	3
PVNS	1	2
Synovial chondromatosis	1	3
Brucellosis	5	0
Thorn synovitis	3	0
Ac rheumatic fever	1	1
Chronic nonspecific inflammation	10	12

In the Saudi Arabian series there were 32 males and 6 females, aged 7 to 62 years. The knee was involved in 31 (82%), the hip in 5 (13%) and the elbow in 2 (5%). Fifty-five per cent of the biopsies were performed in the 21 to 40 years age group. A specific histological diagnosis was obtained in 19 and chronic nonspecific inflammatory changes were noted in the other 19. With additional corroborative evidence, a diagnosis was established in 9 of these latter patients with brucellosis in 5, date palm thorn synovitis in 3 and acute rheumatic fever in 1, leaving 10 with an imprecise diagnosis of chronic non-specific synovitis.

In the Malaysian study, 23 patients were males and 7 females, with ages ranging from 7 to 68 years. The knee was involved in 23 (72%), the hip in 4 (12%), the wrist and ankle in 2 (6%) each and the elbow in 1 (3%). Fifty-three per cent of the biopsies were in the 31–50 year age group. A histological diagnosis was achieved in 20 while chronic non-specific inflammation was present in 12. Additional investigations did not provide a precise diagnosis in any of the latter group.

Discussion

In the investigation of arthritis, synovial biopsy often provides valuable information. The majority of patients are likely to be concentrated in certain centres as determined by the incidence of conditions in the local population and the availability of overall facilities. In many, synovial biopsy provides a diagnosis upon which appropriate management can be based. Needle and punch biopsies in the knee have been shown to be of value in synovial inflammatory conditions, tuberculosis and other specific granulomatous lesions [22, 25, 27, 33]. Arthroscopic biopsy has the added advantage of visualising the joint and obtaining a representative synovial sample. This procedure is now extended to other joints. In our study, 70% of patients had an open biopsy, while more recently, in the other 30%, arthroscopic biopsy was employed. Not every biopsy of the synovium will produce a diagnosis and some clinically unsuspected conditions may be detected. In our experience multiple stains provided no additional information when H & E staining had proved unhelpful. When acid-alcohol-fast bacilli (mycobacterium tuberculosis) were not a common finding, special stains were not contributory. The usual diagnostic features of such an infection (granulotomata and giant cells) were usually evident.

Acute septic arthritis is easily diagnosed, and a synovial biopsy is seldom necessary. The positive culture of microorganisms in the pus provides the definitive diagnosis. A marked neutrophilic response is highly suggestive of pyogenic infective arthritis. Such a reaction may also be seen, however, in Bechet's disease and Mediterranean fever (familial polyserositis). It may also be a striking feature in mycobacterium marinum infection and therefore should be differentiated with the assistance of corroborative evidence. A septic arthritis should be suspected when a nontraumatic acute effusion occurs in an immunocompromised individual [19].

The diagnosis of chronic synovitis is based upon the histological appearance, notably the presence of mild hyperplasia of the synovial intimal cells with dense chronic inflammatory cells composed of lymphocytes and plasma cells in the synovial stroma. Chronic synovitis forms the major proportion of cases and includes specific and nonspecific entities. The nonspecific type may present diagnostic difficulties; often the histological picture needs to be correlated with the clinical findings, radiological features and the laboratory parameters. In our series, one patient with chronic degenerative arthritis developed an acute pyogenic infection. The synovium removed at the time of drainage showed features of both acute and chronic inflammation.

Classically, the synovium in tuberculous arthritis shows a central area of caseation with a surrounding zone of epithelioid cells, macrophages and Langhan's giant cells, which in turn is enclosed by a zone of lymphocytes. Nevertheless, all mycobacterium infections are not of tuberculous origin, and a notable exception is synovitis produced by M. marinum, which involves the tendon sheaths, bones and joints [2, 6, 13]. In this infection the changes vary from the common nonspecific inflammation to the granulomatous response, with or without caseation. Collins et al. [6] reported that many patients with M. marinum synovitis had previously received repeated intra-articular steroid injections. An intense neutrophilic response may occasionally mask the granulomatous reaction and confound the correct diagnosis. It is significant that there are a large number of mycobacteria that are pathogenic to man and the diagnosis of tuberculosis

is not justified solely on the basis of the demonstration of acid-fast bacilli.

In brucellar arthritis, the synovium shows chronic inflammatory changes without any specific histological pattern [1]. In these circumstances, the precise diagnosis is dependent upon other factors. In acute brucellar arthritis with pyrexia, the high yield of positive blood culture for the organism is conclusive [32] while in the chronic form a minimum brucellar agglutinin titre of 1:160 is required and a rising titre is diagnostic [9, 17]. In our series, in one of the 5 patients with brucellar arthritis, the culture of the synovial fluid grew B melitensis. Fungal or viral infection in our material did not occur, probably because the patients were not immunocompromised. Although other infections are prevalent in both Saudi Arabia and Malaysia, our data indicate that the incidence of fungal infections affecting the joint is comparatively low. Further efforts to exclude infective arthritis [21] as well as reactive arthritis [18] may reduce the proportion of histological specimens in the category of chronic nonspecific inflammatory synovitis.

Thorn pricks, especially of the knee joint, may lead to chronic non-specific synovitis such as that produced by the black thorn [15] and the palm thorn [5]. In the Middle East synovitis of this type can be induced by the thorn of the date palm [23], as occurred in three of our patients. A history of a thorn prick and the finding of the thorn in the synovium confirms the diagnosis.

The usual histological features in rheumatoid disease are the presence of lymphoid follicles, small synovial blood vessels and fibrin deposits in the synovium. These changes, although they support the diagnosis in a clinically compatible case, are not pathognomonic of this disease [29, 31]. Two additional nonspecific features include the presence of synovial giant cells and cartilage fragments in the synovial membrane [10]. We have observed non-caeseating granulomas with foreign body giant cells in 2 patients with rheumatoid arthritis. Other authors have noted these changes in both seropositive and seronegative patients [3]. In our series 2 patients with nonspecific synovitis were eventually diagnosed as having rheumatic fever on the basis of their clinical features, high antistreptolysin titres and a favourable response to treatment.

Gout causes about 2 to 5% of all chronic arthritis. Microscopically, uric acid crystals and a granulomatous reaction are characteristic of gout, but nonspecific findings in an established case may be of equal diagnostic significance. Alcohol fixation of the tissue is ideal for demonstrating sodium biurate monohydrate deposits, but we did not use this method since the granulomatous response to these crystals is diagnostic. The first metatarsophangeal joint is commonly affected but other larger joints, as in our two patients, may be involved. It is noteworthy that although the serum uric acid level is raised in a significant proportion of our local populations, systemic gout with joint involvement is relatively rare.

One example of pigmented villonodular synovitis [PVNS] was seen in this study. The knee is the commonest site, but other areas like the hip, shoulder, wrist or the vertebral joints are not exempt [4, 14, 28, 30]. It is rarely polyarticular and seldom invades the bone [7, 12, 16]. Two forms, the localised nodular and the diffuse generalised, are recognised [20]; the diffuse form tends to affect the larger joints [8]. In our patient, the lesions were diffuse and showed pigment-laden cells, foam cells and giant cells. PVNS was initially considered to be an inflammatory condition, but the current theories lean towards it being a benign neoplastic process [11, 20, 24]. The differential diagnosis includes the haemosideric synovitis of haemophilia, rheumatoid arthritis and traumatic synovitis. A synovial sarcoma is differentiated by features such as cellular pleomorphism, a high mitotic content and the absence of fibrosis. The nodular type is best treated by local resection, and the diffuse form by synovectomy, with a possible recurrence rate of about 10% [20].

We believe that synovial biopsy has not been assigned its due importance in the diagnostic process and our limited experience has clearly shown that this procedure has a definite role in routine orthopaedic practice. It has also provided us with a better understanding of the articular disorders that occur in our own geographical localities. The histological diagnosis correlated well with our clinical impressions in about two-thirds of the cases, thus positively contributing to the proper management of the patients. Where the clinical diagnosis was in doubt, the biopsy was directly helpful, as in PVNS and seronegative rheumatoid arthritis. Our study had certain limitations in that the synovial biopsies and the synovial fluid were not cultured and immunofluorescence studies were not performed. Indeed, in most instances the diagnosis was achieved by correlating the results of histopathological examination with the clinical, serological and radiological data. Despite these deficiencies this retrospective study has confirmed the value of synovial biopsy, elucidated the geographical pattern of joint diseases and emphasised the need for greater accuracy in the diagnosis of articular disorders.

Acknowledgements. We are grateful to the Dean, College of Medicine and Medical Sciences, King Fahd University Hospital, Dammam, Saudi Arabia (during the tenure of the first and third authors in Saudi Arabia), the Dean of University of Malaysia and the Director of Subang Jaya Medical Centre for permitting us to use the material pertaining to this paper.

References

1. Akhtar M, Ali MA (1989) Pathology of brucellosis. A review of 88 biopsies. Ann Saudi Med 9. 247–253
2. Beckman EN, Pankey GA, McFarland GB (1985) The histopathology of Mycobacterium marinum synovitis. Am J Clin Pathol 83: 457–462
3. Bahn AK, Roy S (1971) Synovial giant cells in rheumatoid arthritis and other joint diseases. Ann Rheum Dis 30: 294–298
4. Byers PD, Cotton RE, Deacon OW, Lowy M, Newman PH, Sissions HA, Thomson AD (1968) The diagnosis and treatment of pigmented villonodular synovitis. J Bone Joint Surg [Br] 50: 290–305

5. Cahill N, King JD (1984) Palm thorn synovitis. J Pediatr Orthop 4: 175–179
6. Collins RJ, Chow SP, Ip FK, Leung YK (1988) Synovial involvement by Mycobacterium marinum. A histopathological study of 25 culture-proven cases. Pathology 20: 340–345
7. Crosby EB, Inglis A, Bullough PG (1977) Multiple joint involvement and pigmented villonodular synovitis. Radiology 122: 671–672
8. Docken WF (1979) Pigmented villonodular synovitis. A review with illustrative case reports. Semin Arth Rheum 9: 1–22.
9. Gottuzo E, Alacrons GS, Boeanegra TS (1982) Articular involvement in human brucellosis: a retrospective analysis of 304 cases. Semin Arth Rheum 12: 245–255
10. Grimley RM, Sokoloff (1966) Synovial giant cells in rheumatoid arthritis. Am J Pathol 49: 931–954
11. Jaffe HL, Lichtenstein L, Sutro CJ (1941) Pigmented villonodular synovitis, bursitis and tenosynovitis. Arch Pathol 31: 731–765
12. Jergensen HE, Mankin HJ, Schiller AL (1978) Diffuse pigmented villonodular synovitis of the knee mimicking primary bone neoplasm. A report of two cases. J Bone Joint Surg [Am] 60: 825–829
13. Jolly HW, Seabury JH (1972) Infection with Mycobacterium marinum. Arch Dermatol 106: 32–36
14. Karnezis TA, McMillan RD, Ciric I (1990) Pigmented villonodular synovitis in a vertebra. J Bone Joint Surg [Am] 72: 927–930
15. Kelley J 1966) Black thorn inflammation. J Bone Joint Surg [Br] 48: 474–477
16. Kindblom LG, Gunterberg B (1978) Pigmented villonodular synovitis involving bone. Case report. J Bone Joint Surg [Am] 60: 830–832
17. Madkour MM, Mohammed AR, Talukdar MS, Kudwah M (1985) Brucellosis in Saudi Arabia. Saudi Med J 6: 324–332
18. Mason JC, Walport MJ (1992) Arthritis and infective agents. Curr Opin Orthop 3: 54–59
19. Murnaghan J (1994) Management of septic arthritis in adults. Curr Opin Orthop 5: 16–20
20. Murnaghan J, Salonen DC (1995) Pigmented villonodular synovitis. Curr Opin Orthop 6: 8–12
21. Peutherer JF (1991) Viral, fungal and mycobacterial infections. Curr Opin Orthop 2: 69–73
22. Polley HF, Bickel WH (1951) Punch biopsy of synovial membrane. Ann Rheum Dis 10: 277–287
23. Ramanathn EBS, Luis CPJ (1990) Data palm thorn synovitis. J Bone Joint Surg [Br] 72: 512–523
24. Rao AS, Vigorita VJ (1984) Pigmented villonodular synovitis (giant-cell tumour of the tendon sheath and synovial membrane). A review of eighty-one cases. J Bone Joint Surg [Am] 66: 76–94
25. Rodman GP, Yunis EJ, Totten RS (1960) Experience with punch biopsy of synovium in joint disease. Ann Intern Med 53: 319–331
26. Schumacher HR, Kulka JP (1972) Needle biopsy of synovial membrane – experience with Parker-Pearson technique. N Engl J Med 286: 416–419
27. Schwartz S, Cooper N (1961) Synovial membrane punch biopsy. Arch Intern Med 108: 400–406
28. Schajowicz F, Blumefield I (1968) Pigmented villonodular synovitis of the wrist with penetration into bone. J Bone Joint Surg [Br] 50: 290–305
29. Sherman MS (1951) The non-specificity of synovial reaction. Bull Hosp Joint Dis 12: 335–367
30. Shives TC, Ivins JC (1981) Case report 140. Skeletal Radiol 6: 123–125
31. Sokoloff L (1960) Biopsy in rheumatic diseases. Med Clin North Am 45: 1171–1180
32. Zammit F, Maemphel JV (1984) Brucellosis. Med Int Middle East 2: 85
33. Zevelly HA, French AJ, Mikkeben WM, Duff IF (1956) Synovial specimens obtained by knee punch biopsy: histologic study of joint disease. Am J Med 20: 510–519