Original Article

# Diagnosis of Patients Presenting With Monoarthritis

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Objective: To determine the final diagnosis of patients presenting with monoarthritis.

Place & Duration of Study: Study was conducted at Department of Rheumatology, Pakistan Institute of Medical Sciences (PIMS), Islamabad, between February 2010 and May 2011.

Study Design: Descriptive Case Series

Materials and Methods: Fifty consecutive patients 16-40 years of age, presenting with monoarthritis were recruited. Patients were interviewed and examined, followed by investigations. Patients were treated according to the initial work up and diagnosis made. If initial work up did not reveal diagnosis, symptomatic treatment was offered. Patients, who showed remission in 4-6 weeks, were not investigated further. In patients with arthritis extending beyond 6 weeks relevant wok up was done to reach the final diagnosis. Patients were followed up till the diagnosis was made.

Results: Out of a total of 50 patients there were 56% (n=28) males and 44% (9=22) females. Mean age was 29.6 $\pm$ 8.4 SD years. Duration of arthritis was less than 6 weeks in 38% (n=19) and more than 6 weeks in 62% (n=31) of patients. Knee was the most commonly involved joint(60%) followed by ankle, wrist, metatarsophalangeal, elbow and hip joints. White blood cell count was not helpful while radiographs and synovial fluid WBC count gave important diagnostic information. MRI of the affected joint and synovial biopsy in selected cases assisted in making diagnosis. 18% patients had osteoarthritis, 36% inflammatory, 14% infective, 8% gout, 4% malignancy related, 6% undifferentiated arthritis, 6% mechanical and 8% had miscellaneous causes

Conclusion: In evaluating patients with monoarthritis, precise history, thorough clinical examination, radiographs of joint and synovial fluid examination are of great diagnostic value. MRI and synovial biopsy can be helpful in selected cases. Few cases may still remain undifferentiated despite all investigations.

Key Words: Arthritis, Septic arthritis, Reactive arthritis, Osteoarthritis.

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## Introduction

Monoarthritis is a common clinical presentation in general medical and rheumatology practices.[1] Monoarthritis is as common (38.3%) as oligoarthritis (34.1%) and polyarthritis (27.6%).[2] Making a correct diagnosis is crucial for appropriate treatment.[1] Monoarthritis can be the presenting clinical feature of many rheumatic conditions.[3] The differential diagnosis of an acute monoarthritis overlaps with causes of oligoarthritis or polyarthritis since virtually any arthritic disorder can initially present as one swollen joint. Common causes of monoarthritis are osteoarthritis, and crystal arthropathies in older patients and reactive arthritis or gonococcal arthritis in younger patients.[4-6] Primary focus should be to rule out septic arthritis.[4-7] Other diseases which can present as monoarticular arthritis include spondyloarthropathies, connective tissue diseases, inflammatory bowel disease, sarcoidosis, vasculitis, brucellosis, Lyme disease, and leptospirosis.[8]

While evaluating the patient of monoarthritis history and physical examination are usually not enough to make a diagnosis.[7,9] Certain laboratory tests are also needed. A full blood count and ESR, liver function tests (LFTs), radiographs of the involved and contralateral joints, examination of the synovial fluid for crystals, Gram staining, culture of synovial fluid and gross appearance should be done as initial investigations.[9-11] Some other specialized tests may be done as indicated.[12] An elevated ESR or CRP makes an inflammatory arthritis more likely. ANA, RA factor and anti-CCP antibodies can give supportive diagnostic evidence in appropriate clinical settings. HLA-B27 should be done for if there are other features compatible with spondyloarthritis but the evidence is not very strong.

Lyme serology should be ordered only when the clinical suspicion is high for this disease. Synovial biopsy may be useful in the diagnosis of tuberculosis, fungal infection, and sarcoidosis.

Despite intensive investigations the cause of monoarthritis may remain unclear. [13] Few prospective studies of outcomes in patients with early monoarthritis followed up since symptom- onset are available. Limited data is available from Asian countries. So we aimed our study to prospectively follow the patients who presents with monoarthritis and to determine their final outcome.

# Materials and Methods

This study was conducted at the Department of Rheumatology, PIMS, Islamabad between February 2010 and May 2011. All patients with a single painful joint were assessed. Fifty consecutive patients aged between 16-40 years both of either gender presenting with monoarthritis were recruited. Arthritis was defined by the presence of any two of the following objective criteria (1) tenderness, (2) swelling restricted to the joint, (3) limitation of the joint movement. Patients already diagnosed to have any rheumatic disease were excluded from the study.

Patients were evaluated through history, general physical and rheumatological examination followed by necessary investigations at the time of first visit. These investigations included X rays of the involved and contra lateral joint, full blood count, ESR and synovial fluid analysis (where possible) for gross appearance, presence of crystals, leukocyte count (total and differential), Gram staining and culture. Further management depended upon whether a diagnosis was achieved after this initial work-up or not. Those in whom a diagnosis was not available after the initial work-up were followed up with in 2-5 days for reassessment and symptomatic treatment was offered. Symptomatic treatment included non-steroidal anti-inflammatory drugs (NSAIDs) and/ or intra-articular steroids (where indicated).

No further work up was done in those whose arthritis settled with the above approach. In patients with persistent arthritis, reevaluation was done. They were seen at regular interval thereafter until a specific clinical diagnosis became available. Each evaluation included a standardized interview, general and a rheumatological examination and appropriate investigations (where indicated).

X rays of spine and sacroiliac joint were done in patients with clinical features suggestive of spondyloarthropathy. In case of clinical suspicion of rheumatoid arthritis x-rays of hand, RA factor and anti CCP antibodies were done. In patients with suspected tuberculosis chest x-ray, Mantoux test and synovial biopsy were undertaken. MRI of the involved joint was done where indicated. Final diagnosis was made based on all the information available for each patient.

The data were analyzed through SPSS version 16 and various descriptive statistics were used to calculate frequencies, percentages, mean $\pm$ standard deviation. The numerical data were expressed as mean $\pm$ standard deviation and categorical data were expressed as frequency and percentages.

# Results

Out of a total of 50 patients there were 56% (n=28) males and 44% (n=22) females. Patients between16-20 years of age were 18 % (n=9), 21-30 years were 36 % (n=18) and 31-40 were 46 % (n=23). Mean age was 29.6 + 8.4 SD years. Duration of arthritis was less than 6 weeks in 38% (n=19) and more than 6 weeks in 62% (n=31) of patients. Mean duration of arthritis was 206.68 + 379.6 SD days (range between 3 and 1825 days).

Joint distribution with percentage is illustrated in figure 1.

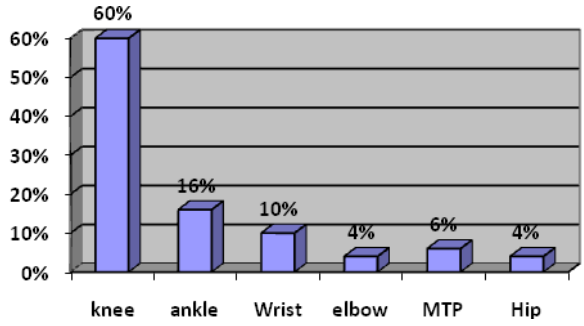


**Figure I. Joint involvement**

Important baseline clinical features are summarized in table I. Few patients had extra articular clinical features which aided in reaching a diagnosis. These included enthesitis in 3 patients, renal failure in 2, nail pitting, wound on overlying skin, sausage digit, chronic myeloid leukemia and lymphadenopathy in 1 patient each.

Results of the laboratory findings are summarized in table II.

X rays of the involved joint were done in all except 1 patient who was pregnant. 64% (n=32) of the patients had normal X-rays and radiographic abnormality was present in 34% (n=17). Radiographic features included joint space narrowing, osteophytes, bone sclerosis and irregularity, erosion, avascular necrosis of hip joint, lytic, radiolucent and cystic lesions in bone.

MRI of the involved joint was done in 18 patients. It was abnormal in 15 patients and normal in 3. MRI findings included erosions, pannus formation, periarticular soft tissue abnormalities, high bone signals, synovial osteochondromatosis, joint effusion, meniscal tear,

degenerative changes, bone oedema, pigmented villonoduular synovitis, rupture of anterior cruciate ligament and osteosarcoma.

**Table I. Baseline Characteristics of Patients (n = 50)**

| Characteristic History | No. Affected % of patients (N) |
|---|---|
| Trauma | 14% (n=7) |
| Prior history of arthritis | 28% (n=14) |
| Urinary tract infection | 8% (n=4) |
| Fever | 20% (n=10) |
| Preceding diarrhea | 2% (n=1) |
| Redness of eye requiring treatment | 16% (n=8) |
| Rash | 2% (n=1) |
| Inflammatory backache | 8% (n=4) |
| **Examination** | **% of patients (N)** |
| Joint tenderness | 92%( n=46) |
| Swelling of joint | 74% (n=37) |
| Limitation of movement of joint | 96% (n=48) |
| Arthritis of other joints | 8% (n=4) |
| Sacroiliitis | 2% (n=1) |
| Schober's index < 5 cm | 6% (n=3) |

**Table II. Laboratory parameters**

| Laboratory parameter | Result |
|---|---|
| Hemoglobin( g/dl) ± SD | 13 ± 1.7 |
| Total leukocyte count( / $mm^3$)± SD | 9620 ± 3158 |
| ESR( mm Hg in 1st Hour) )± SD | 33.4 ± 26.2 |
| ALT( IU / ml) ± SD | 25.3 ± 12 |
| RA factor (N= 32) | |
| Positive % (N) | 8% (n=4) |
| Negative % (N) | 56% (n=28) |
| Synovial fluid (N=25) | |
| Non inflammatory% (No.) | 14% (n=7) |
| Inflammatory % (No.) | 36% (n=18) |
| Septic% (No.) | 0 |
| Positive Gram stain% (No.) | 0 |
| Positive Culture% (No.) | 0 |
| Crystals identification% (No.) | 0 |

**Hb=Hemoglobin, ESR= erythrocyte sedimentation rate, ALT= alanine aminotransferase, RA= rheumatoid arthritis.**

Synovial biopsy was undertaken in 20% (10) patients. It was helpful in making the diagnosis in 7 patients and was normal in 3 patients. Diagnoses made on the basis of biopsy were septic and tuberculous arthritis and osteosarcoma.

Out of 50 patients 18% (n=9) had degenerative arthritis, 36% (n=18) inflammatory, 14% (7) infective,8% (n=4) crystal arthropathy, 4% (n=2) malignancy related, 6% (n=3) mechanical causes, 8% (n=4) miscellaneous causes and 6% (n=3) had undifferentiated arthritis. Final diagnosis in each of the above mentioned group is given in table III.

Mean time of reaching final diagnosis was 27.4 ± 37 days (minimum 1 and maximum 180). Mean follow up time was 120.8 ± 137.3 days.

**Table III. Final Diagnosis**

| Diagnosis | Patients % (N) |
|---|---|
| Osteoarthritis | 18% (n=9) |
| **Inflammatory arthritis** | |
| Reactive arthritis | 20% (n=10) |
| Spondyloarthropathy | 8% (n=4) |
| Rheumatoid arthritis | 4% (n=2) |
| Juvenile idiopathic arthritis | 2% (n=1) |
| Psoriatic arthritis | 2% (n=1) |
| **Infection related cause** | |
| Tuberculous arthritis | 8% (n=4) |
| Septic arthritis | 6% (n=3) |
| **Crystal arthropathy** | |
| Gout | 8% (n=4) |
| **Malignancy** | |
| Osteosarcoma | 2% (n=1) |
| Leukemia | 2% (n=1) |
| **Mechanical cause** | |
| Meniscal tear | 4% (n=2) |
| Rupture of anterior cruciate ligament | 2% (n=1) |
| Undifferentiated arthritis | 6% (n=3) |
| **Miscellaneous causes** | |
| Synovial osteochondromatosis | 2% (n=1) |
| Pigmented villonodular synovitis | 2% (n=1) |
| Avascular necrosis of hip | 2% (n=1) |
| Poncet's disease | |

# Discussion

Monoarthritis is a common clinical presentation and requires careful assessment. Patients presenting with pain or swelling in a single joint are a diagnostic challenge to the clinician. Spectrum of diagnosis differential is wide and includes infections, crystal arthropathy, inflammatory, degenerative arthritis, multisystem disease, malignancy and mechanical causes. Septic arthritis should be excluded above all other diagnoses. The causes of monoarthritis differ according to the age group and among various regions of the world. This study was undertaken to find out the pattern of causes in our country.

Monoarthritis can be a presenting clinical feature in any age group. In a study by Neurauter-Kostorz and his colleague, 501 patients with monoarthritis were analyzed retrospectively.[13] Seven percent of the

patients belonged to younger (under 10 year) age group. Most of the studies done so far on this subject have included patientsaged 18years and above.3 Upper age limit has not been defined in these studies. In our study we included relatively younger patients between 16 and 40 years of age. Mean age was 29.6 years and maximum patients (46%) were between 31-40 years compared to 36% and 18% between 21-30 and 16-20 years respectively. So our study also showed a trend towards higher age group patients presenting with monoarthritis.

Monoarticular arthritis usually involves large joints and small joints are affected less frequently. Knee joint is the commonest site followed by hip, ankle and other joints. [2, 13] In another study evaluating outcome of early monoarthritis, knee was involved in 62%, hip in 15%, wrist 15%, ankle 4% and proximal interphalengeal joint in 4% of the patients. [3] Fletcher and J. T. Scott reported monoarthritis in knee joint in 74%, ankle 8%, wrist 6.6%, interphalengeal joint 6.6%, elbow 2.6% and metatarsophalangeal joint 1.2% of the patients. [14] Our study also showed similar joint distribution. Knee was the commonest site of presentation (60%) followed by ankle, wrist, metatarsophalangeal, hip and elbow joint.

Osteoarthritis and crystal arthropathies were considered as the diseases of older patients. [4] Interestingly in current study which included young patients osteoarthritis was the 2nd most common diagnosis (18%) and gout being the 3rd, in 8% of the patients. Among the patients with osteoarthritis 8% patients had a secondary cause (2 had previous infective arthritis involving the same joint and 2 patients had limb length discrepancy) and 10% had primary osteoarthritis. One patient with the diagnosis of gout had chronic renal failure. This observation suggests that osteoarthritis is no longer a disease of old age. It can affect younger population in our country also.

Freed and colleagues found that using routine clinical tools of history, physical examination, radiographs of joint and synovial fluid culture, Gram's stain, and examination for crystals, 74% of the diagnoses were made either immediately or within two to three days in acute monoarthritis.9 On the other hand in another study both synovial fluid white blood cell count and percentage of polymorphonuclear cells were found to contribute independent diagnostic information. 11 similar results were reported by Margaretten and colleagues in a meta analysis. 7 White blood cell count and sedimentation rate have little diagnostic value.[13,14]

In our study WBC count was of no help in making diagnosis. ESR results were reported between 3 and 110 mmHg in 1st hour. ESR > 50 was found in inflammatory and infective arthritis and highest value (110) was seen in patients with tuberculosis.Tuberculosis isquite prevalent in Pakistan, and our observations suggest that in a patient with monoarthritis and a very high ESR this diagnosis should be kept on the top in differential diagnosis. Synovial fluid was found to be helpful in differentiating between inflammatory and non inflammatory arthritis and excluding septic arthritis.

Synovial biopsy can have a major role in the diagnosis of monarticular arthritis.[15] It is not required for routine diagnostic purpose.However, examination of synovial tissue can assist in the diagnosis of some conditions like tuberculosis, fungal and some bacterial infections.[15,16] In cases of undifferentiated arthritis, a synovial biopsy can facilitate the diagnostic process. [17- 19] In our study 4 patients had tuberculosis and all of them were diagnosed on the basis of synovial biopsy. MRI was helpful in achieving a final diagnosis of meniscal tear, anterior cruciate ligament rupture, synovial osteochondromatosis, pigmented villonodular synovitis andjoint infection.

In studies evaluating acute monoarthritis (of 2-4 weeks duration) the cause remained unknown in up to a third of patients (16%–36%). The most common diagnoses were gout (15%–27%) and septic arthritis (8%–27%), followed by osteoarthritis (5%–17%) and rheumatoid arthritis (11%–16%). [9,11,20,21]

In a retrospective study of 46 patients with undifferentiated monoarthritis of more than > 3 months' duration rheumatoid arthritis and spondyloarthropathy were the most frequent diagnoses.[22] In a study including patients with aseptic arthritis, a benigncause of monoarthritis was found in 70% of patients, traumatic 7.6%, villonodular synovitis 10.7%, rheumatoid arthritis 6.15%, tuberculosis, malignancy and spondyloarthropathy in 1.53% each.[23] Two other studies on patients with monoarthritis of more than 3 months duration reported undifferentiated arthritis (29.6 – 32%), crystal arthropathy (4 – 7.4%), RA (0 – 9%), spondyloarthropathy (0 – 29.6%), osteoarthritis (0 – 29%), mechanical causes (0 – 9%), tuberculosis in only 0.66% and miscellaneous causes in (12 – 33.3%).

In our study reactive arthritis was the most common diagnosis (20%) followed by osteoarthritis in 18%, spondyloarthropathy, gout and tuberculosis in 8% each, mechanical causes 6% and septic arthritis in 6% of patients. Rheumatoid arthritis was diagnosed in 4% patients and malignancy related arthritis in 2%. Other diagnoses were found in 8% of patients. The variability in causes between these studies and our study may be due to:

(1) Small sample size
(2) Different duration of arthritis as in our study both acute and chronic cases were included.
(3) Regional differences may be implicated in the differencesin aetiology.

# Conclusion

In evaluating patients with monoarthritis, precise history, thorough clinical examination, radiographs of joint and synovial fluid examination are of great diagnostic value. MRI and synovial biopsy can be helpful in selected cases. Few cases may still remain undifferentiated despite all investigations.

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