

Etiology Of Avascular Necrosis Of Femoral Head In Population Of Malwa Region In Madhya Pradesh

Choudhari P, Deshpande M, Jain N, Prajapati R

Study performed at Department of Orthopaedics, Sri Aurobindo Institute of Medical Science & Post Graduate Institute, Indore (M.P.)

Abstract

Background: Osteonecrosis is characterized by bone cell death following, decrease in blood supply to the bone due to traumatic or non-traumatic cause. We evaluated the etiology of osteonecrosis of femoral head in population of Malwa region of Madhya Pradesh.

Material and Methods: This longitudinal study was conducted from January 2018 to Jan 2020 in patients diagnosed with avascular necrosis of femoral head, which were evaluated, examined and investigated to know the etiology of the disease.

Results: 70 cases with mean age of 39 years (55 males and 15 females) were included. Bilateral involvement was seen in 20 (29%) cases, whereas 50 (71%) cases had unilateral involvement. Idiopathic AVN was most common cause of the osteonecrosis as seen in 27 (39%) cases followed by steroid induced AVN in 12 (17%), post traumatic in 13 (19%) cases, alcohol induced in 8 cases (11%), both alcohol and steroid induced in 2 (3%) cases and sickle cell anaemia was seen in 8 (11%) cases.

Conclusion: Our results showed that most common cause of osteonecrosis of femoral head in population of Malwa region of Madhya Pradesh is idiopathic followed by trauma, steroid induced and then alcoholism or sickle cell anemia. Most commonly affected people are in age group of 26-40 years with male preponderance. Appearance of disease is more, unilateral as compared to bilateral.

Keywords: Avascular necrosis, Osteonecrosis, Malwa region

Address of correspondence:

Dr. Pradeep Choudhari
7/3/3, Ahilaya Mata Colony, Near
Charak Hospital, Rani Sati Gate,
Indore-452003
Email – pchoudhari@rediffmail.com

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Introduction

Osteonecrosis (also known as avascular necrosis, ischemic necrosis, subchondral AVN, aseptic necrosis or osteochondritis dissecans) is characterized by bone cell death, which follows due to decrease in the blood supply to the bone from a traumatic or non-traumatic cause [1,2]. It is a disabling disease, which is characterized by death of the osteocytes and bone marrow, which is followed by resorption of the necrotic tissues and formation of new osseous tissue but weaker tissue than normal, which leads to destruction of bone architecture, subchondral fracture, loss of

articular contour and collapse of joint, finally causing loss of the joint function [2-4]. This mostly occurs at the head of the femur.

The exact cause of AVN is still not fully understood but it is thought to be caused by multiple factors along with some genetic predilection. The causes of AVN can be traumatic or atraumatic [5-9]. We in this study tried to evaluate the causes of osteonecrosis of femoral head in the central part of India in patients presenting with hip pain at our institute.

Material and method

This longitudinal study was conducted from January 2018 to January 2020 in Orthopaedic department of our tertiary care hospital in metropolitan city of central India. Institutional ethical committee clearance and patients consent was obtained before the study. All patients diagnosed with avascular necrosis of femoral head (Ficat and Arlet stage I to IV), unilateral or bilateral with age more than 18 years of age were included in the study. Patients with age less than 18 years were excluded from the study.

All patients coming to OPD with hip pain were evaluated with X-rays of the pelvis AP view. X rays showing avascular necrosis of the head of the femur of any stage were included after they fulfilled the inclusion criteria. Patients included in the study were subjected to detailed history and thorough clinical examination. In patients with history of alcoholism, detailed information of the amount and duration of alcohol intake was recorded. In patients on steroids, precise information was obtained about the indication, duration and time after which symptoms occurred. In post-traumatic cases, the details of injury, duration and mode of injury, surgery/intervention and surgical procedure related information collected. The details of the diseases were obtained from the clinical records and these patients were rechecked to collect out any missing data.

The patients were evaluated radiologically with anteroposterior and lateral radiographs of the hip joint and staging of osteonecrosis of femoral head was done based on Ficat and Arlet classification. Functional score of patient was done by Harris hip score (HHS).

Routine laboratory investigations such as complete haemogram profile, renal function test, liver function test, lipid profile and coagulation profile (such as prothrombin time, clotting time) were performed for all patients. Patients with suspected condition or specific disease that might have led to osteonecrosis were further evaluated with specific laboratory and radiological investigations. Patients without any abnormalities were labeled as

idiopathic. All the information so obtained was assessed and studied for the cause of AVN.

Results

A total of 70 patients were included in the study. Out of which 55 (79%) were male and 15 (21%) were female. Bilateral involvement was seen in 20 (29%) cases, whereas 50 (71%) cases had unilateral involvement. The mean age of the patients in the series was 39 years (19 to 63 years).

In the bilateral disease group, the most common etiology seen was idiopathic in 10 (50%) cases, followed by steroid in 5 (25%) cases, then alcohol in 3 (15%) cases. In the unilateral disease group, the most common etiology seen was idiopathic in 17 (34%) cases, followed by post traumatic after surgery as seen in 12 (24%) cases, then sickle cell and steroid use, each contributing to 7 (14%) cases. Overall, idiopathic AVN was most cause of the osteonecrosis as seen in 27 (39%) cases. This was followed by steroid induced AVN in 12 (17%), post traumatic in 13 (19%) cases, alcohol induced in 8 cases (11%), both alcohol and steroid induced in 2 (3%) cases and sickle cell anaemia as seen in 8 (11%) cases (table no. 1).

In the bilateral disease group, 11(55%) cases had never received any treatment whereas 4 (20 %) cases had history of treatment for 1 year, 1 (5%) case had treatment for 5 years, 2 (10%) had treatment history for 6 to 10 years and 2 (10%) had history of treatment for more than 10 years. In the unilateral disease group, 28(56%) cases had never received any treatment whereas 5 (10 %) cases had history of treatment for 1 year, 6 (12%) cases had treatment for 5 years, 6 (12%) had treatment history for 6 to 10 years and 5 (10%) had history of treatment for more than 10 years. In 8 patients who were consuming alcohol, the mean alcohol consumption in unilateral (3 cases) and bilateral patients (5 cases) was 520 ml/week (range 260–780 ml/week) and 926 ml/week (range 350–1850 ml/week), and mean duration of alcohol ingestion was 75 months and 88 months respectively.

Total 14 cases were on steroids (12 only steroids and 2 along with alcohol). Out of the

14 patients, 5 (36%) has Lichen planus, 4 (28%) has dermatitis, 2 (14 %) each had psoriasis and bronchial asthma and one case (7 %) had COPD. Among 12 cases of post-traumatic AVN, one case was posterior dislocation, whereas rest of the 11 cases had osteonecrosis after fracture neck femur.

Table no. 1: Distribution of patients according to etiology

Etiology AVN	Bilateral		Unilateral		Total	
	No.	%	No.	%	No.	%
Alcohol	3	15.0	5	10.0	8	11.4
Steroid	5	25.0	7	14.0	12	17.1
Alcohol and steroid	0	0.0	2	4.0	2	2.9
Idiopathic	10	50.0	17	34.0	27	38.6
Sickle Cell anaemia	1	5.0	7	14.0	8	11.4
Post traumatic	1	5.0	12	24.0	13	18.5
Total	20	100.0	50	100.0	70	100.0

Discussion

The major blood supply to the head of the femur comes from the medial and lateral circumflex branches of the profunda femoris, which is a branch of the femoral artery. The medial and lateral circumflex femoral arteries anastomose to form a ring around base of the neck of the femur (extrasynovial ring), from which retinacular vessels arise and ascend along the neck to form a subsynovial (intra-synovial ring) anastomosis. From this ring, many small arteries branch off to perfuse the femoral head. Another direct source of blood supply is from the foveal artery which is also known as the artery of the ligamentum teres [10]. The blood supply of the acetabulum comes mainly from the acetabular branch of the obturator artery, along with the contributions from pubic branches of the obturator artery and deep branches of the superior gluteal artery. Because of this limited collateral circulation and precarious blood supply by end arteries, disruption of the blood supply to the head of the femur as caused by fracture neck of femur or hip dislocation, can lead to ischemia and subsequent necrosis [11].

Atraumatic osteonecrosis of femoral head is a multifactorial disease which is associated with genetic predilection and exposure to certain risk factors such as chronic corticosteroid administration, chronic alcohol ingestion, smoking and various chronic diseases (renal disease, haematological disease, inflammatory bowel disease, post organ transplantation, hypertension and gout) [5-9]. Unsupervised use of steroid for long time and excessive alcohol consumption represent the bulk of non-traumatic etiologies. Despite evidence demonstrating the correlation between steroid use and osteonecrosis, the exact pathophysiology is still not clear. The cause is most likely a combination of factors such as emboli, fat cell hypertrophy leading to raised intraosseous pressure, endothelial dysfunction, hyperlipidemia and abnormality of the stem cell pool of the bone marrow, all of which contribute to ischemia and subsequent necrosis [12]. Alcohol-induced osteonecrosis is also not well understood but is most likely caused by stems from bone marrow fat cell hypertrophy and proliferation, serum lipid level changes, blood vessel occlusion, raised intraosseous pressure and subsequent lack of perfusion [13]. Sickle cell disease can be another cause of osteonecrosis. The rigid red blood cells formed by clumping of sickle shaped RBCs, hampers blood flow leading to ischemia and bony infarction, with the femoral head being the most common site [13]. Autoimmune and chronic inflammatory disorders, e.g., systemic lupus erythematosus (SLE), are other well-known causes to be associated with osteonecrosis of the femoral head [14]. Traumatic cause of osteonecrosis is femoral neck fracture or dislocation, which disrupts the blood supply to the head of the femur, leading to avascular necrosis.

We evaluated the causes of osteonecrosis of femoral head in 70 patients with mean age of 39 years presenting with hip pain at our institute and found that idiopathic is the most common cause of AVN in both unilateral and bilateral involvement. After idiopathic AVN, steroid and alcohol are most common cause of AVN in bilateral involvement, whereas traumatic involvement was most common cause in unilateral involvement. The most

common age group involved was 26 to 40 years and there was male preponderance, probably due to more alcoholic indulgence by males as compared to females in the Indian set up. These factors were in accordance with other studies, except for the fact that 71% were unilateral cases in our series whereas other series have unilateral cases in range 40 to 50%, alcohol induced AVN was 11.4% in our series while other studies have this range from 5 to 10% and steroid induced AVN in our series was found to be 17% while 6 to 10 % in other reported series [15-17].

Conclusion

Our results showed that most common cause of osteonecrosis of femoral head in population of Malwa region in Madhya Pradesh is idiopathic followed by operated case of trauma then steroid intake and then alcoholism or sickle cell. Most commonly affected people are in age group of 26-40 years with male preponderance. Appearance of disease is more in unilateral as compared to bilateral. In most of the patients after 30 days disease also appeared in opposite side. In our study 50% patients had modifiable cause so we concluded that disease can be prevented in 50% of patients.

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