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ORIGINAL RESEARCH

Role of MRI in detecting avascular necrosis of hip joints in post covid patients

[1]Dr. Tarun Sehgal, [2]Dr. Shreya Shashi, [3]Dr. Anjali Pawar Dahiphale, [4]Dr. D B Dahiphale

[1,2]Junior Resident, [4]Professor and HOD, Department of Radiology, MGM Aurangabad, Maharashtra, India
[3]Associate Professor, Department of Radiology, GMC Aurangabad, Maharashtra, India

Corresponding Author
Dr. Anjali Pawar Dahiphale
Associate Professor, Department of Radiology, GMC Aurangabad, Maharashtra, India

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ABSTRACT

Aim -To identify and early diagnose AVN of hip joint in post covid 19 patients presenting with hip pain. **Materials and methods-** 20 patients were evaluated over a 12-month period to investigate avascular bone necrosis (AVN) in COVID-19 patients with hip joint pain. The inclusion criteria consisted of a positive COVID-19 PCR test and concurrent hip joint pain, while prior hip joint injury, steroid treatment history, and severe chronic illnesses were among the exclusion criteria. **Results-** The study found that the mean interval between the onset of initial symptoms and the MRI examination was 2–4 weeks. **Conclusion-** Early diagnosis through MRI plays a vital role in enhancing patient care and potentially averting the need for surgical interventions in post-COVID-19 individuals with hip pain.

Keywords- COVID-19, hip, MRI

INTRODUCTION

The COVID-19 emerged as the SARS-CoV-2, which was initially discovered in December 2019 in Wuhan, China. It rapidly expanded and developed into a pandemic illness[1,2]. SARS-CoV-2 binds more efficiently to the angiotensin-converting enzyme 2 receptor found in human glial cells, neurons, respiratory epithelial cells, and vascular endothelial cells[3]. Increasing evidence suggests that, while many patients are recovering from COVID-19, it has a negative impact on several human body systems as part of post-COVID-19 syndrome. The cardiopulmonary system appears to account for the majority of post-COVID-19 complications. Myocarditis, arrhythmia, and ischaemia are among the cardiac post-COVID-19 complications, whereas bacterial pneumonia, pneumothorax, and pleural effusion are among the most prevalent pulmonary complications[4]. It is crucial to be aware of non-pulmonary complications, such as strokes, renal failure, and peripheral arterial disorders[5]. Avascular necrosis (AVN) is one of these complications that, if ignored, can result in severe outcomes, including bone collapse. AVN was prevalent in SARS and may also be common in COVID-19 infections. It should be noted that the risk of AVN persists in individuals who have recovered from COVID-19 infection, similar to SARS[6]. The aim of this study was to identify and early diagnose AVN of hip joint in post covid 19 patients presenting with hip pain.

MATERIALS AND METHODS

In a study conducted at MGM Medical College in Aurangabad, 20 patients were evaluated over a 12-month period to investigate avascular bone necrosis (AVN) in COVID-19 patients with hip joint pain. The inclusion criteria consisted of a positive COVID-19 PCR test and concurrent hip joint pain, while prior hip joint injury, steroid treatment history, and severe chronic illnesses were among the exclusion criteria. The patients underwent plain radiography and MRI examination on the affected hip joint, with MRI being performed using a 1.5 T Philips Prodiva CX machine. Informed consent was obtained from all patients, and the diagnosis and staging of AVN were conducted using established MRI criteria and the Ficat and Arlet classification system. Notably, the study identified the presence of AVN in the femoral head among these COVID-19 patients showing symptoms of joint dysfunction.

RESULTS

The study found that the mean interval between the onset of initial symptoms and the MRI examination was 2–4 weeks. According to the Ficat and Arlet classification system, the distribution of AVN stages among the cases was as follows:

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- Stage IV AVN was not observed in any of the cases.
- Stage I AVN was observed in 9 cases, representing 45% of the total cases.
- Stage II AVN was observed in 8 cases, accounting for 40% of the cases and being more prevalent in middle to elderly age groups (40–60 years of age).
- Stage III AVN was observed in 3 cases, representing 15% of the cases and being more prevalent in the elderly age group (>60 years of age).

The absence of Stage IV AVN cases was attributed to early detection due to the early presentation of affected patients.

Table 1: Demographic and clinical characteristics

CRITERA	MALE	FEMALE	TOTAL
Gender	14	6	20
Symptoms			
Fever	10	4	14
Hip pain	9	5	14
Comorbidities			
DM	5	3	8
HYPERTENSION	3	3	6

DISCUSSION

AVN is a condition in which the blood supply to the bone is disrupted, leading to bone death and subsequent collapse of the bone structure[7]. AVN of the hip occurs frequently as a result of trauma, most commonly following a femoral neck fracture or hip dislocation. Several causal links to non-traumatic AVN have been discovered[8].

Most of the patients with Covid 19 infection are asymptomatic while some had mild to severe symptoms with its consequence on multiple organ systems that may compromise quality of life.[9] Osteonecrosis/avascular necrosis (AVN) of the hip is the vascular disruption mediated cell death of the femoral head, systemic inflammation mediated by Cytokines which includes CXCL10, IL-17, and TNF-alpha are results in reduction of proliferation and differentiation of osteoblasts.[10] Causes of AVN of the femoral head includes direct trauma, and sometimes the causative factors were unknown and there may be associated risk factors that can predispose to the disease.[11] Corticosteroid use is considered to be one of the most common cause for the development of AVN[12] and have been widely used in the treatment of severe acute respiratory syndrome (SARS). This study excluded all patients who received steroid treatment either as a part of covid 19 infection treatment or for chronic systemic illness. AVN of femoral head is asymptomatic in the beginning, there is segmental collapse, pain and hip become stiffer, which is reflected in the gait of the patient when they starts to limp while all patients in this study presented with hip pain only. MRI hip is the investigation of choice in patients with high index of clinical suspicion because of its ability in multiplanar determination of the volume and location of infarcted segments of bone. MRI is also useful in patients with risk factors for development of osteonecrosis, such as corticosteroid therapy, proximal femoral trauma includes femoral neck fracture, femoral head dislocation, slipped capital femoral epiphysis and congenital hip dislocation.[13] Osteonecrosis has wide association with other disease conditions and many theories have been put forward for the mechanism behind it, but none have been proven. In diseases such as systemic lupus erythematosus, bilateral involvement in 50–80% and here it is 23.5%. AVN of the hip is becoming an more important concern in the general population after SARS-CoV infection than in non-Covid populations. The diagnosis of avascular necrosis is seen with the onset of hip pain in the patient, which occurs over an average period 66 days in this study population. Early diagnosis and treatment of femoral head osteonecrosis will prevent the progression of disease to subchondral collapse and final disabling arthropathy. Surgical procedure choices like core decompression, rotational osteotomy, or bone graft are depend on the stage of disease.

CONCLUSION

Post-COVID-19 patients, especially those who have received steroid treatment, are at a heightened risk of developing avascular necrosis (AVN). Although steroids are essential in the management of COVID-19, they can increase the susceptibility to AVN. Early detection of AVN is crucial as it enables better disease management and can help prevent disease progression, ultimately reducing morbidity and the need for surgical interventions.

Given that MRI of the hips is the most sensitive and non-invasive test for diagnosing early stages of AVN, it is imperative to consider this imaging modality when evaluating post-COVID-19 patients presenting with hip pain. By promptly performing an MRI to rule out AVN in these cases, healthcare providers can take proactive measures to control disease advancement and improve patient outcomes. Early diagnosis through MRI plays a vital role in enhancing patient care and potentially averting the need for surgical interventions in post-COVID-19 individuals with hip pain.

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