

Proportion of Traumatic Avascular Necrosis on Hip Joint at Dr. Hasan Sadikin General Hospital Bandung in 2016–2020

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Abstract

Background: Traumatic factors affecting the femur such as fractures and dislocations can cause complications in the form of avascular necrosis (AVN), if not treated immediately, AVN is one of the contributors to total hip arthroplasty (THA) usage and disability which will have an impact on productivity and quality of life. Hence, it is necessary to understand the epidemiology of AVN caused by traumatic factors. This study aimed to determine the proportion of traumatic AVN on the hip joint at Dr. Hasan Sadikin General Hospital.

Methods: A Descriptive-observational study with a cross-sectional study design was conducted on all patients registered in the medical record database, with a diagnosis of AVN on the hip joint at Dr. Hasan Sadikin General Hospital Bandung in 2016–2020. Traumatic AVN was included and patients with incomplete medical record data were excluded.

Results: In total, 210 patients were registered in the medical records and only 56 had complete medical records, and 10.5% (22 of 210) were diagnosed with traumatic AVN of the hip joint, consisting of 14 male with most of the trauma (n=11) caused by AVN were femoral neck fractures and 20 patients were of productive age (18–64 years old). Most of the patients underwent surgical therapy with a THA (n=20).

Conclusion: The proportion of AVN on the hip joint caused by trauma is 10.5%. However, this disease should not be underestimated because AVN has the potential to cause disability and impact the quality of life.

Keywords: Avascular necrosis, hip joint, proportion, trauma

Introduction

Avascular necrosis (AVN) is a disease that involves damage to the arterial blood supply or venous stasis in the bone, resulting in the death of osteocytes and bone marrow.¹ Based on the etiology, AVN is classified into traumatic and non-traumatic.^{1,2} Traumatic AVN is occurred, causing fracture and/or dislocation of the bone in which the most commonly site is involving the head of femur.³ One of the most frequent clinical manifestations of AVN is pain in the groin that can spread to the thighs and buttocks.^{3,4} Furthermore, some AVN patients can experience pain on walking, and decreased range of motion (ROM) of the hip joint, with trendelenburg signs and

crepitus.³ AVN could become progressively more severe if left untreated because of death of bone marrow and osteocytes, resulting in bone structural changes and thus the head of femur collapse.⁵ Eventually, these conditions could cause the use of total hip arthroplasty (THA) in younger individuals, leading to disability and decreased quality of life.⁶ A THA might be a financial burden because it is quite expensive.⁷ Therefore, AVN should be of particular concern and should be considered in the clinical settings.⁶

The AVN could affect all ages with a peak in the age of 30 to 65 years, of whom more than 20,000 patients require hospital treatment.³ In addition, the incidence of AVN in Sweden⁸ reached 4.7 cases/10.000 people per year. The

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etiology of most cases was idiopathic (56.6%) and traumatic (25.2%).⁸ A different situation is occurred in Japan,⁹ with about 2.5–3 new cases/1000 persons per year and 51% of AVN cases mainly due to steroid use.^{2,9} Differences in outcomes in Sweden⁸ and Japan⁹ reflect the differences in AVN characteristics in culture and environmental exposure. Hence, understanding the AVN epidemiology in Indonesia is important, considering the lack of studies regarding the AVN. Moreover, Dr. Hasan Sadikin General Hospital Bandung is the highest referral hospital in West Java. The objective of this study was to explore the proportion of AVN on the hip joint due to trauma treated at Hasan Sadikin General Hospital Bandung in 2016–2020.

Methods

This was a descriptive-observational research with cross-sectional study design, using a total sampling method. Data from 2016 to 2020 were collected, and a total of 210 patients were diagnosed with AVN on the hip joint at Dr. Hasan Sadikin General Hospital Bandung. Patients with inaccessible medical record and missing data were excluded (n=154). Of the remaining 56 medical records with a diagnosis of AVN, some were defined as traumatic AVN (n=33) and non-traumatic AVN (n=23). Afterward, we also excluded double medical record from traumatic AVN (n=11). Eventually, only 22 medical records met the criteria for AVN in the hip joint due to trauma. The data were then described and presented in text, tables, and figures. The ethical clearance for this study was obtained from the Research Ethics Committee of Universitas Padjadjaran no. 583/UN6.KEP/EC/2020.

Results

A total of 210 patients were registered and diagnosed with AVN from 2016 to 2020 of whom only 22 met the inclusion criteria. Therefore, the proportion of AVN was only 10.5%. The proportion of male patients among all traumatic AVN patients was 14 of 22. Hence, the male-to-female ratio in this study was 7:4. Based on the patient's age, the age was 43 years old (range 19–71 years), indicating no pediatric patients (≤18 years) in this study (Table).

Traumatic AVN affected the hip joint more in unilateral side than bilateral, in which the proportion of the right hip joint was similar as the left hip joint. Patients commonly had a

Table Proportions of Traumatic Avascular Necrosis from Dr. Hasan Sadikin General Hospital in 2016–2020

Characteristics	n=22
Sex	
Male	14
Female	8
Age	
Children (≤18 years)	0
Adult (>18–64 years)	20
Elderly (>64 years)	2
Type of trauma	
Neck of femur fracture	11
Unspecified fracture	6
Periprosthetic fracture	1
Stabilized fracture	1
Inferior pubic rami fracture	1
Neglected posterior hip dislocation	2
Location of AVN hip joint	
Unilateral (left hip joint)	9
Unilateral (right hip joint)	9
Bilateral	4

Note: AVN= Avascular necrosis

fracture of the neck of femur. This study found that all treated patients had AVN grade IV according to the Ficat & Arlet classification and about 20 of 22 patients underwent surgical therapy with THA (Figure).

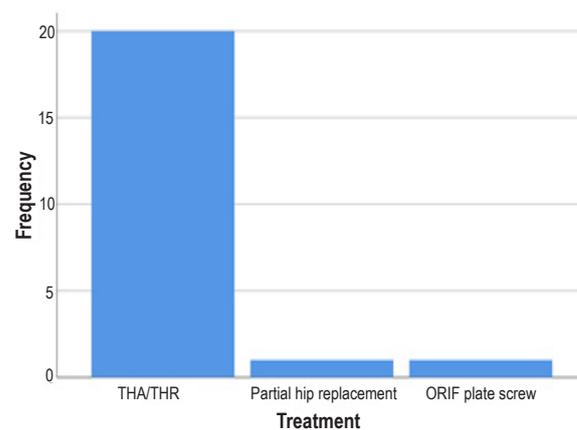


Figure Treatment of Traumatic Avascular Necrosis Patients

Note: THA= total hip arthroplasty, THR= total hip replacement, ORIF= open reduction internal fixation

fracture of the neck of femur. This study found that all treated patients had AVN grade IV according to the Ficat & Arlet classification and about 20 of 22 patients underwent surgical therapy with THA (Figure).

Discussion

The four years proportion of AVN due to trauma among all AVN patients in this study was 10.5% (22 of 210). This is in accordance with a previous study that AVN due to trauma is less than nontrauma.² Most of the patients are in their productive age (>18–64 years), and this is consistent with previous studies suggesting that the 30–65 year age group is susceptible to AVN.^{3,4,10} Our study also shows that male is in a higher proportion than female. Many risk factors may associate with traumatic AVN such as fracture due to high energy trauma that is related to the culture where occupations with high risk of trauma are often performed by male.¹¹

The location of the occurrence of AVN correlates with the blood supply. The bone area that is often the location of this AVN is the sub-articular areas. They are mostly covered by cartilage and are located farthest from the blood vessels. Consequently, this area is vulnerable because of the limited supply of local blood vessels.¹² The head of the femur is the most common location for AVN because the neck of the femur has limited collateral blood vessels.^{3,13} The head of femur is supplied by two important anastomoses that provide collateral blood flow. The first is between the inferior gluteal artery and the medial circumflex femoral artery, and the other is the anastomosis between the superior gluteal artery and medial/lateral circumflex femoral artery.¹⁴ Disruption such as high energy trauma to the hip area can cause AVN on hip joint. The result of this study proved that half of the patients (11 of 22) experience a femoral neck fracture that disrupts the blood vessels, resulting in AVN in the hip joint. Other types of trauma in this study are unspecified fracture, periprosthetic fracture, stabilized fracture, inferior pubic rami fracture, and neglected posterior hip dislocation. Falls, traffic accidents, slips, and accidents while playing football are possible causes of trauma such as femoral neck fracture in this study.

The clinical manifestation that most often makes patients come to the hospital is pain.^{3,4,6} Most of the patients in this study had chronic pain from several months to several years ago. Pain is felt when the patient is active and will improve with rest. Afterward, the patient

may also experience limitations in hip joint movement, limps or trendelenburg sign, and numbness. Signs and symptoms may worsen if the AVN affects both sides of the hip joint, as most AVN are affected on the bilateral side of the hip joint.¹⁵ However, this contrast with the findings in this study which showed that most patients with traumatic AVN affect the unilateral hip joint. With more samples, the data should be more representative to show whether traumatic AVN would affect more unilateral or bilateral hip joint.

Management of AVN in hip joint can be both nonsurgical and surgical. The use of weight bearing protection such as crutches, drug treatment, and physical therapy can be given as initial management. However, if the AVN on hip joint progresses rapidly and nonsurgical management is ineffective, surgical management can be performed. Patients with more than 15% necrotic volume and patients with ARCO stage 1–3 can receive core decompression, osteotomy, and non-vascularized bone transplantation. Joint replacement or THA can be chosen if the femoral head has collapsed, there is already a features of late-stage arterial occlusion (ARCO stage 3C–4), and severe joint function loss or moderate/severe pain is present.¹ In this study, almost all patients had late stage AVN in hip joint. Therefore, 20 of the 22 patients underwent surgical therapy with THA.

Our study has several limitations. This study is cross-sectional and the cross sectional study design does not help to determine the association between trauma and AVN. However, despite the shortcomings that have been mentioned before, all forms of high energy trauma such as falls, slips, and even traffic accidents affecting the pelvic area especially hip joint should be considered as a traumatic AVN.

To conclude, the proportion of AVN in the hip joint caused by trauma is 10.5%. However, this disease should not be underestimated because AVN has the potential to cause disability and is a common cause of THA usage, leading to a financial burden.

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