

Epidemiologic Study of Avascular Necrosis of the Femoral Head

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ABSTRACT: Avascular necrosis of the femoral head is an increasingly common cause of musculoskeletal disability, and it poses a major diagnostic and therapeutic challenge. The disease affects mostly young adults within their 3rd and 5th decade, the majority of the patients being men. The aim of this paper is to present the findings of our epidemiological study that concerned patients diagnosed with avascular necrosis of the femoral head, admitted in the Orthopaedics Department of the Clinical and Emergency Hospital Craiova between 2007 and 2011. Material and method: The study group included 92 patients diagnosed with avascular necrosis of the femoral head and who were admitted in the Orthopaedics Department of the Clinical and Emergency Hospital Craiova between 2007 and 2011. Inclusion criteria were that the residential county of the patients had to be Dolj County. The obtained findings were processed statistically to correlate clinical and laboratory data of patients diagnosed with this condition. Results: We noticed an increase in the number of patients admitted with the diagnosis of 11 patients in 2007 to a total of 25 patients in 2011. Most patients included in the study, 85.87% were diagnosed in advanced evolutionary stages of the disease, stages III and IV. The main risk factors detected in patients were represented by smoking (36.96%), alcohol intake (20.65%), trauma (11.96%), and corticosteroid therapy (8.70%). In 29.35% of the patients we were not able to find any risk factor, we considered that the cause to be idiopathic. Conclusions: The results of the epidemiological study presented in this paper correspond with related research results found in the consulted literature. There were some variables of our study that we haven't been able to find correspondence for in the literature.

KEYWORDS: avascular necrosis, femoral head, epidemiology.

Introduction

The avascular necrosis of the femoral head is an increasing cause of musculoskeletal disability, with diagnostic and therapeutic problems [1]. The disease is especially common among younger population, patients are usually between the 3rd and 5th decade of life, affecting mainly men [2, 3].

Because this disease mainly affects young adults the importance is higher as the initial treatment costs but also of the long-term treatment, are increased in case of diagnosis delay [1].

Although patients are initially asymptomatic femoral head avascular necrosis progresses to destruction of the hip joint in a relatively short time, requiring hip arthroplasty usually until the 5th decade of age [4].

Based on these considerations, a quick and thorough investigation can lead to the formulation of a correct diagnosis in time for the application of therapeutic methods less debilitating for patients diagnosed [5].

A correct diagnosis must be made taking into account the correlation of the clinical data and imaging findings.

Avascular necrosis of the femoral head shows no particularity of clinical diagnosis. Patients are pain free during the ischemic episode. The occult, avascular necrosis of the femoral head may be present for more than 5 years before the onset of symptoms [4, 5].

Material and method

The study included a total of 92 patients diagnosed with avascular necrosis of the femoral head, hospitalized in the Clinic of Orthopaedics-Traumatology Clinic of the Emergency County Hospital Craiova, between 2007-2011. The criterion for inclusion of patients in the study was that their county of residence was Dolj County.

Data on the number of patients admitted with the diagnosis of avascular necrosis of the femoral head, the total number of hospitalizations and the number of performed hip arthroplasty interventions in the Orthopaedics-Traumatology Clinic of the Emergency County Hospital Craiova, between 2007-2011, were obtained from the Statistical Office of the Emergency County Hospital Craiova.

Data on age, sex, area of residence, reasons for admission, past medical risk factors and present ones, the results of physical examination and laboratory tests, stage of disease and type of intervention sustained were obtained from patients charts diagnosed with avascular necrosis of femoral head.

Information obtained was stored in Microsoft Excel files (Microsoft Corp., Redmond, WA, USA) and were then statistically analyzed in order to investigate the relationship between clinical and laboratory data of patients diagnosed with avascular necrosis of the femoral head by using the Microsoft Excel XLSTAT suite of programs (Addinsoft SARL, Paris, France).

Secondary data processing - calculating fundamental statistical parameters, mean and standard deviation of their report - the coefficient of variation, graphical representation and calculation of the regression coefficients -

was performed with Excel, Pivot Tables using the controls, Functions, statistics, Chart and Data Analysis module. To achieve data normality tests (Shapiro-Wilks and Anderson-Darling) and Z tests for proportions, Mann-Whitney-Wilcoxon and Kruskal-Wallis we used the XLSTAT suite of programs.

Results

In the Orthopaedics-Traumatology Clinic of the Emergency County Hospital Craiova, there were a total of 92 patients diagnosed with avascular necrosis of the femoral head, hospitalized between 2007-2011. The distribution was as follows: admissions per year - in 2007 there was a total of 11 patients admitted with this diagnosis in 2008 - 17 patients in 2009 - 21 patients, in 2010 - 18 and in 2011 a total of 25 patients.

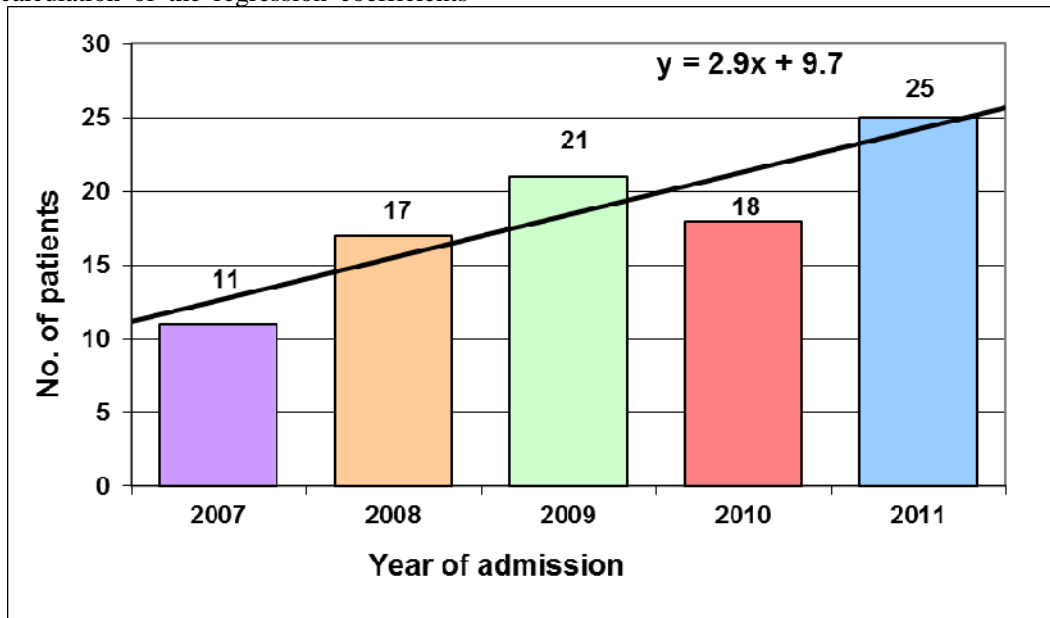


Fig.1. Distribution of the cases by year of admission

Following the case history, a physical examination and imaging investigations, the studied group of patients was divided according to stage of disease into 4 categories. For staging patients in these 4 stages of the disease we used FICAT functional classification system of femoral head avascular necrosis[6].

Distribution of patients according to disease stage were as follows - 4.35% of patients were diagnosed in stage I , 9.78% of patients were diagnosed in stage II of disease, 34.78% of patients were diagnosed in stage III of the

disease, while 51.09% of patients were diagnosed in stage IV of the disease.

Patients included in the study were aged between 19 and 68 years, with a mean age of 49.68 years and a standard deviation of 11.17.

Distribution of patients by age group was as follows - 16.30% of patients were aged less than 30 years, 31.52% of patients were aged between 30 and 40 years, 26.09% were between 40 and 50 years, 17.39% were aged between 50 and 60 years and 8.70% were aged over 60 years.

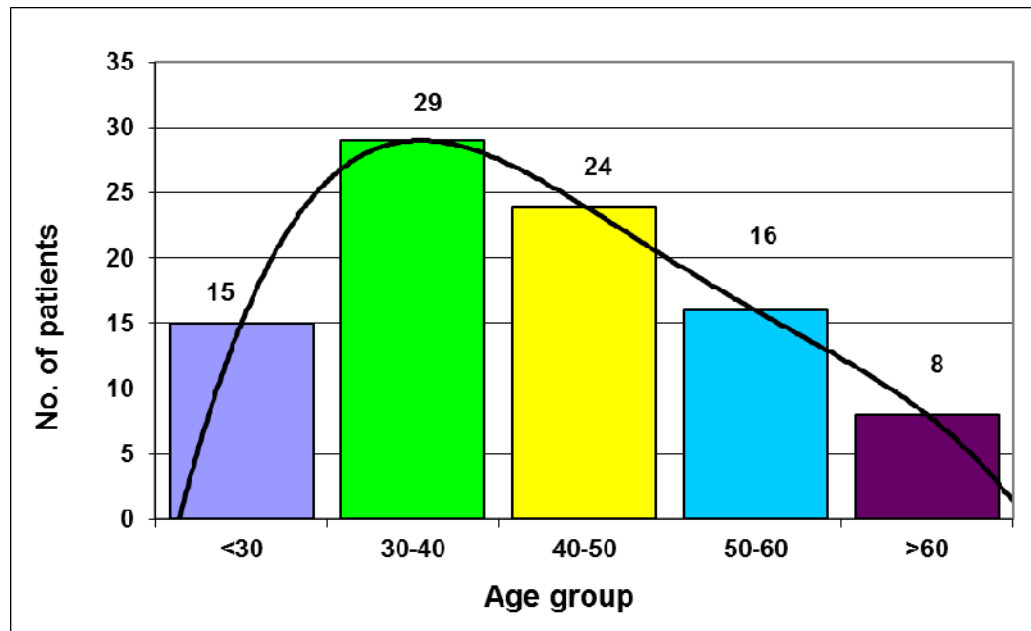


Fig.2. Study group structure by age

Analyzing the composition by gender group of patients we found the following issues – the study group was composed of 68 men and 24 women, resulting in a male to female ratio of about 3:1. In the study group, 73.91% were men and only 26, 09% women.

Group structure according to the residence was as follows - 35 patients (38.04%) were

living in rural areas, while 57 patients (61.96%) were from urban areas.

The main risk factors detected in patients investigated were represented by smoking (36.96%), alcohol (20.65%), trauma (11.96%) and corticosteroids (8.70%). For 29.35% no risk factors were found therefor we considered the condition to be idiopathic.

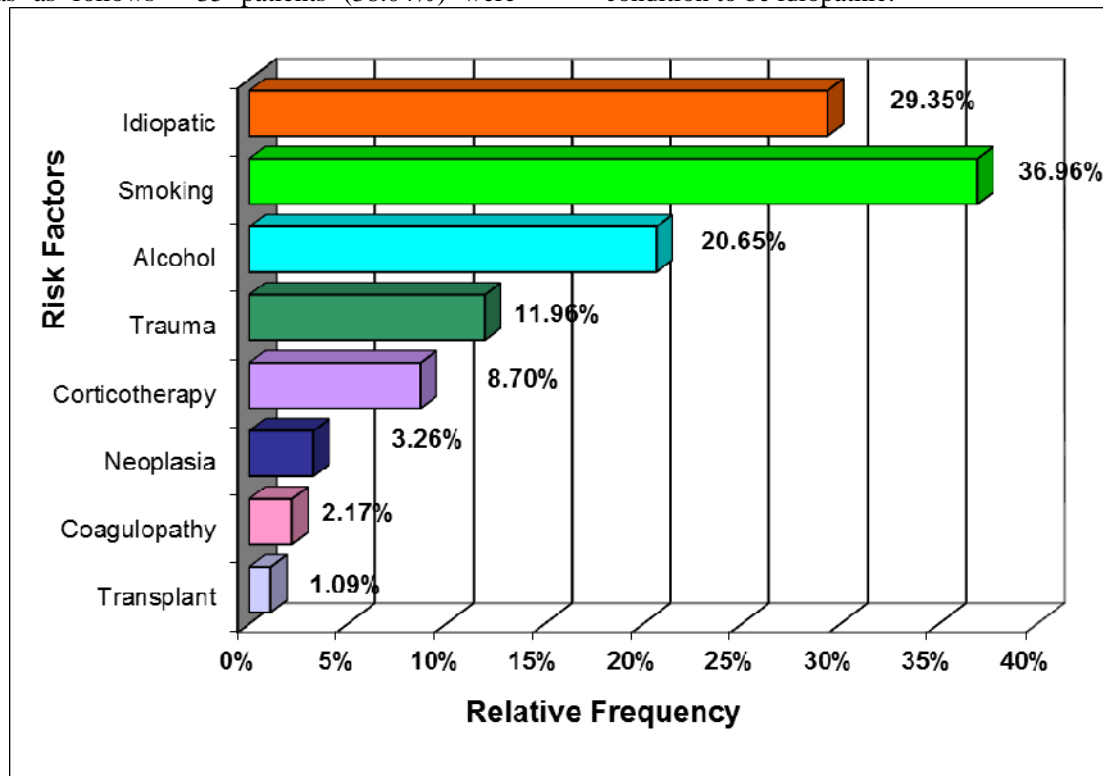


Fig.3. Frequency of the different risk factors discovered in the study group

For most patients in the study group (89.13%) the main reason for requesting medical counseling was the pain arising from the hip. In most patients in the study group the period between the pain occurrence and the necessity for hip surgery was between 1 and 3 years.

The results of the study according to the type of surgery performed on the basis of the evolutionary state in which patients were classified as follows - 100% of the drilling

decompression method used for the rescue of the femoral head was carried out in patients of progressive stages I and II, 7.06% of hip replacements performed in patients group, was done on patients in stages I and II. 92.94% of hip arthroplasties were performed in patients diagnosed in stages III and IV. Patients enrolled in the third and fourth evolutionary stage did not receive therapeutic means other than hip arthroplasty.

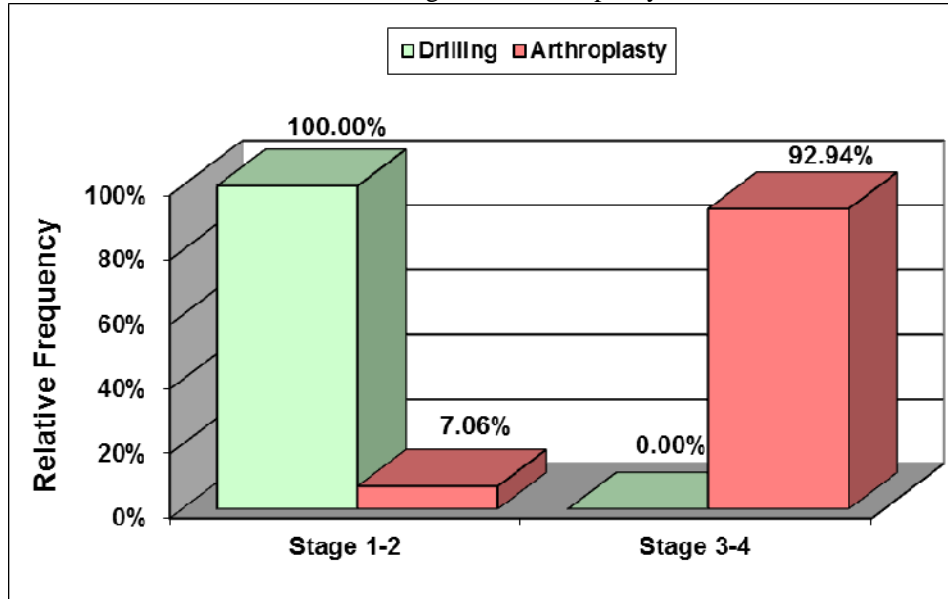


Fig.4. Study group structure by stage and type of surgery

Discussions

The clinical-statistical study results presented in this paper correspond largely to related research results found in the consulted literature. But there were variables captured in our study that we have not been able to find any correspondence in the literature.

In our study, we observed an almost continuous increase in the number of patients admitted annually from 11 in 2007 to a total of 25 patients, in 2011, the regression coefficient calculated based on the number of years start of the study with a positive value equal to 2.9. (See Figure 1)

Concrete data on incidence and prevalence, and costs of diagnosing and treating this disease are poorly known in our country. Therefore, we decided to present further data on these issues which internationally known.

The prevalence of avascular necrosis of the femoral head is uncertain, but each year in the USA there are between 10000-20000 new cases diagnosed with avascular necrosis of femoral head [7-12]. It is considered that a percentage

between 5-18% of a total of 500 000 hip replacement surgeries performed in a year are performed on patients diagnosed with avascular necrosis of the femoral head, the cost is estimated to be about 1 billion dollars annually [1-8, 11, 14].

In a study from Japan there were 2500-3000 new cases of avascular necrosis of femoral head every year [2].

In a retrospective study conducted in England, in 2009, the estimated incidence of disease, between 1989 and 2003, was from 1.4 to 3 cases per 100 000 inhabitants [15].

The increase in the number of patients diagnosed with avascular necrosis of the femoral head has increased in recent years throughout the world due to widespread use of corticosteroid therapy and the increase in alcohol consumption and the high incidence of local trauma. Because the life expectancy of patients with associated diseases has increased led to a higher incidence of this disease. There was an increased number of patients that had access to modern diagnostic imaging, resulting

in early detection of femoral head avascular necrosis (MRI, CT) [1].

Investigating the distribution of the studied group by the stage of the disease, we showed that more than half of the patients, 51.09% were diagnosed in the last stage of the disease, stage IV, and most patients in the study, 85.87% were diagnosed in advanced evolutionary stages of the disease, stages III and IV.

The large number of patients diagnosed with advanced, stage III and IV may have many explanations. The most important would be that patients are asymptomatic for a long time. Another explanation would be that there are no changes to the coxofemoral joint integrity shown on plain radiography in the early stages, as it is the first investigation carried out on paraclinical imaging when dealing with pain in the coxofemoral joint. Another factor is chronic alcohol consumption, incriminated as a risk factor in approximately 20% of patients, who are known for their tendency to neglect and lack of compliance to investigation and treatment.

By performing an analysis on the ages of the 92 patients at the time of the study, we observed that more than half of the patients, a percentage of 57.61% - were within the age groups 30-40 years and 40-50 years, the data is consistent with the literature, the femoral head avascular necrosis mainly affects young adults are between the 3rd and 5th decade of life [1-3, 7, 16, 17].

The group was composed of 68 men and 24 women, resulting in a male to female ratio of about 3:1. The data we found was similar to that described in the literature, where it is considered that the femoral head avascular necrosis affects men, four times more frequently than women [1, 7, 16, 17]. Some authors recorded a male to female sex ratio of 8:1, unless the condition occurs in the context of systemic lupus erythematosus [2]. Since Dolj county population consists of 48.8% men and 51.2% women, we can say that there is a highly significant difference in concern for gender, p value calculated by the Z test for proportions < 0.001 .

As mentioned above, a percentage of 38.04% of the patients were from rural areas and 61.96% of patients had the urban residential environment. Note that we have not found evidence of any correlation of the residence of the patients diagnosed with avascular necrosis of the femoral head, in the literature. Therefore, we limited the comparison between the residence of the patients diagnosed with avascular necrosis of

the femoral head and the distribution of population by residence in the county of Dolj.

Taking into account that from Dolj County population, 46.87% lives in rural areas and 53.13% in urban areas, we can say that there was a highly significant difference between these ratios and proportions calculated for the total number of patients with avascular necrosis of the femoral head, the p value calculated by Z test for proportions was < 0.001 . In conclusion, the percentage of patients in urban areas was significantly higher than their share in the population of the county.

The main risk factors detected in patients in the study group were represented by smoking (36.96%), alcohol (20.65%) and trauma (11.96%), corticosteroids (8.70%). For 29.35% no risk factors were found and the condition was considered to be idiopathic.

The relative frequency of the most common causes of avascular necrosis of the femoral head in the United States is: alcohol intake (20-40%), corticosteroid therapy (35-40%), idiopathic causes (20-40%) [1].

Common causes incriminated in the occurrence of disease in Japan were corticosteroids (34.7%), heavy drinking (21.8%) and idiopathic forms (37.1%) [2].

In England the most important risk factor involved in the development of avascular necrosis of the femoral head is trauma [15].

The majority of patients (89.13%) had as a main reason for presentation to the doctor hip pain, which is present in most patients for 1 to 3 years.

In the literature consulted, the main reason for seeking medical assistance was pain in the hip joint [1, 2, 7, 8]. Patients present no pain during the ischaemic period, which may start within 5 years after the trigger event.

For most patients, the time period between the onset of the the first clinical signs and the first orthopedic surgery required, due to femoral head collapse and subsequent damage as affected coxofemoral joint, was more than 5 years [2, 18]. Some authors argue that this period may be even shorter than/or 2 years [1].

Patients diagnosed in the early stages (I and II) had benefited from a surgical procedure performed in order to save and to maintain the integrity of the femoral head, respectively decompression drilling. Patients diagnosed in the third and fourth evolutionary stage have not benefited from other therapeutic means, in addition to the reconstruction of the femoral head, respectively hip arthroplasty.

Drilling is a therapeutic decompressive surgical prophylactic method used in pre-collapse stages of the disease. The benefits of this therapeutic technique are as follows: creating a channel to facilitate revascularization of the necrotic area and decreasing the pressure of the femoral head, which improves patient symptoms [19].

Total hip replacements are performed most often in advanced stages of necrosis of the femoral head (stage III and IV liver) and present a considerable success rate in improving symptoms [20-22].

Conclusions

We noticed the gradual increase in the number of patients diagnosed with avascular necrosis of the femoral head, hospitalized in the Orthopaedics-Traumatology Clinic of the Emergency County Hospital of Craiova, in recent years.

Concrete data on incidence and prevalence, and costs of diagnosing and treating this disease are poorly known in our country and we believe that our study brings new information useful in disease management.

The results regarding the batch distribution by age, sex, risk factors, functional complaints, treatment presented in this paper correspond to the data found in the literature consulted.

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