

Staging Osteonecrosis of the Hip and Eventual Mean Time to Surgery: Do Multiple Risk Factors Pose a Difference?

*H Rangunwala, MD; A Salvador, DO; K Patel, MD; A Daous, MD; S
Abdelhadi, MD; N Lewis, MD; Detroit Medical Center, Wayne State University*



School of Medicine

OBJECTIVE

- Osteonecrosis or avascular necrosis (AVN), accounts for more than 10% of hip replacements in the United States
- Our goal is to study the relationship between risk factors of AVN and the mean time to surgery (MTTS)
- In addition, we will assess whether having multiple risk factors affects the progression of disease in the interval to surgical intervention



BACKGROUND

- AVN results from diminished blood flow leading to bone death and subsequent collapse and destruction of the hip joint
- Presentation of the disease is usually late, eventually leading to destruction of the joint within 5 years
- Therefore, early diagnosis and treatment is important to delay the need for a joint replacement
- The most commonly involved joint is the hip, however, multiple sites may be affected



BACKGROUND

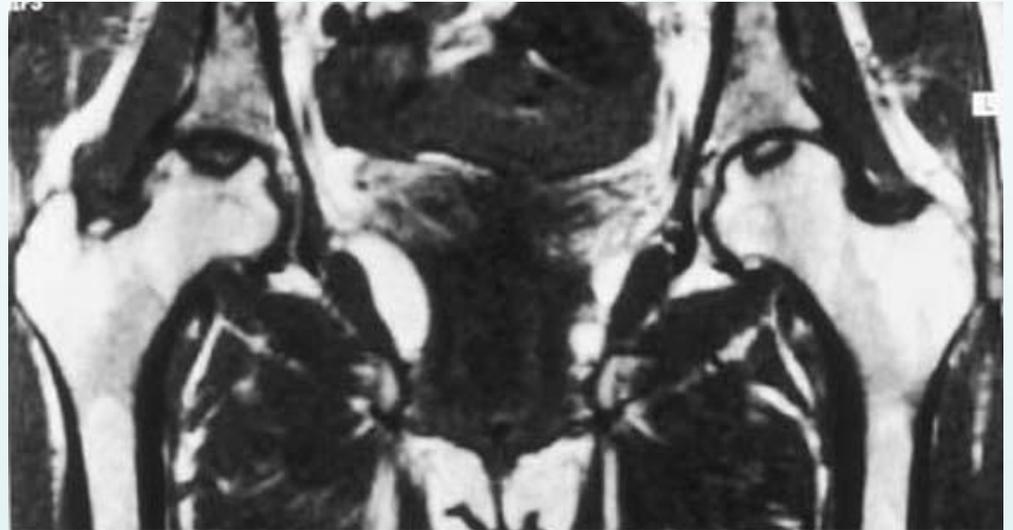
- Over 15,000 cases are reported each year in the United States
- AVN represents 10% of all hip replacement surgeries
- While mortality rates are low, morbidity rates, including long-term disability, are high
- Multiple risk factors are known, including, but not limited to: chemotherapy, alcoholism, steroid use, trauma, vasculitis, radiation, bisphosphonates, sickle cell anemia, etc.



BACKGROUND



Hip X-Ray (AVN with sclerosis of the femoral head)



T1 Weighted MRI (AVN with low signal intensity in the femoral heads)

MATERIALS & METHODS

- This is a retrospective study focusing on patients with AVN of the hip who subsequently underwent arthroplasty from July 2010 to July 2015
- Each patient was assigned a risk factor according to the Steinberg Classification (Grade I-VI) and subsequently graded until time to surgery; radiographs, CT and MRI were utilized
- Each patient's MTTs was calculated based on initial presentation (Grade I-IV)



Steinberg Classification

- **Stage 0** - Normal or non-diagnostic radiographs, MRI and bone scan of at risk hip
- **Stage I** - Normal radiograph, abnormal bone scan and/or MRI
- **Stage II** - Cystic and sclerotic radiographic changes
- **Stage III** - Subchondral lucency or crescent sign
- **Stage IV** - Flattening of femoral head, with depression graded into
 - Mild: <2 mm
 - Moderate: 2-4 mm
 - Severe: >4 mm
- **Stage V** - Joint space narrowing with or without acetabular involvement
- **Stage VI** - Advanced degenerative changes



MATERIALS & METHODS

- Furthermore, each patient's risk factors were collected including: BMI, social history (alcohol, smoking, and/or substance abuse), past medical history (HIV, diabetes mellitus, sickle cell disease, and/or vasculitis), and steroid use
- Patients individual risk factors were summed, with a numeric interval of one given for any positive risk factor and BMI greater than or equal to 25
- Each group was then analyzed using ANOVA with MedCalc 16.2.1 with a p-value <0.05 considered significant
- Exclusion criteria included individual patients who were lost to follow-up

RESULTS

- 62 patients were included in the study
- For each patient there was an overall average of 708 days for MTTTS and a standard deviation (SD) of 797 days
- When accounting for the various stages at surgery (from one to six) the average number of days for MTTTS varied from 412 to 925 without statistical significance (***p-value of 0.759***)
- Also when each individual risk factor was averaged together the overall MTTTS was 709 days with a SD of 775
- Each individual risk factor for AVN had no statistically significant difference when comparing the MTTTS (***p-value of 0.774***)



RESULTS

Grade	Sample Size	MTTS	SD
1	1	412	0
2	18	687	796
3	20	925	1024
4	15	561	531
5	6	455	426
6	2	786	38
Total Patients	62	708	797

Table 1. Comparison of grade at surgery with MTTS and standard deviation (SD)

RESULTS

Risk Factors	Sample Size	MTTS	SD
BMI	41	754	842
Alcohol	9	865	811
Diabetes	13	770	639
HIV	6	877	1399
Sickle Cell	5	204	124
Smoking	39	671	672
Steroids	14	668	578
Substance Abuse	12	574	719
Vasculitis	4	1003	828
Total Risk Factors	143	709	775

Table 2. Comparison of risk factors with MTTs and SD



RESULTS

Number of Risk Factors	Amount	MTTS	SD
One	18	564	678
Two	18	763	974
Three	19	811	861
Four	7	663	508

Table 3. Comparison of one to four risk factors with MTTS and SD

- When tallying up the individual risk factors and comparing the different groups (cumulative of one to four risk factors), there was still no statistically significant difference to MTTS (*p-value of 0.811*)

CONCLUSION

- ***Overall, there is no statistical significance between grading or the number of risk factors in MTTs in patients with AVN of the hip***
- ***Therefore, patients in whom AVN is suspected should be closely followed regardless of grade, type of risk factor, or number of risk factors as the progression of disease can vary independently with each eventually leading to surgery***



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