

Meeting Reports/Abstracts

Avascular Necrosis Leading to Total Hip Arthroplasty: An Incidence and Comorbidity Analysis in a Closed Urban Population

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a Mr. Forster recently graduated from Brown University with a Health and Human Biology degree. As a former collegiate athlete, he is very interested in orthopedics and sports medicine. Mr. Forster is currently employed as a technical associate in Langer Lab at the MIT Koch Institute for Integrative Cancer Research, which focuses on the development of unique drug delivery mechanisms and the use of polymer biotechnology as they pertain to various therapeutic modalities. In his free time, he enjoys traveling, spending time with friends, and playing drums and guitar.

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[Conflicts of Interest Statement for Mr. Forster](#)

b [Conflicts of Interest Statement for Karina Wang](#)

c [Conflicts of Interest Statement for Claire Bergen](#)

d Mr. Hong is a senior at Brown University, concentrating in Neurobiology and Music. After graduating, he intends on working as a clinical researcher before starting medical school.

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[Conflicts of Interest Statement for Mr. Hong](#)

e Ms. Leon is a full time post-bacc lab research assistant. She graduated from Brown University with a Biology ScB, focused on physiology and biotechnology. Her research will consist of elucidating the pathogenic bone resorption of *P. gingivalis*. She also has an additional interest in orthopedics which was enhanced by her fellowship at BronxCare Health System Orthopedic Surgery Department, where she completed research on short acting corticosteroids and avascular necrosis.

[Connect with Ms. Leon on LinkedIn](#)

[Conflicts of Interest Statement for Ms. Leon](#)

f Mr. Schwartz is a rising Senior at Brown University where he studies Biology and Dance. He has an interest in orthopedics and sports medicine and aspires to be an orthopedic surgeon. Mr. Schwartz is also a professional ballet dancer and still dances professionally and recreationally while studying to become a doctor.

[Connect with Mr. Schwartz on LinkedIn](#)

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g Ms. Stern is a current senior at Brown University where she is studying public health and completing her pre-medicine requirements. She is a member of the varsity track and field team and enjoys spending my free time going for a run or reading a book. She is hopeful to pursue a career in medicine, particularly orthopedics, and looks forward for what the future brings post-graduation!

[Conflicts of Interest Statement for Ms. Stern](#)

h Ms. Wilson works as the Senior Intern for the Department of Orthopaedics at BronxCare Health System. She graduated from Brown University with a Bachelor of Science in Biology.

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i Mr. St. Peter is a current junior at the University of Kansas.

[Conflicts of Interest Statement for Austin St. Peter](#)

j [Conflicts of Interest Statement for Ira Kirschenbaum](#)

[Visit the Open Payments Data Page for Dr. Kirschenbaum](#)

Avascular necrosis (AVN) results from a loss of intraosseous blood supply. And there is a range of causes and comorbidities, including trauma to the femoral head and neck, deep-sea diving, alcoholism, and having an HIV-positive diagnosis. AVN is a high-risk factor for total hip arthroplasty (THA) and there is a much higher prevalence of AVN in an underserved population like the one in our study. Understanding these results may lead to investigating AVN early. And then, communities with a high prevalence of HIV patients reporting hip pain should not be overlooked. We found that 58% were male, 24.5% of our THA's were due to AVN, and 40.7% of our AVN patients had the diagnosis of HIV.

What is Avascular Necrosis (AVN)?

AVN is A Disease as a Result of Loss of Intraosseous Blood Supply
A Common Indication for Total Hip Arthroplasty (THA)

Causes & Comorbidities

- Long-Term Steroid Use
- Femoral Neck Trauma
- Deep-Sea Diving
- Alcoholism
- Diabetes
- Hypertension
- HIV/AIDS

Prevalence

- 20,000-30,000 New Cases Per Year in United States¹
- Severe AVN Accounts for 10% of THA²

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1. Musacchio E, Sartori L. Zoledronic acid for the treatment of pregnancy-associated femoral head necrosis: A case report. Case Reports in Women's Health. 2020
2. Desforges JF, Mankin HJ. Nontraumatic Necrosis of Bone (Osteonecrosis). N Engl J Med. 1992

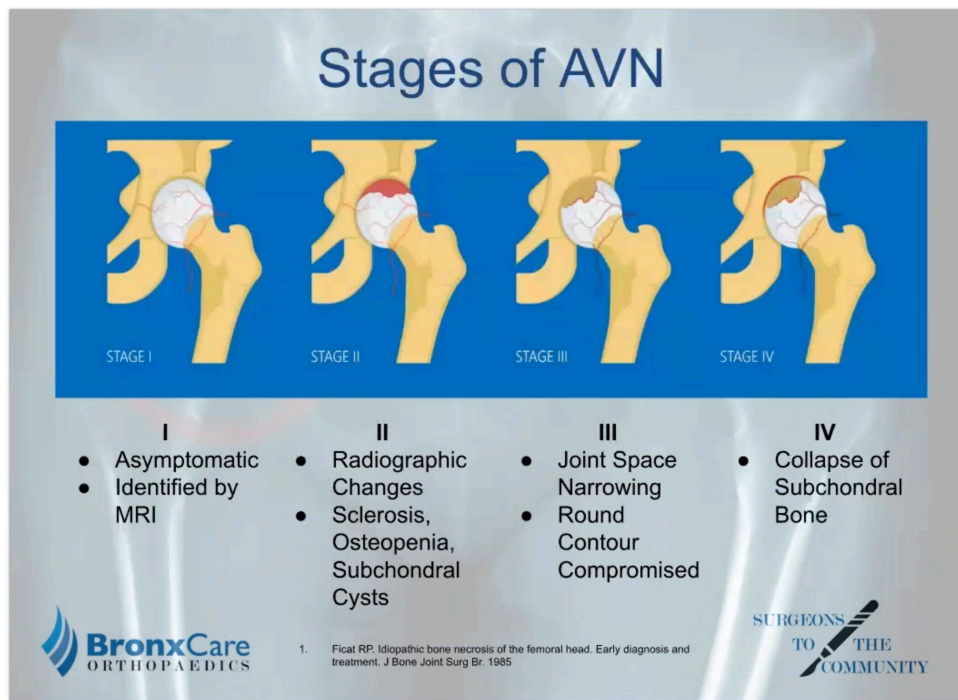
SURGEONS TO THE COMMUNITY

Slide 1

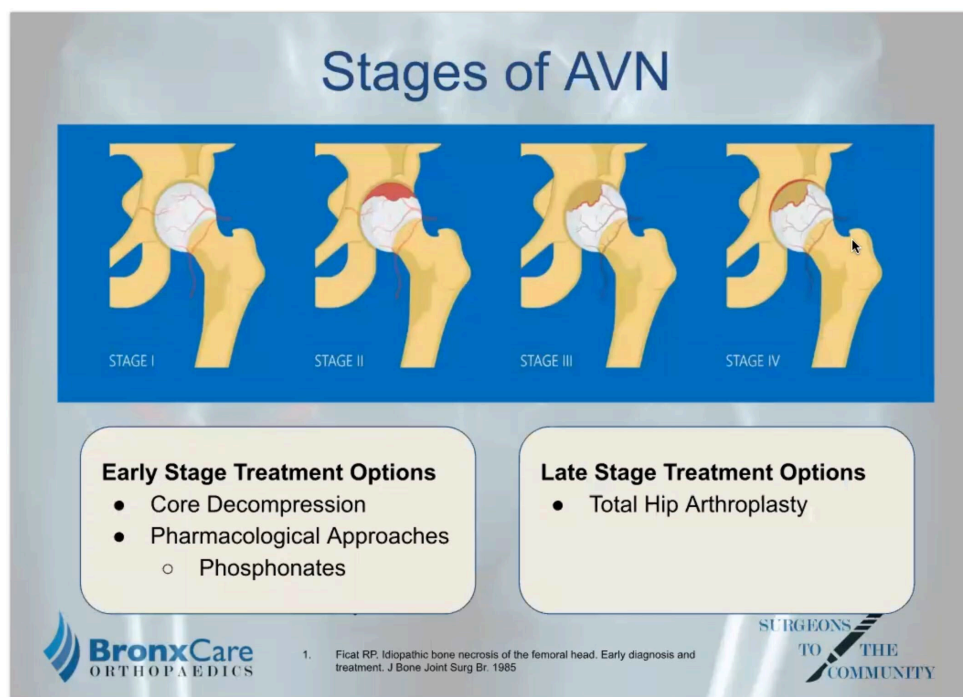
What is avascular necrosis? It's a disease that results from a loss of intraosseous blood supply. And there is a range of causes and comorbidities, including trauma to the femoral head and neck, deep-sea diving, alcoholism, and having an HIV-positive diagnosis.

Avascular necrosis is a common indication for total hip arthroplasty, a severe cases account for 10% of the annual total hip cases.

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Slide 2



Slide 3

There are four stages of avascular necrosis of the femoral head ranging from asymptomatic to total collapse of the bone. Core decompression is indicated in the early stages as well as drugs such as bisphosphonates. Total hip arthroplasty is indicated for the more severe cases of AVN.

Our Study Population




Closed Urban Setting
Reporting on a Community
A Petri Dish!


BronxCare Health System


- A Safety Net Hospital
- Poorest Congressional District in the United States
- Payment Models
 - 85% Manage Medicaid
 - 5% Commercial Insurance
 - 5% Charity Care
 - 5% Workers Comp

Social Barriers to Healthcare Access



Delayed Diagnosis





Slide 4


We have the privilege of working with the unique population of BronxCare. Being located in the poorest congressional district in the United States, there are many existing social barriers to healthcare. Unfortunately, this oftentimes leads to delay diagnosis and advanced disease progression. Eighty-five percent (85%) of patients at BronxCare utilized manage Medicaid. While the remaining 15% are evenly split between Commercial Insurance, Charity Care, and Workers' compensation payment models. From a research lens, we can consider this community a closed urban setting. To create an analogy, this community is like a petri dish for healthcare. As patients tend not to leave the Bronx for care nor do they come into the Bronx for care.

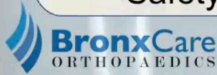

Aims

To Evaluate the Frequency of AVN for THA Patients

To Identify the Prevalence of AVN in a Closed Urban Setting

To Identify the Prevalence of Comorbidities Relevant to AVN Within the Context of a Safety-Net Hospital



Slide 5

Some of the aims of our study were to evaluate the frequency of AVN for patients who underwent a total hit. We also wanted to identify the prevalence of AVN in a closed urban setting. And also, the prevalence of comorbidities relevant to AVN within the context of a safety net hospital.



Methods

Patient Demographics

- Patients Underwent Primary THA
 - Consecutive Series
 - 2010-2021
 - Single Department (BronxCare Orthopaedics, Bronx, NY)
 - Patient Age, Sex, BMI, & Comorbidities Were Collected

Statistical Analysis

- Correlations Between Prevalence of Comorbidities in THA due to AVN





Slide 6

This retrospective study reported on a consecutive series of patients from 2010 to 2020 within a Single Orthopedic Department. We first collected patients' demographic information and comorbidities and then did statistical analysis including driving correlations between common comorbidities and the prevalence of total hip arthroplasty due to AVN.

Methods

P

1. Incidence of AVN in THA Population Determined
2. Comorbidities of Each Case Recorded
3. Correlations
 - Age-, Sex-Match Control
4. **"PART 2"**
 - Analyzed HIV Population as a Seperate Group





Slide 7

In summary, we first collected all total hip patients and identified which were indicated for a procedure due to AVN. Then, we recorded the comorbidities of the avascular necrosis patients. We generated a one-to-one agent sex match control group of total hip patients who did not have AVN. And then, we separate outpatients with HIV as specific comorbidity for further analysis.

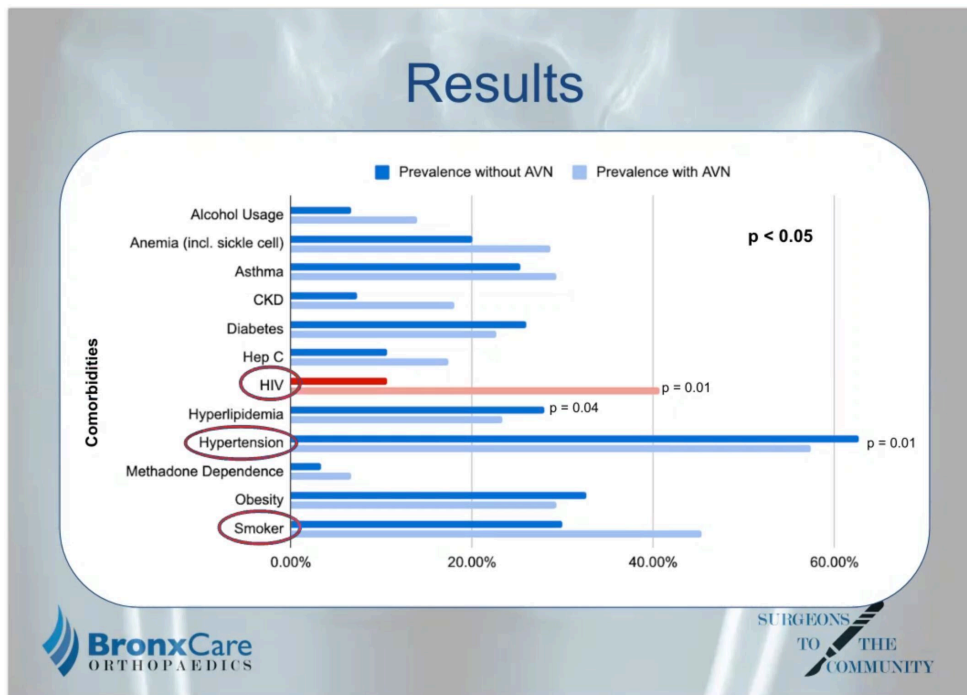
Results

- 613 Hips Underwent THA
 - 24.5% Indicated for THA due to AVN (n=150)
 - 87 Male
 - 63 Female
- 40.7% of AVN + THA Patients Had History of HIV (n=61)
 - Only 10.7% of non-AVN + THA Patients Had a History of HIV (n=16)
 - Within Age-, Sex-Matched Control Group

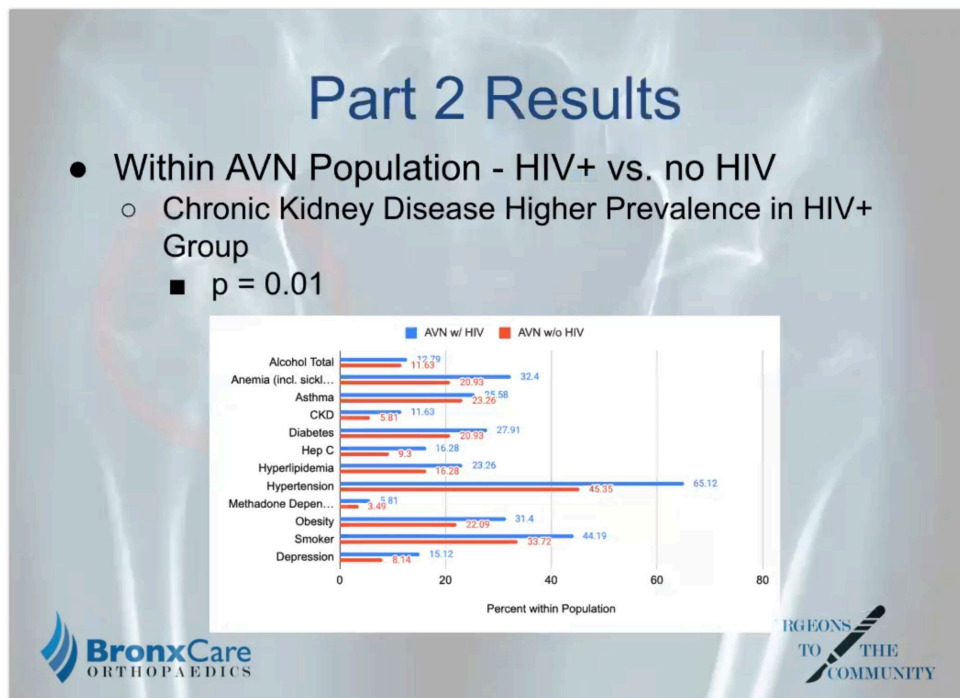
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Of the 613 hips that underwent arthroplasty, 24.5% were due to AVN. Within this AVN group, 40.7% of the patients had a history of HIV. And looking at the age-sex match control group of patients who underwent a total hip without AVN, this number was only 10.7%.



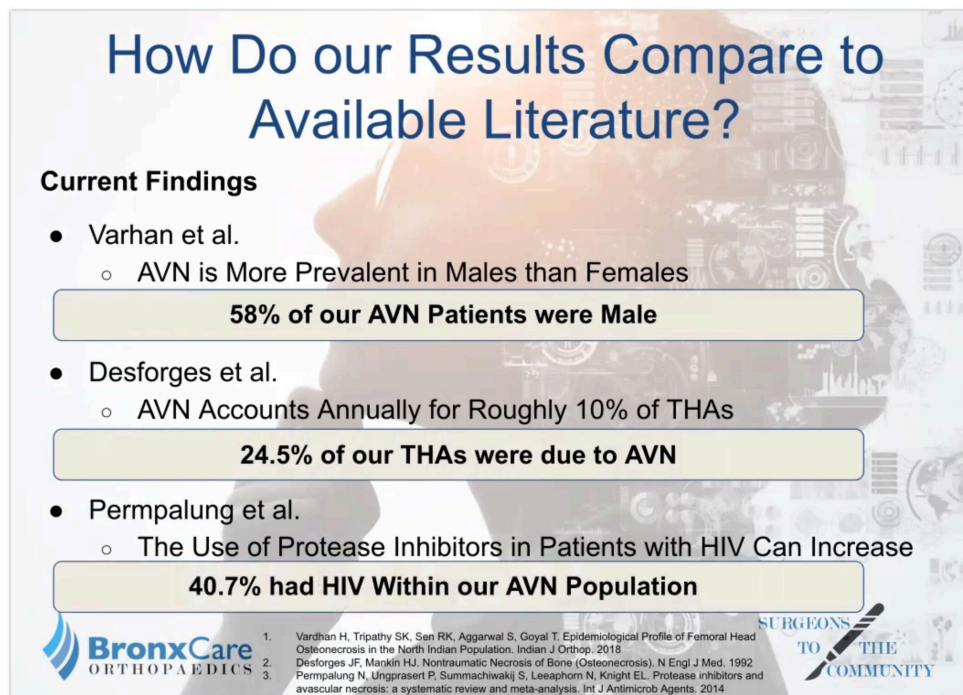
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Among the comorbidities, hypertension, smoking, and HIV-positive were the most common in the AVN total hip population. Comparing total hip due to AVN and non-AVN, HIV was the only comorbidity to demonstrate a significantly higher proportion in the AVN group.



Slide 10

We also created an age-sex match within the AVN population looking at patients with a history of HIV and patients without HIV. Comparing the comorbidities, we found that CKD had the only significant difference. However, the HIV group had a higher prevalence of comorbidities overall.



Slide 11

Based on our results, our study both disagrees, agrees and calls upon further research when compared to prior literature. Our say supports the notion that AVN is more prevalent in males than females.

Yet our study identified a much higher prevalence of AVN in patients requiring total hip. And within our population of a very high proportion of AVN patients were HIV-positive.



Conclusions & Summary

- AVN High Risk Factor for THA
 - Extraordinarily Higher Prevalence of AVN in Underserved Population, Our Study Population
- Clinical Relevance
 - Understanding May Lead to Investigate AVN Early in Treatment Course
- Future studies
 - Evaluation of AVN in Asymptomatic HIV Patients - MRI Study
 - Associated Risk Factors in HIV Group
 - Asthma / Long Term Steroid Use
 - Complete HIV Group Matched: Hip vs No-Hip Pathology
 - Assess Comorbidities
 - Is it Actually HIV Causing Hip Pathology?
 - Evaluate the Social Barriers to Early Diagnosis

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COMMUNITY

Slide 12

In conclusion, AVN is a high-risk factor for total hips and there is a much higher prevalence of AVN in an underserved population like the one in our study. Understanding these results may lead to investigating AVN early. And then, communities with a high prevalence of HIV patients reporting hip pain should not be overlooked. This study in our results went further future analysis, including evaluating AVN and asymptomatic HIV patients such as through an MRI study. Evaluating the associated risk factors in HIV groups such as asthma or long-term steroid use. Or completing an HIV group matched in hip versus no hip pathology to assess differences and comorbidities. Overall, we believe that evaluating the social barriers to early diagnosis is most relevant in improving future patient care.



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