MRSA Screening Prior to Total Ankle Arthroplasty: A New Standard Preoperative Protocol

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STATEMENT OF PURPOSE

Methicillin-Resistant Staphylococcus Aureus (MRSA) screening prior to total hip arthroplasty and total knee arthroplasty has been the gold standard in the preoperative setting due to high incidence of staphylococcal species causing prosthetic joint infections (PJIs). However, there is not a protocol in total ankle arthroplasty (TAA), due to the lack of literature present. The goal of this study is to determine if MRSA screening prior to TAA is warranted to decrease overall infection rates and improve patient outcomes.

METHODS

Prior to beginning our study, Institutional Review Board (IRB) approval was obtained before data collection. We retrospectively reviewed patients who underwent a TAA at OhioHealth from March 1, 2014, and March 1, 2023, with a minimum of 1 year follow-up. A total of 135 patients met the inclusion criteria after duplicates were removed and exclusion criteria was applied. For each patient, we analyzed demographics, if MRSA was screened prior to surgery, if antibiotics were administered in the perioperative period, and occurrence of post operative infections **(Figure 1).**

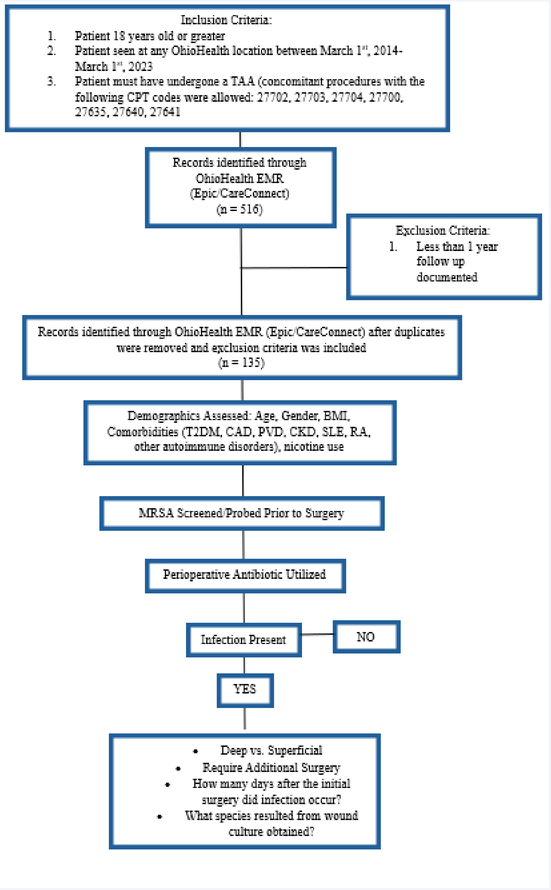

Figure 1: Retrospective review methodology and algorithm followed for data collection

RESULTS

135 patients met the inclusion criteria, of those only **two patients (1.5%)** were MRSA screened prior to their TAA. Both patients did not receive decolonization due to a negative screen. Therefore, there were 0% of patients decolonized in this study. The overall incidence of post-operative infection was **8.9% (12/135).** We further subdivided infections into superficial and deep. There were **41.7% (5/12)** superficial infections. All patients had a culture that was obtained from the surgical site and needed additional surgery that included one of the following: washout, debridement, wound assisted closure, grafting, or flaps. There were **58.3% (7/12)** deep infections. All patients had a culture that was obtained from the surgical site and needed additional surgery that included implant explantation . Overall, the time to infection after initial surgery averaged **201.3 days (43-870). Seven out of the twelve (58.3%)** patients who developed infection were of the staphylococcal species. Other species identified were Group B Strep, Pseudomonas Aeruginosa, Strep Viridians, and Peptostreptococcus. Ancef was the most utilized perioperative antibiotic, **119/135 (88.1%)**. Followed by, Clindamycin **14/135 (10.4%)**, and **Vancomycin 2/135 (1.5%).** Of the twelve patients who developed infection, the average age was **69.1 years old. 25%** of patients with infection were females, compared to **75%** males. The average BMI of infected patients were **32.05**. **41.7% (5/12)** of patients were type II diabetics, **25% (3/12)** had coronary artery disease, and **8.3% (1/12)** had chronic kidney disease. **25% (3/12)** of patients were current smokers at the time of the initial surgery **(Table 1).**

Patient	Age	Gender	BMI	Comorbidities	Nicotine Use	Depth of Infection	Species
1	63	Female	43.6	T2DM, CAD, CKD	No	Superficial	Gram + Cocci
2	61	Male	32.5	T2DM	No	Deep	Coag - Staph
3	76	Male	29.3	None	No	Superficial	Group B Strep
4	45	Female	34	None	Yes	Superficial	MSSA
5	75	Male	34	T2DM	Yes	Superficial	Pseudomonas Aeruginosa
6	69	Male	33	T2DM, CAD	No	Deep	Staph Intermedius
7	79	Female	24	None	No	Superficial	Group B Strep
8	70	Male	32	None	No	Deep	MRSA
9	61	Male	21	None	No	Deep	Strep Viridians
10	83	Male	25.9	None	No	Deep	NOS
11	78	Male	40.9	None	No	Deep	Coag – Staph; Peptostrep
12	70	Male	34.4	T2DM, CAD	Yes	Deep	MRSA

Table 1: Includes age, gender, BMI, co-morbidities, nicotine use, depth of infection, and species identified in 12 out of 135 patients included in the study.

ANALYSIS & DISCUSSION

One concern with total joint replacements is the risk of prosthetic joint infections as a complication that a patient could endure. On average, one in every fifty patients who undergo total joint arthroplasty develop a surgical site infection (SSI)[3]. Greater than 60% of prosthetic joint infections that occur in patients undergoing total hip and knee arthroplasties are caused by the staphylococcal species[11]. Therefore, screening and decolonization of staphylococcus aureus carriers prior to surgical intervention has emerged as an important protocol implemented by orthopedic providers to decrease the risk of prosthetic joint infections postoperatively.

MRSA screening occurs prior to elective surgery for patients undergoing total hip and knee arthroplasty. Screening technique entails rubbing the culture swab in the anterior nares of each nostril for five seconds[11]. The nasal cavity is one of the most common sites for staphylococcus aureus colonization, which is why screening is performed by intranasal swab cultures[12]. Sousa et al. revealed staphylococcus aureus was 22.2% and that of MRSA was 0.8% when screened[8]. Kim et al. showed a MSSA rate of 22.6% and MRSA rate of 4.4%[6]. However, there are studies that have explored culturing other locations aside from intranasally that have shown promise. Ahmad et al. determined that intranasal MRSA screening only had a detection rate of 50.5% but, by including the groin and throat, detection rate increased to 92%[1]. Patients that have staphylococcus aureus nasal colonization have a nine times increased probability of developing orthopedic SSI[5].

ANALYSIS & DISCUSSION CONTINUED

Currently, the most common method for staphylococcus aureus decolonization is mupirocin 2% applied intranasal twice a day for five days prior to surgery[9]. Another key component to decolonization is chlorhexidine. Chlorhexidine comes in many different forms, including cloths, wipes, sponges and even tablets. There is controversial literature if adding chlorhexidine to mupirocin aids in decolonization[10]. Sporer et al. looked at 9,690 patients that had undergone elective total joint arthroplasty who were screened prior to surgery for MRSA and MSSA. Perioperative infection rates were compared one year before implementation of decolonization protocol and five years after. They found that SSI rates decreased from 1.11% to 0.34% after initiated[9]. A large multicenter prospective cohort trial by Schweizer et al. examined the effect of the introduction of staphylococcus aureus screening prior to cardiac surgery, total hip arthroplasty, and total knee arthroplasty. The authors reported a significant reduction of prosthetic joint infections after the initiation of standard decolonization[7]. Kim et al reported a 59% reduction in SSI after implementing standard decolonization protocol[6]. Despite the promising effect that decolonization allows, Baratz et al. demonstrated that despite a significant reduction in nasal carriage of MRSA, 20% of patients remained colonized after decolonization[2].

Lastly, MRSA screening preoperatively, allows for the appropriate antibiotics to be utilized. According to Hansen et al. if a patient has confirmed MRSA on screening, then it is recommended to use vancomycin for antibiotic prophylaxis extending 24 hours post-operatively. If the patient has successfully decolonized, then Ancef may be used[4].

CONCLUSION

While this protocol has already been routinely implemented in patients undergoing total hip and total knee arthroplasty its application in TAA has not been established. This is likely due to the limited literature with the recent debut and evolvement of the TAA. To our knowledge there is no study that evaluates the incidence of MRSA screening and decolonization prior to TAA, nor the incidence of PJIs postoperatively. Our study found **1.5% of patients were MRSA screened** prior to TAA with an **8.9% infection rate**. It is important to acknowledge the limitations of our study which include retrospective design, multiple authors involvement in data collection, potential misdiagnosis, and errors in EMR. However, this case study sheds to light on the significance of MRSA screening prior to TAA, as it identifies MRSA and MSSA carriers. This allows providers to appropriately manage patients in the perioperative setting through decolonization and administration of antibiotics if warranted.

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