Pre-operative Surgical Prep is not Effective at Eliminating *C. Acnes* prior to Total Hip Arthroplasty

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INTRODUCTION: Periprosthetic joint infection is one of the most devastating complications following total hip arthroplasty (THA). Of growing concern in orthopaedics is the emergence of atypical periprosthetic joint infections, particularly Cutibacterium species infections. Standard pre-operative antibacterial prophylaxis may be ineffective in eliminating the *C. Acnes* and other Cutibacterium species from the surgical site prior to the operative procedure. Further, the dermal colonization rate of *C. Acnes* with various pre-operative cleaning protocols in THA has yet to be elucidated. The purpose of the study was to investigate the effect of different pre-operative skin cleansing protocols on colonization rate about the hip in patients undergoing elective THA.

METHODS: THA patients were recruited into the study and randomized into either standard surgical prep (STD group) or STD + benzoyal peroxide gel (BPO group). The STD group underwent a standard chlorhexidine gluconate (CHG) skin cleansing protocol which included the application of 4% CHG skin wipes upon the biopsy site on the day of surgery. The BPO group underwent the additional application protocol utilizing BPO, which was 4 doses of 5% BPO gel to be applied to the biopsy site starting 48 hours prior to biopsy collection. On the morning of biopsy collection, a final application of 5% BPO gel was applied. Intraoperatively, all patients had the skin prepped with standard prep (Duraprep). After the skin prep, a 3-mm punch (Acu-Punch, Acuderm, Fort Lauderdale, FL) skin biopsy was performed for both an anterior-based hypothetical incision and for a more lateral/posterior incision, for a total of 6 biopsies taken per patient at the proximal, middle, and distal aspect of the hypothetical incisions. Using an established culturing protocol, cultures were maintained for 14 days in both aerobic and anaerobic culture medium. Statistical analysis was conducted using Minitab 18 and significance was accepted at $p \leq 0.05$.

RESULTS:

Of the 2,022 biopsies collected from n=337 patients, a total of n=223 biopsies had a positive culture (11.03 %). 38% percent of the patients in the STD group and 41% of the patients in the BPO group had a positive culture (p=0.612). Of the n=47 biopsies in the BPO group, n=32 patients were positive for *C. Acnes* (4.78 %). Of the n=46 biopsies in the STD group, n=29 patients were positive for *C. Acnes* (4.43 %). 16.76% of the patients in the STD group and 19.51% of the patients in the BPO group had a positive culture for *C. Acnes* (p=0.512). *C. Acnes* was more commonly cultured in both the STD and BPO groups, as compared to *Staph Aureus* (second most common pathogen in both groups) and *Bacillus Species* (third most common in both groups). There were no differences between positive culture biopsies between anterior or lateral sampling locations (p=0.615 STD group and p=0.711 BPO group).

DISCUSSION AND CONCLUSION:

There was a high rate of patients that demonstrated *C. Acnes* colonization prior to THA. There was no difference in positive culture rate with anterior or lateral sample locations. Pre-operative surgical prep was not effective at eliminating *C. Acnes* from the surgical site prior to THA. Future studies are warranted to elucidate the effectiveness of different skin preparation protocols to decrease the rate of *C. Acnes* and other Cutibacterium species from surgical sites prior to THA.