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(Consulting/Royalty payments for other products from same company as the product discussed)

INTRODUCTION

Among the many efforts invested to prevent the occurrence of periprosthetic joint infection (PJI), optimization of wound healing and prevention of wound drainage are important initiatives. The AQUACEL® Ag Hydrofiber® dressing is an antimicrobial dressing which consists of a weaved cellulose center that contours to the skin to eliminate dead space, absorbs exudate and releases ionic silver to reduce microbial activity and support wound healing¹ (Figure 1).

The objective of this study was to evaluate the effect of using this dressing on the occurrence of acute PJI in patients undergoing TJA.

MATERIALS AND METHODS

After obtaining institutional review board approval, retrospective chart review over a 35-month period was undertaken. 903 consecutive patients undergoing primary total joint arthroplasty (TJA) who received the AQUACEL® Ag Surgical dressing were included and compared to 875 consecutive patients undergoing TJA who received the standard dressing. Our major outcome was the development of acute PJI, defined as occurring within 3 months after surgery and verifying the new definition criteria established by the Musculoskeletal Infection Society². The AQUACEL® Ag Surgical dressing was applied on the surgical site in sterile conditions in the operating room and kept for 5 days postoperatively. Standard dressing application consisted of sterile gauze applied over the incision site in the operating room and secured with adhesive tape. Changes in practice and multiple potential confounding factors were taken into account in a multivariate analysis model (Table 1). Statistical analyses were performed using R version 2.15.1 (R Foundation for Statistical Computing®, Vienna Austria).

RESULTS

The prevalence of acute PJI was lower in the AQUACEL® Ag Surgical dressing group (0.44%) compared to the standard dressing group (1.71%). Bivariate analysis showed this to be statistically significant (p=.005). A backward stepwise logistic regression model retained 7 independent risk factors for PJI (out of 37 variables), including the use of AQUACEL® Ag Surgical, with an independent odds ratio of 0.165 (95% confidence interval: 0.051-0.533). Other independent significant risk factors for infection were: age, body mass index, smoking status, thyroid disease, liver disease and history of steroid treatment (Table 2).



Figure 1 AQUACEL® Ag Surgical dressing in place 1 day after total knee arthroplasty.

<u>Demographics:</u>	<u>Comorbidities:</u>	
Age	Smoking status	Chronic renal disease
Gender	Frequent alcohol drinking	Malignancy (history, active disease or metastatic disease)
BMI	History of MI	Rheumatoid disease
	Congestive heart failure	Hypertension
<u>Procedure factors:</u>	Peripheral vascular disease	Dyslipidemia
Joint	Cerebro-vascular disease	Thyroid disease
Bilateral procedure	Dementia	Psychiatric disease
OR time	Chronic pulmonary disease	Anemia
Transfusion need	Connective tissue disease	Dysrhythmia
Type of anesthesia	Coronary artery disease	History of DVT or PE
Length of stay	Peptic ulcer disease	GERD
AQUACEL® Ag Surgical dressing	Liver disease	History of steroid treatment
Dilute betadine irrigation	Diabetes mellitus	ASA

Table 1 List of patient-related and procedure-related factors included in the first step of the logistic regression model.

ASA = American Society of Anaesthesiologists physical status classification, BMI = Body Mass Index, DVT = Deep Vein Thrombosis, GERD = Gastro-Esophageal Reflux Disease, MI = Myocardial Infarction, OR = Operating Room, PE = Pulmonary Embolism.

	Odds Ratio (95% confidence interval)	p-value
AQUACEL® Ag Surgical dressing use	0.17 (0.05 – 0.53)	0.003
Age	1.09 (1.03 – 1.14)	0.002
BMI	1.10 (1.03 - 1.19)	0.006
Former Smoker	3.02 (1.12-8.12)	0.029
Thyroid disease	3.71 (1.42 – 9.67)	0.007
Liver disease	7.03 (1.43-34.60)	0.017
History of systemic steroid treatment	22.22 (1.83 – 269.45)	0.015

Table 2 Factors included in the final logistic regression model with independent odds ratios and 95% confidence intervals.

BMI = Body Mass Index.

DISCUSSION

PJI is a major healthcare concern with mental, physical and financial burden on affected patients. Wound healing problems and superficial surgical site infections have been shown to be a risk factor for the development of PJI³. Thus, addressing these specific issues represents an additional weapon in our armamentarium to prevent the occurrence of deep infection.

The use of the AQUACEL[®] Ag Surgical dressing in TJA has already been shown to decrease the need for dressing changes, thus sparing healthcare resources, prevent superficial wound problems such as blister development, and avoid delays in hospital discharge due to wound healing issues¹. This is the first study demonstrating that the use of the AQUACEL[®] Ag Surgical dressing led to a reduction in the incidence of acute PJI after TJA. It appears that the use of this dressing decreases the risk of developing acute PJI by 83%.

We recognize several limitations to our study, principally its retrospective design on a cohort of consecutive patients. Nonetheless, we were able to include a large number of subjects and all changes in practice, as well as potential confounding factors, were taken into account in a multivariate model. Our main concern was the confounding effect of intravenous vancomycin prophylaxis and dilute betadine irrigation, two practices we implemented based on promising evidence in the literature^{4,5}. Even though vancomycin use manifested a trend towards significance, these 2 factors did not reach statistical significance for the development of PJI in the current study, probably due to the limited number of subjects involved.

In conclusion, the AQUACEL[®] Ag Surgical wound dressing with ionic silver significantly reduces the incidence of acute PJI. Its systematic use would be an effective measure to prevent the occurrence of acute PJI following TJA and thus avoid healthcare costs and major patient morbidity associated with this devastating complication.

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