

Role of Topical Vancomycin in Hip Arthroplasty: A Retrospective Study

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ABSTRACT

Background: Total hip arthroplasty has progressed to become one of the most successful surgical procedures, but infection remains a serious complication. Surgical site infections (SSI) continue to be a significant source of morbidity despite the introduction of perioperative intravenous antibiotics. The objective of the study was to assess the efficacy of local vancomycin powder on lowering deep SSI rates in hip arthroplasty without any systemic or adverse clinical effects.

Materials and Methods: The present retrospective study was carried out between March 2015 to December 2020 with 141 cases of hip arthroplasty. Sixty patients received 1gram vancomycin powder directly into the surgical wound during surgery, and the remaining 81 patients served as controls. Demographic data, patient comorbidities, injury and treatment details, and infection details will be recorded. The recorded data was compiled, and Descriptive and comparative statistics was performed.

Results: A total of 141 patients were included in the study. Sixty patients received 1gram vancomycin powder directly into the surgical wound during surgery, and the remaining 81 patients served as controls. The post-operative wound infection in 13 of the 141 patients (9.21%). It was found that 9 of the

patients who developed post-operative wound infection were in the non-vancomycin-treated group and 4 were in the vancomycin-treated group. The rate of the infection was found to be 6.66% in the vancomycin-treated and 11.11% in the non-vancomycin treated group.

Conclusion: The present study concluded that the rate of the infection was found to be 6.66% in the vancomycin-treated and 11.11% in the non-vancomycin treated group.

Keywords: Vancomycin, Surgical Wound, Hip Arthroplasty.

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INTRODUCTION

Total hip arthroplasty (THA) is a highly successful approach for the treatment of hip osteoarthritis, with a 92% to 94% survivorship at 7 to 12 year follow up.⁹ Despite the overall success of THA, periprosthetic joint infection (PJI)-the most common cause of readmissions after total joint arthroplasty-occurs in approximately 1% to 2% of patients.^{1,2}

In spite of advances in surgical techniques and operative room environment, approximately 1% patients develop infection after hip replacement. Despite systemic use of antibiotic prophylaxis, post-surgery infection remains a cause of concern in joint replacement surgery.³

Infection has marked impact on patients and their resources as they had to undergo repeated surgical procedures, delayed rehabilitation and poor surgical outcome.⁴ Local application of antibiotic results in high concentration at the operative site and systemic effects are thus avoided.⁵⁻⁷ Staphylococcus is one of the

commonest organism causing surgical site infection and application of vancomycin locally can reduce its incidence.^{8,9} The mechanism of action underlying this effect is believed to be direct local bactericidal action at the site of wound inoculation during surgery. This hypothesis is supported by the fact that skin flora account for the predominant pathogens. There are no reported serious complications with the use of vancomycin locally.¹⁰ Local administration of topical powdered antibiotics was first popularized in the late 1960s for prevention of wound infection in abdominal surgery prior to the existence of effective systemic prophylaxis.¹¹ Topical antibiotics have also been applied locally in irrigation solutions, ointments, pastes, beads, sponges, and fleeces.⁶ Local administration of powdered antibiotics is an attractive method, as it has the potential to deliver exceptionally high doses of antibiotic to the surgical site with less systemic exposure and thus potentially fewer adverse systemic effects.¹²

MATERIALS AND METHODS

The present retrospective study was carried out between March 2015 to December 2020 with 141 cases of hip arthroplasty. Before the commencement of the study ethical approval was taken from the Ethical Committee of the institute and written consent was taken from the patient after explaining the study. Sixty patients received 1 gram vancomycin powder directly into the surgical

wound during surgery, and the remaining 81 patients served as controls. Demographic data, patient comorbidities, injury and treatment details, and infection details will be recorded from CR office. The recorded data was compiled, and Descriptive and comparative statistics was performed. The values of all parameters were presented as the mean standard deviation. Fischer exact test and t-test considered significant for $p < 0.05$.

Table 1: Distribution of patients

Groups	No. of patients
Vancomycin group	60
Control group	81
Total patients	141

Table 2: Comparative of surgical site infection (SSI) between groups

	SSI Absent	SSI present	Total	p value
Vancomycin group	56(93.33%)	4(6.66%)	60(42.55%)	< 0.05
Control group	72(88.88%)	9(11.11%)	81(57.44%)	
Total patients	128(90.78%)	13(9.21%)	141(100%)	

RESULTS

A total of 141 patients were included in the study. Sixty patients received 1gram vancomycin powder directly into the surgical wound during surgery, and the remaining 81 patients served as controls. The post-operative wound infection in 13 of the 141 patients (9.21%). It was found that 9 of the patients who developed post-operative wound infection were in the non-vancomycin-treated group and 4 were in the vancomycin-treated group. The rate of the infection was found to be 6.66% in the vancomycin-treated and 11.11% in the non-vancomycin treated group.

DISCUSSION

The use of topical vancomycin was first reported in 1989 when the application of topical vancomycin to the sternum in cardiothoracic patients reduced rates of sternal infection from 3.6% to 0.45%.¹³ The first large retrospective study investigating the clinical efficacy of VP was published in 2011 and reviewed 1,732 consecutive spinal fusions and showed a reduction in infection rate from 2.6% to 0.2%.⁷

Eight meta-analyses have been published since 2014 reporting on the pooled risk for SSI from up to 16 studies with and without the use of topical vancomycin in spinal surgery. Each meta-analysis found a statistically significant improvement in favour of the use of topical vancomycin, with odds ratios for SSI ranging from 0.11 to 0.43.¹⁴ A single retrospective clinical study has reported initial results with the use of topical vancomycin for surgical prophylaxis in total hip arthroplasty and periarticular tibia fractures. 125 consecutive patients who underwent THA received either intravenous cefazolin alone or in addition to 2 grams of vancomycin powder. There was a significantly lower infection rate for patients receiving topical vancomycin, and there were no adverse events reported.^{15,16}

Otte et al. assessed the use of intrawound VP in revision total knee arthroplasty (TKA) and revision THA and found the infection rates in patients receiving intrawound VP was significantly lower than in patients who received no intrawound VP, 0.0% vs. 3.89%, respectively.¹⁷ In a prospective randomized controlled trial comparing 433 patients receiving VP to a control group of 474 patients receiving no VP, Tubaki et al. found no statistical difference in infection rates (1.6% in both groups). The authors hypothesized that the addition of VP may not be effective when the incidence of postoperative infection is low.¹⁸

Johnson et al studied the local and serum vancomycin concentration levels after topical administration of vancomycin. They found that topical vancomycin provides a highly therapeutic intrawound concentration, with low systemic absorption.¹⁹

CONCLUSION

The present study concluded that the rate of the infection was found to be 6.66% in the vancomycin-treated and 11.11% in the non-vancomycin treated group.

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