شبكة المعلومات الجامعية

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بسم الله الرحمن الرحيم

HANAA ALY

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جامعة عين شمس

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Local Vancomycin in Prevention of Surgical Site Infection in Spinal Surgeries

Systematic Review

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Gadallah Helal Gadallah

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Abb.	Full term
CDC	*Centers for Disease Control and prevention*
E.coli	*Escherichia coli*
E.faecalis	*Enterococcus faecalis*
JCI	*Joint Commission International*
MDROs	*MultiDrug-Resistant Organisms*
MIC	*Minimal Inhibitory Concentration*
MRCNS	*Methicillin-Resistant Coagulase Negative Staphylococci*
MRSA	*Methicillin-Resistant Staphylococcus Aureus*
MRSE	*Methicillin-Resistant Staphylococcus Epidermidis*
MSCNS	*Methicillin- Susceptible Coagulase Negative Staphylococci*
MSSA	*Methicillin-Susceptible Staphylococcus Aureus*
P.acnes	*Propionibacterium acnes*
P.aeruginosa	*Pseudomonas aeruginosa*
S.epidermidis	*Staphylococcus epidermidis*
S.marcescens	*Serratia marcescens*
SSIs	*Surgical Site Infections*
VCM	*Vancomycin*
VRE	*Vancomycin-Resistant Enterococcus*
WHO	*World Health Organization*

INTRODUCTION

Deep surgical site infections (SSIs) are a substantial burden to the patient and the health-care system. Despite the ubiquity of prophylactic antibiotics and aseptic technique, SSIs comprise 22% of all health care-related infections and are the second most common health care-associated infections in the United States [(1)].

The literature has demonstrated significant morbidity with SSIs after spinal fusion procedures [(2)], as well as adult spinal trauma [(3)], and the short- and long-term effects of SSI can be devastating. Multiple reoperations, instrumentation removal, long-term antibiotic therapy, and prolonged hospital stays complicate the postoperative period, negatively impact patient reported outcomes and hospitalization costs increase significantly when these complications occur [(4)]. With increasing pressures to control resource utilization, and the curtailed reimbursement for the treatment of ‘‘preventable’’ complications, it is imperative that additional techniques to control SSIs and minimize these costs be discovered [(5)].

Traditionally, perioperative prophylaxis for SSIs during spine surgery has included intravenous antibiotic coverage of Gram-positive organisms, such as a 1st generation cephalosporin or clindamycin, given within 1 hour prior to surgical incision and discontinued within 24 hours following the end of surgery [(6, 7)]. Cephalosporins have been preferentially

used because of high activity against Gram positive organisms, particularly Staphylococcus aureus, which is the most common cause of SSIs. S. aureus has been identified as the causative organism in 30% of all SSIs reported to the National Healthcare Safety Network between 2006 and 2008, including approximately 50% of all orthopaedic and neurosurgical procedures [8]. However, rising resistance to common antibiotic medications has led to ineffective prophylaxis against more than half of all SSI causing organisms; methicillin-resistant S. aureus SSIs have seen a significant increase in frequency and are notoriously difficult to treat [9, 10].

Because of these concerns, various studies have reported placement of lyophilized vancomycin powder directly into the surgical wound during closure as a form of perioperative antibiotic prophylaxis [11]. In doing so, the direct inoculation of the site with high concentrations of the antibiotic will hypothetically overwhelm any residual bacterial load, even those with moderate resistance, and will ultimately decrease the rate of SSIs. Intrasite application of the drug should also theoretically minimize rapid absorption into the systemic circulation, thereby reducing vancomycin-associated side effects [12].

It is also hypothesized that the precipitous concentration gradient between the local wound and the supporting circulation should also curtail the generation of drug resistance [13].

Vancomycin is a glycopeptide antibiotic (branched tricyclic glycosylated nonribosomal peptide, C66H75Cl2N9O24) produced by the Actinobacteria species Amycolatopsis orientalis and was first isolated in 1953 by Edmund Kornfeld from a soil sample collected in Borneo. Vancomycin was derived from the term ‘‘vanquish,’’ and the original indication was for the treatment of penicillin-resistant S. aureus [(14)].

The bactericidal mechanism of action of vancomycin is inhibition of cell wall biosynthesis in Gram-positive bacteria and occurs through various methods: inhibits RNA synthesis and formation of long polymers for the bacterial cell wall, for any long polymers that do form, prevents them from cross-linking with each other, and alters bacterial cell membrane permeability [(15)].

Vancomycin is not active against Gram-negative bacteria (except some non-gonococcal species of Neisseria) because they produce their outer membrane and cell walls by a different mechanism. The US Food and Drug Administration (FDA) in 1958 first approved the use of IV vancomycin (initial trade name Vancocin; Eli Lilly, Indianapolis, IN, USA) for the treatment of penicillin-resistant Staphylococci infections and is now widely available in generic versions [(16)].

The current topic regarding the use of vancomycin as an intrasite adjunct within a surgical wound uses the IV preparation, which is produced as a white-to-tan lyophilized powder. The

unreconstituted lyophilized powder is available in single-dose vials produced by various generic manufacturers and typically contains equivalents of 500 mg, 750 mg, or 1 g. Most importantly, the intrasite administration of vancomycin powder has not been approved by the US FDA and requires investigational new drug approval before initiating a prospective study evaluating this treatment [17].

AIM OF THE WORK

A systematic review discussing the effect of Local vancomycin in prevention of surgical site in spinal surgeries.

Chapter (1)

SURGICAL SITE INFECTIONS

What are surgical site infections?

Surgical site infections "SSIs" were defined as infections occurring up to 30 days after surgery (or up to one year after surgery in patients receiving implants) and affecting either the incision or deep tissue at the operation site [(18)].

SSIs can also be defined as infections which occur after surgery in the part of the body where the surgery took place. These can sometimes be superficial infections involving the skin only. Other SSIs are more serious and can involve tissues under the skin, organs or implanted material [(19)].

SSIs are considered the most frequently reported health acquired infection and common surgical complication in both developed as well as developing countries [(20)].

Classification and clinical features of surgical site infections:

SSIs following spine surgery comprise superficial and deep infections. Superficial spine infections are localized to the skin and subcutaneous tissue. On the other hand, deep infections disseminate under the fascia and encompass discitis, epidural abscess and spondylitis; this type of infections is