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Antibiotic Prophylaxis for Preventing Wound Infection in Burn Patients: is there any Consensus?

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Abbreviations: RCTs: Randomised Controlled Trials; UTI: Urinary Tract Infection; SDD: Selective Digestive Tract Decontamination.

Introduction

Patients with serious thermal injury require immediate specialized care in order to minimize morbidity and mortality. Significant thermal injuries induce a state of immunosuppression that predisposes burn patients to infectious complications. Early excision of the eschar has substantially decreased the incidence of invasive burn wound infection and secondary sepsis, but most deaths in severely burn-injured patients are still due to burn wound sepsis or complications due to inhalation injury [1]. Burn patients are also at risk for developing sepsis secondary to pneumonia, catheter-related infections, and suppurative thrombophlebitis.

Sepsis and the accompanying invasive infection continue to be the primary reason for patient death after the first 24 hours. Over the last 10 years, the most frequent clinical complications reported in patients admitted to a certified burn center were pneumonia (3.5%), cellulitis (3%), and urinary tract infection (2.6%). The frequency of pneumonia was greater in patients who had been injured by fire and those with four or more days of mechanical ventilation [2]. Every year, approximately half a million Americans sustain burn injuries requiring medical intervention. Most of these do not require admission to a hospital. However, around 40,000 of these people are admitted, with 75% of them needing specialized treatment at a certified burn center. About 3.400 patients die each year from burn-related complications in the United States [3].

Although the leading infective bacterium in burn wounds is Staphylococcus aureus, a recent study showed that the leading causes of death from infection now are multiply. Resistant organisms, including MRSA, VRE, Pseudomonas, Acinetobacter, non-albicans Candida species and Aspergillus [4-6]. Infection of burn wounds can delay healing, increase scarring and invasive infection may result in the death of the patient. Antibiotic prophylaxis is one of the several interventions that may prevent burn wound infection and protect the burned patient from invasive infections. A Cochrane review of 36 randomised controlled trials (RCTs) evaluated the efficacy and safety of antibiotic prophylaxis in burn patients.

The review included 36 RCTs (2117 participants), twenty six (72%) evaluated topical antibiotics, seven evaluated systemic antibiotics (four of these administered the antibiotic perioperatively and three administered upon hospital admission or during routine treatment), two evaluated prophylaxis with non-absorbable antibiotics, and one evaluated local antibiotics administered via the airway. The 11 trials (645 participants) that evaluated

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topical prophylaxis with silver sulfadiazine were pooled in a meta analysis [7].

Topical Antibiotic Prophylaxis

There was a statistically significant increase in burn wound infection associated with silver sulfadiazine compared with dressings/skin substitute (OR = 1.87; 95% CI: 1.09 to 3.19, I(2) = 0%). These trials were at high, or unclear, risk of bias. Silver sulfadiazine was also associated with significantly longer length of hospital stay compared with dressings/skin substitute (MD = 2.11 days; 95% CI: 1.93 to 2.28).

Systemic Antibiotic Prophylaxis in Non-Surgical Patients

This was evaluated in three trials (119 participants) and there was no evidence of an effect on rates of burn wound infection. There is no evidence that general systemic antibiotic prophylaxis compared with placebo or no active treatment has an influence on any of the primary outcome variables assessed (burn wound infection, sepsis, bacteraemia, Urinary Tract Infection (UTI) or death associated with infection). Systemic antibiotics (trimethoprim-sulfamethoxazole) were associated with a significant reduction in pneumonia compared with placebo (only one trial, 40 participants) (RR = 0.18; 95% CI: 0.05 to 0.72) but not sepsis (two trials 59 participants) (RR = 0.43; 95% CI: 0.12 to 1.61).

Perioperative Systemic Antibiotic Prophylaxis

There is no evidence that perioperative systemic antibiotic prophylaxis compared with placebo or another antibiotic influences any of the outcome variables of this review (primary or secondary).

Selective Decontamination of the Digestive Tract

There is no evidence that selective digestive tract decontamination (SDD) influences the frequency of burn wound infection, sepsis, or bacteraemia. Evidence indicates, however, that people in the SDD group developed more adverse events (diarrhoea) compared with those receiving placebo. Selective decontamination of the digestive tract with non-absorbable antibiotics had no significant effect on rates of all types of infection (2 trials, 140 participants). Moreover, there was a statistically significant increase in rates of MRSA associated with use of non-absorbable antibiotics plus cefotaxime compared with placebo (RR = 2.22; 95% CI: 1.21 to 4.07).

Local Antibiotic Prophylaxis (Administered by Airway)

There is no evidence that gentamicin administered by airway influences on the frequency of sepsis or total mortality when compared to placebo (only one trial, 30 participants). The results given in this Cochrane review are still limited; few data could be pooled in most comparisons. Outcome measures and follow-up times were heterogeneous, or not even defined, which made it difficult to interpret the results of the review and to determine their applicability. These results, however, will undoubtedly evolve with the establishment of new strategies and the standardization of care for burn wounds. As a result of these factors, it was not possible to identify or generate definitive evidence on the effects of antibiotic prophylaxis in people with burn wounds.[7]Advances in antimicrobial therapies and the release of new classes of antibiotics have certainly added to the armamentarium of resources for the clinician. Nevertheless, strict infection control measures, constant wound surveillance with regular sampling of tissues for quantitative culture, and early excision and wound closure remain the principal adjuncts to control invasive infection in burn patients [6].

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