Drug Corner

A Real-World Evidence Study on Effectiveness and Tolerability of Topical Lincomycin in the Treatment of Surgical Site Infection (SSI) and Skin & Soft Tissue Infection (SSTI)

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Aim : The study evaluated the effectiveness and tolerability of topical lincomycin gel 2% in the treatment of Surgical Site Infection (SSI) and Skin & Soft Tissue Infection (SSTI)

Methodology : Patients above 18 years of age undergoing surgery with clinical diagnoses of impetigo, folliculitis, or SSTI were included in the study. Patients received topical lincomycin gel (2%) every 12 hours until the end of treatment. Primary endpoints were to assess signs and symptoms associated with SSI and SSTI, including reduction in severity, signs of infection at the surgical site, wound healing and post-operative pain. Secondary outcomes measured included incidence of adverse events such as allergic contact dermatitis, antibiotic resistance and anaphylaxis.

Result : The study included 165 patients, with 69 females and 96 males, having a mean age of 41 years. The findings of the study demonstrated significant reductions in the mean scores for all outcomes, indicating the efficacy of topical lincomyc in treatment in reducing the severity, signs of infection at surgical sites, wound healing, post-operative pain, erythema, purulence, crusting, oedema, redness, swelling, warmth, and pain.

Conclusion : Topical gel formulation (2%) of lincomycin was found to be effective in the treatment of both SSI and SSTI, with better tolerability.

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***Key words* : Surgical Site Infection, Skin & Soft Tissue Infection, Topical Lincomycin, Surgery, Emergency Department**

Surgical Site Infection (SSI) is one of the most common hospitals acquired infections and according to recent studies its incidence is estimated to be 2-11% for all surgical interventions. SSIs are associated with increased treatment costs; prolonged hospital stay and increased mortality. SSI leads to scar formation that can reduce the quality of life in patients, commonly in young women. SSIs can be divided in three categories : Superficial which develop within 30 days since surgery and involve skin and subcutaneous tissue; deep which develop after 30 days or within one year if a foreign body was implanted and involve fascia and muscles and organ or body cavity infection near the surgical site which develop within 30 days or one year if a foreign body was implanted[1].

SSIs account for around 20% of all Healthcare-Associated Infections (HAIs) and at least 5% of patients following a surgical treatment acquire a surgical site infection. The frequency of SSIs in patients following inpatient surgery is 2-5%; however, the number of SSIs is likely to be under estimated because around 50% of SSIs become apparent after discharge. Most common micro-organisms are responsible for surgical site infections are S aureus, coagulase negative staphylococci, Enterococcus species and *E coli*. Current pharmacological therapies include drugs like Vancomycin, Daptomycin, Fosfomycin, Linezolid, etc. The prevention of SSIs is becoming increasingly crucial as the number of surgical procedures increases[2].

SSTIs encompass a wide clinical spectrum of common infectious diseases that often require acute treatment and inpatient hospital admission. SSTI affects the epidermis, dermis, superficial fascia, subcutaneous tissues and muscle in an increasing order of severity. Complicated SSTIs (cSSTIs) are the most severe, involving deeper soft tissues and include infective cellulitis, ulcer or wound site infections, surgical site infections, major abscesses, infected burns, skin ulcers and diabetic foot ulcers. The US FDA in 2013 grouped all SSTIs under a unified term, Acute Bacterial Skin and Skin Structure Infection (ABSSSI), which includes cellulitis/erysipelas, wound infection and major cutaneous abscesses. It is defined as a bacterial infection of the skin with a lesion size

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area of at least 75 cm^2 (lesion size measured by the area of redness, oedema, or induration)[3].

Staphylococcus aureus, an aerobic Gram-positive coccus, is the most dominant causative pathogen and has prime epidemiological significance in cSSTI. Pseudomonas aeruginosa, Escherichia coli, and Enterococcus spp have also been identified as causes of cSSTI; however, these are not the pre-dominant causative pathogens[4].The usual oral antimicrobial choices for treatment of SSTI include either penicillin, cephalosporins, clindamycin, trimethoprim-sulfamethoxazole, doxycycline, or linezolid. The parenteral treatments include vancomycin, daptomycin, telavancin[3].

Lincomycin, a naturally sourced lincosamide antibiotic obtained from the actinomycete species, Streptomyces lincolnensis, is used to treat penicillin-allergic patients and drug-resistant bacterial infections of multiple[5]. Significant concentrations of antibiotic are attained in most tissues including bone and, though lincomycin hardly penetrates the normal blood brain barrier, there is some evidence that in the presence of meningeal infection, therapeutic levels can be achieved in CSF. Clinically, lincomycin has been shown to be effective in several bacterial infections including staphylococcal osteitis, septicaemia, respiratory infections, and infective. While some of these reports have included cases of penicillinresistant infections, experience in conditions specifically due to penicillinase-producing strains of Staphylococcus pyogenes is limited, as are reports of the use of lincomycin in young children[6]. Although approved for use in medicine, lincomycin is rarely used nowadays. Lincomycin has an in-vitro activity like that of erythromycin. It has the additional advantage that, unlike erythromycin, bacterial resistance to it develops slowly[7].

The aim of the current study was to assess the effectiveness and tolerability of topical lincomycin gel 2% for the treatment of SSI & SSTI.

Materials and Methods

Setting and Participants :

Patients above 18 years of age who were undergoing surgery and with the clinical diagnosis of impetigo, folliculitis, or minor soft tissue infection including secondarily infected eczema presumed to be caused by Staphylococcus aureus were included in the study. Pregnant and breast-feeding patients were excluded along with patients who were unable to understand the protocol. All patients were administered topical lincomycin gel 2% (manufactured by Wallace Pharmaceuticals), every 12 hours interval till the end of treatment.

Outcomes and Follow-up :

Primary endpoints included evaluation of signs and symptoms associated with SSI: reduction in severity, signs of infection at surgical site, wound healing, post-operative pain and with SSTI: erythema, purulence, crusting, oedema, redness, swelling, warmth and pain after application of Lincomycin topical gel 2%. They were assessed at the time of suture removal or 6 to 8 days after treatment. Incision and drainage after the end of planned course was also included as a primary endpoint. Secondary outcome measures included incidence of adverse events such as allergic contact dermatitis, antibiotic resistance and anaphylaxis (assessed during the antibacterial treatment), wound size at baseline & follow up and length of hospital stay.

Statistical Analysis :

A sample size of 165 was included in the study. The data was presented in mean and percentage form using descriptive statistics. To test for significance, the paired t-test and the Wilcoxon Sign Ranked Test were performed.

Results

The present study comprised of 165 patients, out of which 58.18% were males and 41.82% were females. Most of the patients (32.58%) received topical lincomycin2%for 4 days (Fig 1).

Effectiveness in Surgical Site Infections (SSI) :

The data showed that there was a complete reduction in mean scores of severities of surgical sites infection from 2.24. ($P<0.05$). Reduction in signs of infection at the surgical sites was also observed (2.11 to 0.04, $P<0.05$). Other parameters like wound healing and post-operative pain also decreased from 3.00and 2.15 to 0.38 and 0.04, respectively ($P<0.05$)(Fig 2).

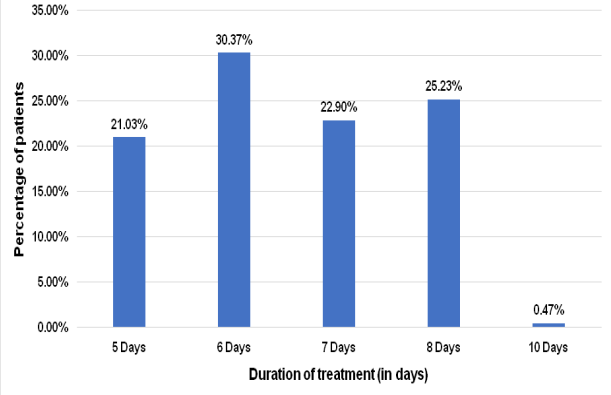

Fig 1 — Duration of treatment

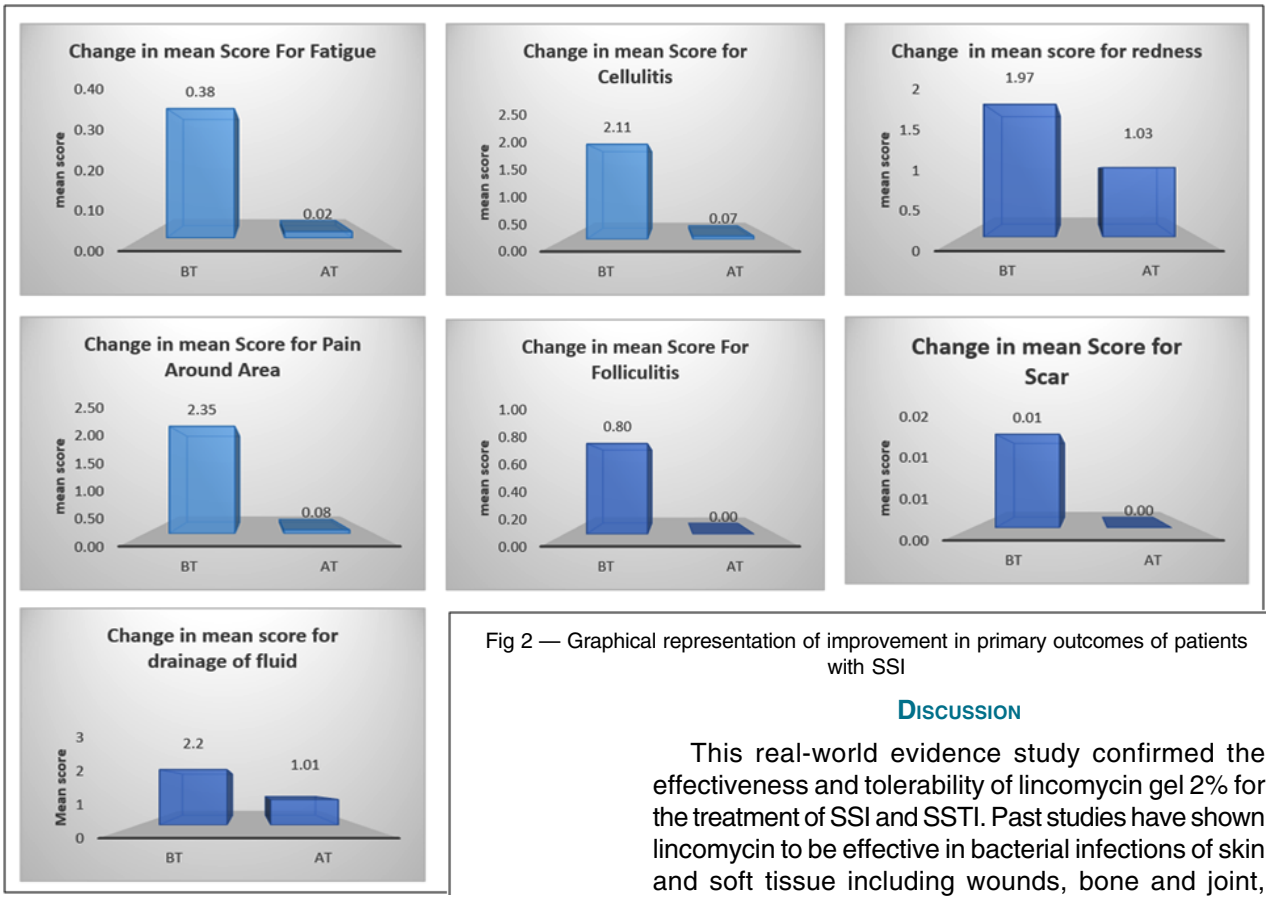

Fig 2 — Graphical representation of improvement in primary outcomes of patients with SSI

Effectiveness in Skin and Soft Tissue Infections (SSTI) :

Topical treatment with lincomycin reduced the mean symptom scores of erythema, purulence and crusting from 2.51, 2.95 and 2.95 to 0.09, 0.13and 0.09, respectively (P<0.05). Edema, redness, swelling and warmth at infection sites also showed reduction in mean scores from 1.98, 2.27, 2.04and 2.00to 0.05,0.82,0.07 and 0.14, respectively (P<0.05). Complete reduction in mean score of incision and drainage was also observed at the end of treatment. (P<0.05).

Thus, there was asignificant reduction in the mean scores of all outcomes such as severity, signs of infection at surgical site, wound healing, post-operative pain, erythema, purulence, crusting, oedema, redness, swelling, warmth and pain, indicating topical lincomycin's effectiveness (Fig 3).

Tolerability :

Topical Lincomycin treatment was well tolerated by the patients. Patients did not report any adverse reactions like allergic contact dermatitis and anaphylactic reactions. No other major adverse reactions were reported.

Discussion

This real-world evidence study confirmed the effectiveness and tolerability of lincomycin gel 2% for the treatment of SSI and SSTI. Past studies have shown lincomycin to be effective in bacterial infections of skin and soft tissue including wounds, bone and joint, respiratory system, dental infections and against penicillinase producing and erythromycin resistant strains.It acts by inhibiting protein synthesis in susceptible bacteria by binding to the 50 S subunits of bacterial ribosomes and preventing formation of the peptide bond during transcription[8].

Topically applied lincomycin has strong tissue penetration and exhibits potent activity against P. acnes with a Minimum Inhibitory Concentration (MIC) ranging from <0.1 to 1.6 mcg/ml. Its mechanism of action involves eliminating the production of free fatty acids and other local irritating enzymes produced by P acnes bacteria. Additionally, lincomycin may possess immunomodulating properties, which contribute to reducing inflammation[9].

Topical lincomycin is indicated in bacterial skin infections as a 2% gel formulation. This is the first real world evidence study for lincomycin gel in the treatment of SSI and SSTI. In the past, a multicentric, randomized, double-blind, placebo-controlled clinical trial was conducted in 200 patients with grade II and grade III acne vulgaris[9]. The patients were treated with either lincomycin hydrochloride 2% gel or a placebo for 4 weeks. Good to excellent response was seen in 70% of the patients compared to 23% in placebo group.

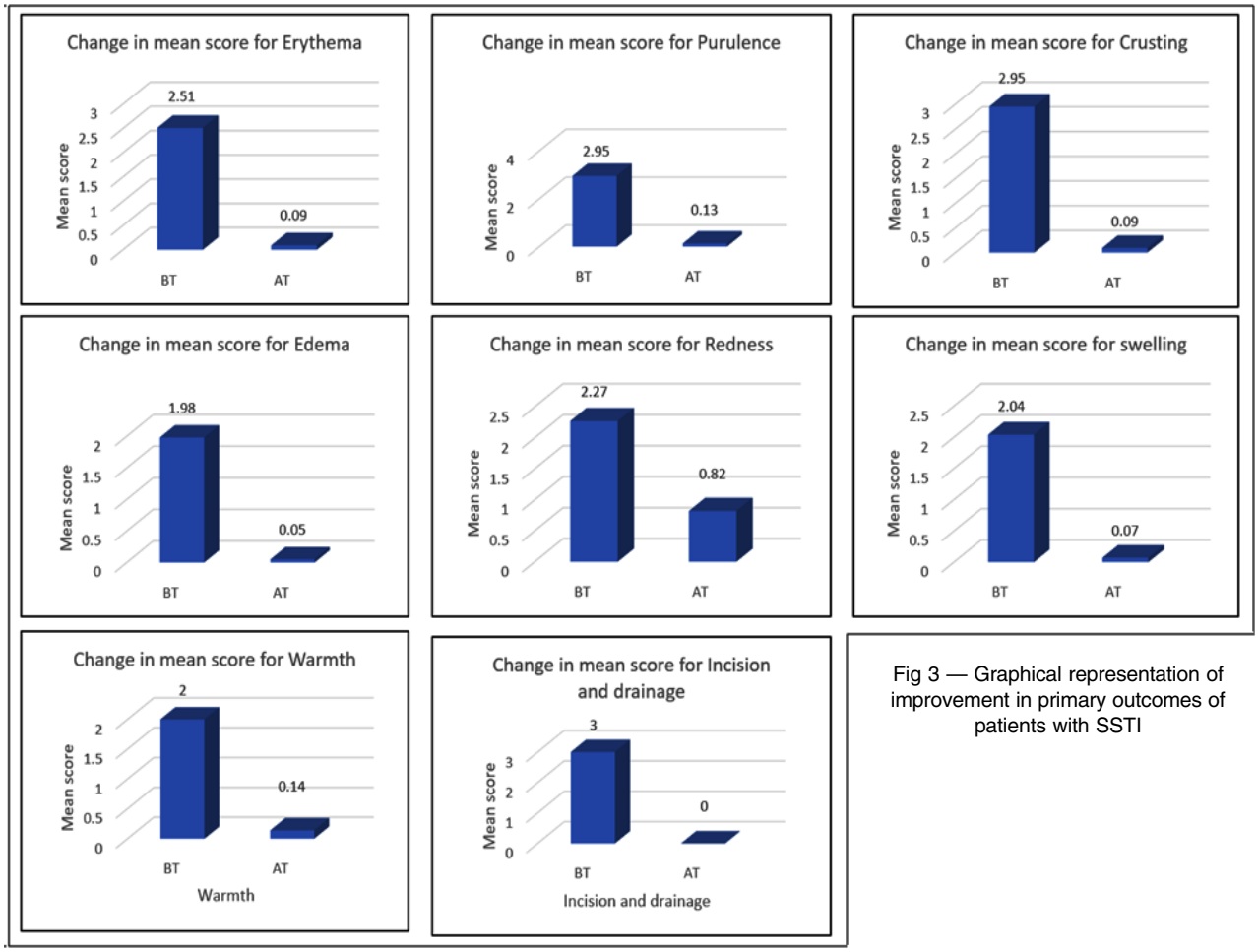

Fig 3 — Graphical representation of improvement in primary outcomes of patients with SSTI

Conclusion

The substantial decrease in the mean scores of erythema, purulence, crusting, edema, redness, swelling, warmth and pain shows the notable efficacy of topical lincomycin. This real-world study establishes that the application of a 2% lincomycin gel formulation is highly effective in management of both SSI and SSTI, while also demonstrated enhanced tolerability.

Declaration : Article is not published / submitted in any other journal.

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Conflict of Interest : No

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