

Use of Co Mupimet as a Local Therapeutic Agent for Extensive Infected Lacerated Wound: A Case Report of few Cases and Extensive Review of Management

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ABSTRACT

Massive lacerated wounds in the facial and scalp region is more common in patients reporting to the emergency department after a road traffic accident, assault, blast injury and animal attack injuries. These wounds have a greater chance of getting infected even after thorough debridement and closure. Wounds managed locally using potato, banana peels, honey have been reported in literature. This article is a review of 4 cases for the management of such injuries to maxillofacial region that required careful wound management skills and treatment of these cases to prevent infection and also in managing those cases that developed infection. This article deals with the usage of COMUPIMET powder in the management of the wounds secondarily infected with nosocomial infections. All these cases managed with COMUPIMET powder resulted in effective healing of wound, control of infection and formation of healthy granulation tissue. In all cases, clinical judgment and close follow-up is recommended to reduce further complications.

KEYWORDS: COMUPIMET powder, Mupirocin, Nosocomial infection, Bite wounds

INTRODUCTION

Injuries inflicted by animals and Road traffic accidents usually result in puncture, laceration, and avulsion and crush wounds. Bite wounds inflicted to the head and neck region by large animals can present in a more serious fashion.¹

Management of such cases is difficult to manage due to the extensive nature of the injury.

Moreover risk of infection in such cases increases manifold. Many locally therapeutic agents have been tried in such cases to enhance the healing ability.

Following should be the ideal property for a local therapeutic agent:

- They should be least toxic to the tissue.
- They should have a strong bactericidal property
- They Should have a prolonged action
- Medication should be easy to apply to the injury site.
- They should enhance the formation of healthy granulation tissue.
- There entry into the main circulation should be minimal.

COMUPIMET powder particle is basically a composition of Mupirocin 2%, Metronidazole 1 % and Collagen particles.

Mupirocin 2% has been proven to be active against the topically active MRSA organisms and used in dermatology for infections.

The presence of metronidazole in the powder particles helps in fighting against the anaerobes. The collagen particles present in the powder helps in wound healing with the properties of collagen and fibroblast formation.

CASE REPORT

CASE 1

A 60 -year-old man was brought to emergency department with severe facial injury following attack by a wild bear, near his farm in the forest area. Patient was conscious, cooperative, and well oriented to time, place and person. Patient provided the history of the bear attack on his face and scalp region. The patient was attacked by the wild bear the previous day evening and had reported for management only the next day afternoon. One could visualize insects flying, in and out of the wound as the patient reported for management. His Vitals recorded were within normal limits. Patient had severe degloving injury to Right and left temporal side of the Scalp region including contused lacerated wound over the left lateral aspect of the eye region. Patient had a fracture over the left side zygoma, F-Z region, and Infra orbital region.

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Vision in both eyes was intact. Prophylactic antibiotics (Inj Cefotaxim and Inj Metronidazole) was started and planned for primary closure under general anesthesia. Wound was irrigated thoroughly with normal saline and betadine solution with minimal debridement of the exposed tissue. Bleeding was induced over the lacerated wound margins. Fractured Zygomatic complex bone over left side was treated by open reduction and internal fixation using titanium plating system. Primary suturing of the wound was done in layers. Polyglactin (Vicryl) for deeper layers and Nylon (Ethilon) for superficial scalp area. Patient was started with injection of Rabipur 0.5mL (D0, D3, D7, D14, and D28). Intra lesional anti rabies injections were not given as the wound was not of animal bite but more of hit by animal.

The patient had an associated fracture of the 2nd and 3rd metacarpal bones of his hand and was operated under orthopaedics on the same day.

Regular Dressing was done daily over the sutured wounds after cleaning with povidone iodine solution. Pus discharge was evident from the sutured wound on Postoperative day 5 over the forehead region (Fig. 1) and wound gaping had started already.



Figure 1

Pus culture and antibiotic sensitivity was done for the patient. Pus culture of the wound revealed Gram negative organisms such as E.coli and Proteus which might be hospital acquired. The organisms were managed effectively using Gentamycin Intravenous injections. Sutures were removed and wound debridement was done.

Infected wound was debrided first using saline and hydrogen peroxide, then cleansed using povidone - iodine solution and finally washed with copious amount of normal saline solution. COMUPIMET powder which contains Mupirocin (Anti biotic), collagen and metronidazole was finally used to fill the wound Margins (Fig. 2). (Sutures were removed and kept open after debridement)

Finally Turban dressing was done over the comupimet powdered wound in the scalp. COMUPIMET powder was applied on a daily basis, along with the regular pattern of dressings as described earlier. Soakage of the wound and pus discharge reduced considerably over time. There were 2 sites of tissue loss over the forehead which

could not get approximated without tension. So, COMUPIMET powder application was continued with turban dressing. Over a period of 1 month, the wound bed started granulating with healthy granulation tissue (Fig.3).



Figure 2



Figure 3

CASE 2

A 10 year old girl was brought to the emergency department with the history of road traffic accident. On examination there was a bilateral mandible body fracture. Patient was operated for the fracture by open reduction and internal fixation using miniplates. Wound gaping occurred on the floor of the mouth after a week period of operation (Fig. 4). Patient was treated using comupimet



Figure 4

powder packing in the wound region and routine change of dressings (Fig. 5).

Wound healed satisfactorily over a period of around 45 days. The wound healing was satisfactory and uneventful (Fig. 6).



Figure 5

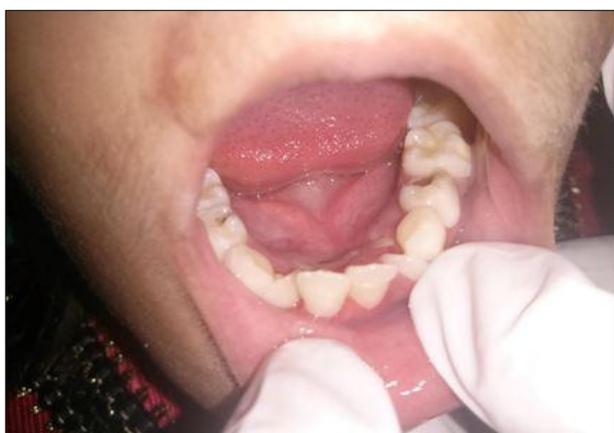


Figure 6

COMUNIPET was used in few other cases as well. In one case, a 45-year-old man was brought to the emergency department with the history of bear attack. On examination there were severe lacerations over the scalp. Soft tissue closure of the wound was done. The patient also had associated orthopedic fractures over the hand and got operated for the same by getting admitted in orthopedic ward. Later, the wounds got infected and revealed gram negative bacteria in the culture. The wound was re-explored and managed as stated earlier using COMUPIMET powder. Healing was found to be satisfactory and uneventful. Antibiotic prophylaxis was administered according to the organisms found in the pus culture. Follow up was done for the period of 1 year and no signs of infection were observed.

In another case, a 25 year old man was brought to the emergency department with the history of road traffic accident. On examination there was a through and through wound communicating with the mandible exposing the region from angle to the body of the mandible in the left side. The CLW was extending from angle of mandible to lower lip in a degloving fashion. The patient had an associated oblique fracture of the body

of the mandible which was treated by open reduction and internal fixation followed by routine wound closure. After being infected, the wound was re-explored and managed by similar methods stated earlier using COMUPIMET powder particles and appropriate antibiotic prophylaxis.

DISCUSSION

In the management of RTA, Animal attack injuries, irrigation is essential in preventing infection as it removes debris and microorganisms.² Due to possibility of tissue disruption and edema, sustained high pressure irrigation has to be avoided in eyelids and cheeks of children that contain loose areolar connective tissue.³ Visible dirt has to be sponged away using saline followed by rigorously washing the wound with high pressure saline irrigation.⁴ Facial wound debridement must be kept to a minimum. Puncture wounds have deep inoculation of pathogens and high infection rate.⁵ Crush injuries with tissue ischemia have infection with lower bacterial counts.²

Surgical wounds can be classified as follows: Clean, Clean contaminated (a wound involving normal but colonized tissue), contaminated (a wound containing foreign or infected material). During the first 2 days, wounds are most susceptible to infection. In general, do not suture non-facial bite wounds longer than 6–12 hours. Wounds older than 6-12 hours increases the infection rate. Another approach is to avoid suturing, perform debridement and then approximate wound edges using adhesive tapes.⁴

One of the patients with bear maul injury, who reported after a day of the injury to emergency care, got primary suturing done after thorough debridement. Delayed closure was not performed in this case because; the entire scalp was exposed with avulsive tissue. Even after meticulous wound management, it got infected and pus discharge was evident. The presence of infection normally precludes suturing of the wound.⁶

Under antibiotic coverage, linear lacerations can be safely repaired even after several days of injury. But, severely crushed wounds become edematous within hours and are at increased risk for infection hence delayed primary closure is indicated to avoid dehiscence because of approximation under tension.⁷ High-pressure saline irrigation has a crucial role in the conversion of the contaminated (or even dirty) wound into a clean-contaminated environment, suitable for subsequent primary closure. Use of normal saline is emphasised on the mechanical effect rather than any antibacterial activity.⁸

Many randomized controlled trials have been carried out comparing honey with various other wound treatments. The effectiveness of honey in assisting wound healing has also been demonstrated in 16 trials on a total of 533 wounds on experimental animals. There is also a large amount of evidence in the form of case studies that have been reported. Ten publications have reported on multiple

cases, totaling 276 cases. There are also 35 reports of single cases. These various reports provide a large body of evidence to support honey having the beneficial actions of clearing and preventing wound infection, rapidly debriding wounds, suppressing inflammation and thus decreasing edema, wound exudates and hypertrophic scarring, and stimulating the growth of granulation tissue and epithelialisation. It has been shown to give good results on a very wide range of types of wound.

Hydrogen peroxide is used due of its effervescent and presumed antimicrobial effects. The effervescent action is the result of oxygen bubbles created by the breakdown of hydrogen peroxide to water and oxygen by tissue catalase. This “bubbling” action may enhance mechanical cleansing. Methicillin-resistant *S. Aureus* are shown to be susceptible to 3% hydrogen peroxide in vitro. But, usage of hydrogen peroxide has decreased due to its deleterious effects on wound healing such as formation of bullae under new epithelium, inhibition of keratocyte migration and proliferation, impaired fibroblast activity and decreased wound tensile strength.⁸ 1% povidone-iodine solution has been recommended for wound irrigation as this solution provides an optimal therapeutic balance between bactericidal capacity and tissue toxicity associated with iodine-containing formulations.⁹ Studies show that the early application of povidone-iodine solution after a rabid animal bite can decrease the risk of rabies infection.¹⁰⁻¹¹ All the patients were managed primarily using copious amounts of saline for initial wound debridement followed by hydrogen peroxide and finally povidone iodine solution, still these cases ended up in developing infection after the initial 3 days of operation.

According to World Health Organization (2005) globally each year about 55,000 (24,000–90,000) die of rabies of which 20,000 (36% or 2 out of 5–6 deaths) are from India alone. The vaccine should be injected in the bite wounds and the rest given intramuscularly. Active vaccine is administered intramuscularly on days 0, 3, 7, 14 and 28 after exposure.¹² In our case report, patient was given rabies prophylaxis according to the literature. Nosocomial infections (NI) develop in a patient during his/her stay in a hospital or other type of clinical facilities which were not present at the time of admission.¹³ The most frequently reported nosocomial pathogens have been *E. coli*, *S. aureus*, enterococci and *P. Aeruginosa*.¹⁴ Even the organisms isolated in our cases by pus culture were *E.coli* and gram negative variety.

If the infection is not responding to the antibiotics being administered, the organisms involved in producing such an infection must be identified. Using pus culture is one ideal method to find out the causative organism and target the antibiotics towards the specific organism. In our study, source of infection was most commonly *E.coli* and *Proteus* (gram negative and nosocomial). These organisms were sensitive to gentamycin. After the change of antibiotics and routine meticulous local wound management with comupimet powder, the infection subsided and wound healing was satisfactory.

Resistance to penicillin appeared soon after they were introduced into clinical practice in the 1940s respectively. Methicillin-resistant *Staphylococcus* spp. (MRSA) was reported within a year after the introduction of methicillin in 1959-1960.¹⁵ Mupirocin has proved effective against topical MRSA infections and is one of the components of comupimet powder used for treatment locally in our study. Surgical tape is used to reinforce sutured lacerations at the time of closure and after suture removal. Surgical tape minimizes skin tension.¹⁵

Winter’s landmark article established that the formation of a dry scab on the superficial surface of a wound impairs epithelization and he determined that a moist environment without scab formation enhances wound healing.¹⁶ Even in our cases, an occlusive dressing such as turban dressing was done after thorough cleansing of wound with saline, hydrogen peroxide, povidone iodine and application of comupimet powder. Various wound dressing materials such as potato peel, banana leaf, honey are being used with varied success in the treatment of wound management and burns.

Co mupimet contains Co-Mupimet Mupirocin 2 % w/w and Metronidazole 1 % w/w. Mupirocin (Bactroban or Centany) is an antibiotic originally isolated from *Pseudomonas fluorescens* NCIMB 10586, developed by Beecham. Mupirocin is bacteriostatic at low concentrations and bactericidal at high concentrations. It is used topically and is effective against Gram-positive bacteria, including MRSA. Mupirocin is a mixture of several pseudomonic acids, with pseudomonic acid A (PA-A) constituting greater than 90% of the mixture. Also present in mupirocin are pseudomonic acid B with an additional hydroxyl group at C8, pseudomonic acid C with a double bond between C10 and C11, instead of the epoxide of PA-A, and pseudomonic acid D with a double bond at C4` and C5` in the 9-hydroxy-nonanoic acid portion of mupirocin.

CONCLUSION

The usage of COMUPIMET powder particles in infected wounds in these cases proved to be efficient and lead to uneventful wound healing. The infected wounds after proper wound care by irrigation and debridement of debris, systemically applied culture specific antibiotics and the application of comupimet powder particles helped to control infection and aided in wound healing.

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