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# Use of quarternary ammonium compound in wound dressing – A case report

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## Abstract
Bacterial infection hinders wound healing. Important mechanism of which is growth in the dressing material itself. Wound dressings are of various types and they act by an individual mechanism, but none of which prevent growth of the organism in the wound dressing itself. In this case report, we would like to describe a dressing that can prevent microbial contamination of the wound, biofilm formation and contamination of the dressing itself.

**Keywords:** Wound, Dressings, DADMAC.

## Introduction
As described by the Father of Modern Plastic Surgery, Sir Harold Gillies, infection is the enemy of Plastic Surgeon, as it hinders with wound bed preparation and thereby delaying definitive cover of wound. This increases the morbidity of the patient and increases hospital stay. In an attempt to control the wound infection, systemic antibiotics are used, which have side effects. Hence an ideal antimicrobial agent is required. In this article, we would like to report an antimicrobial delivering dressing which contains Polydiallyldimethylammonium chloride, shortened poly DADMAC, which serves both as an absorbent and antimicrobial agent

## Materials and Methods
This dressing was used in a 60 year old lady, a known case of Type 2 diabetes mellitus with an ulcer in the left foot, who was admitted to the Department of Plastic Surgery in JIPMER, Pondicherry. The wound dressing evaluated contained a high molecular weight (250 kDa) polymer with a high density of quaternary amines, p DADMAC (0.3%) bonded onto a polyurethane foam.

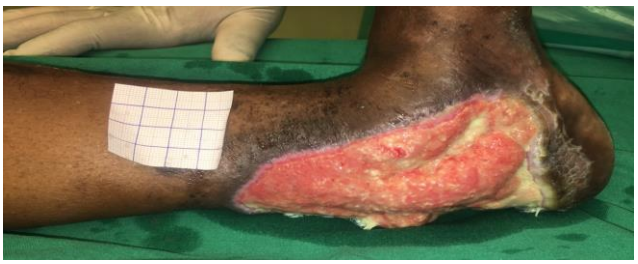

**Fig. 1:** Wound before application of DADMAC dressing

**Fig. 2:** Application of DADMAC dressing

**Fig. 3:** Wound after application of DADMAC and grafting

It was used as an adjunct to wound care modalities like Autologous Platelet Rich Plasma, Low Level Laser therapy and Negative pressure wound therapy.

Once the wound was debrided, and tissue for culture sensitivity taken, the foam dressing containing the quaternary ammonium compound was placed over the wound and dressing was done. Change of dressing was done, every 5 days, depending on the soakage. Once the wound was found to be culture negative, it was reconstructed either by grafting or by flap reconstruction.

In our patient, after 5 dressings wound culture became sterile and wound was managed with skin grafting.

## Discussion
Bacterial infection colonisation occurs in both acute and chronic wounds. *Staphylococcus aureus* and *Pseudomonas aeruginosa* are two of the most common bacterial pathogens

that are detected in infected wounds.[1-4] These infections hamper with wound healing. Hence a dressing material that inhibits bacterial growth in both the wound and the periwound area is required. Wound dressings can either leach antimicrobial compound into the wound or, are antimicrobial but do not leach into the wound; or can be a mixture of both. The use of polycompounds (quaternary ammonium) covalently attached to materials to form antimicrobial surfaces has been reported.[5-6] The first polymeric compound that was introduced was chitosan which was described in 1811 by Henry Braconnot.[7]

Quartenary ammonium compounds were linked with foam and used as dressing. Along with the ammonium, various elements like copper oxide and silver were also linked with the compound dressing.

The mechanism proposed for killing by quaternary ammonium compounds is the disruption of the plasma membrane of the bacteria.[8-9]

Phat el tran et al described that the peptidoglycan layer outside the plasma membrane of Gram-positive bacteria offers little or no resistance to the pDADMAC-PU compound, while it takes more time to penetrate the lipopolysaccharide outer membrane of Gram-negative bacteria. However overall killing of the bacteria were the same.[10]

It was inferred that the foam and polyamine compound prevented migration of the bacteria through the foam and hence preventing contamination of the wound periphery.

Moreover it was understood that it attaches to the bacteria and thereby aiding removal of the bacteria from the wound and aerosolization of the bacteria from the wound and thereby preventing the contamination of surrounding structures and to health care workers.

Hence the dressing, unlike others, acts by various mechanisms and thereby preventing bacterial colonization.

## Conclusion

Our case report describes the use of the DADMAC dressing and thereby resulting in no growth of bacteria in the wound, thereby helping in early wound reconstruction.

The disadvantages is that it is a single case report, single institute study. It requires a Multicentric randomized control study to validate the reports.

## Source of funding

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## Conflict of interest

None.

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