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The UKM StimuGold (UKMSG) Wound Bed Preparation Method: A unique technique in combining Superabsorbent Polymer Polyacrylate Sodium with Collagen–Glycerine amorphous base dressing: A case series

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ORIGINAL

Abstract

Introduction: A wound is a disruption of the normal structure and function of the skin and its architecture. An acute wound heals predictably, time frame, if any, with few complications but the result is a well-healed wound. A chronic wound is defined as one that is physiologically impaired due to the disruption of the wound healing cycle. Advanced dressings are designed to maintain a moist environment at the site of application, allowing the fluids to remain close to the wound and not spread to the unaffected, healthy skin areas. We developed a unique technique of dressing combining Superabsorbent Polyacrylate Sodium (Gold Dust®) with Collagen-Glycerine base amorphous gel (Stimulen®), A.K.A, UKMSG, in six patients with acute and chronic wounds of various aetiology; referred for recalcitrant, non-healing wound.

Case Presentation & Methods: Six patients with acute and chronic wounds of various aetiology were referred for recalcitrant, non-healing wounds. Patients' data were obtained from medical files and surgical databases. Depending on the size and condition of the wound, the average duration of treatment varies from 1 - 6 weeks. The dressing was done mainly by wound nurses. Dressings were changed from daily to once every three days, based on the type of wounds. It does not need a lot of experience for the application of UKMSG. A short briefing and demonstration on how to apply the dressing would suffice. We did not start adjuvant antibiotics for all our wounds. Antibiotics were only started for infected wounds and based on cultures & sensitivity. There were two females and four males. The youngest in the group was 2 years old and the oldest was 72 years old. We had two pressure ulcers, one gangrenous penis, one Surgical Site Infection wound breakdown post total hysterectomy, one lower abdominal wall necrotizing fasciitis, and a 23% infected burn wound. All patients' wounds were initially managed by respective primary teams (except the infected burn wound) with dressings and surgical debridement is done at least once but a healthy wound bed was still not achieved.

Results: The UKMSG is part of our Wound Care Team approach to wound management across a variety of wounds. Through the case series, we noted that UKMSG is ideal for the treatment of recalcitrant, non-healing, moderate to highly exudative wounds. It produces a good result in wound bed preparation. It is also easy to apply and removed, comfortable, has fewer peri-wound complications, and does not need an expensive secondary dressing. In the future, we aim to perform an RCT and comparison study to further evaluate the UKMSG method.

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Keywords : A chronic wound, recalcitrant wound, UKMSG method, Collagen-Glycerine base amorphous gel, Superabsorbent Polyacrylate Sodium, dressing, wound debridement.

Introduction

A wound is a disruption of the normal structure and function of the skin and its architecture (1). An acute wound heals predictably, time frame, if any, with few complications but the result is a well-healed wound. A chronic wound is defined as one that is physiologically impaired due to the disruption of the wound healing cycle (2). Wound dressings aim to provide an ideal environment for its healing. Advanced dressings are designed to maintain a moist environment at the site of application, allowing the fluids to remain close to the wound but not spread to the unaffected, healthy skin areas (3).

Advance dressing like a hydrogel is a three-dimensional, hydrophilic polymeric network capable of absorbing large amounts of water or biological fluids and it closely simulates natural living tissue materials (4). Superabsorbent polymer (SAP) like Polyacrylate Sodium is a special type of hydrogel that is ideal for treating recalcitrant, non-healing wounds as it is effective in removing excessive exudate-containing inflammatory mediators that ultimately hinder wound healing, not just that, it is also an excellent autolytic debridement agent. Collagen, on the other hand, has long been known to have a pivotal role in stimulating cell proliferation by acting as a chemo-attractant for fibroblasts, hence "jump-starting" the healing processes (5; 6).

Wound bed preparation (WBP) is the process of removing local barriers to wound healing to maximize the potential for successful healing. WBP can be done through debriding nonviable tissue, pathogens (biofilm), contaminants, foreign (or other) materials, and drain areas of infection. Chronic wounds may require serial surgical wound debridement (WD) to sufficiently prepare the wound bed (2). We present a case series of six patients with recalcitrant, non-healing wounds; referred to us, The Plastic, Reconstructive, Burns & Wound Care Team, Universiti Kebangsaan Malaysia Medical Centre (UKMMC). We developed a unique dressing technique, also known as UKM StimuGold (UKMSG), constituting the combination of 2 dressings, ie; Superabsorbent Polyacrylate Sodium (Gold Dust®) with Collagen-Glycerine base amorphous gel (Stimulen®) for wound management and wound bed preparation (WBP).

Case Series & Methods

UKMMC is a Quaternary Referral Centre and Level 1 Trauma Centre situated in Kuala Lumpur, Malaysia. Between July 2014 to October 2015, The Plastic, Reconstructive, Burns & Wound Care Team, UKMMC developed a unique technique of dressing constituting the combining of Superabsorbent Polyacrylate Sodium (Gold Dust®) with Collagen-Glycerine base amorphous gel (Stimulen®), in six patients with acute and chronic wounds of various aetiology being referred for recalcitrant, non-healing wounds. All wounds were initially managed by the respective primary team with dressings and surgical WD but a healthy wound bed was still not achieved. Patients' data were obtained from medical files and surgical databases. There were two females and four males. The youngest in the group was 2 years old and the oldest was 72 years old. We had two pressure ulcers, one gangrenous penis, one Surgical Site Infection wound breakdown post total hysterectomy, one lower abdominal wall necrotizing fasciitis, and a 23% infected burn wound. Informed consent was obtained after a thorough history, wound examination, and clinical indication for types of dressing before commencing the UKMSG technique.

The technique involved initial cleansing of the wound with either sterile water, normal saline, or superoxide solutions. A small amount of Stimulen® gel is then mixed with the Gold Dust® paste. Finally, apply the mixture to the wound bed cavity. The secondary dressing was with gauze and gamgee secured with Elastoplast bandages.

The Gold Dust® comes in sachets, crystalline form. To prepare the Gold Dust® paste, 30mls to 15mls of sterile water was added into a full pack (30g) or half pack (15g) of Gold Dust® crystal

respectively and stirred gently to form a paste. Regular wound bed assessment and monitoring were done on all patients via photo documentation noting its granulation tissue, evidence of infection, wound moisture, and wound edges. Several assessment criteria were also evaluated including pain, dour, pruritus, adverse reaction, comfort, and well-being of the patient. Dressing nurses were also interviewed.

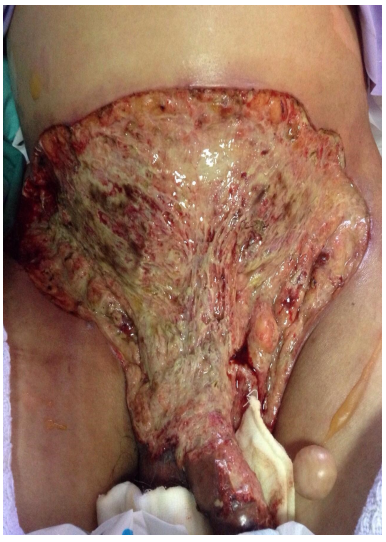
Case Management And Outcomes

Dressings were changed from daily to once every three days, based on the clinician's judgment and type of wounds. The average duration of treatment is about 1 to 6 weeks. The dressing is done mainly by wound nurses. However, it does not need a lot of experience for the application of UKMSG. A short briefing and demonstration on how to apply the dressing would suffice. We did not start adjuvant antibiotics for all our wounds. Antibiotics were started for infected wounds and based on cultures& sensitivity. In all patients, frequent dressing changes were needed initially but when exudates level decreased and the wound becomes healthier, dressings were changed once every three days. Inspecting the degree of saturation of dressing was easy by simply inspecting the secondary dressing. If it was wet, the dressing will be changed.

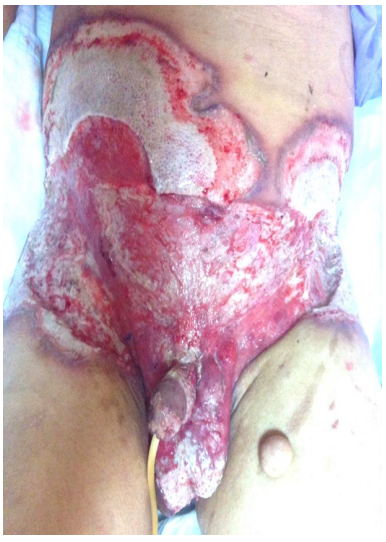
From the feedback of patients and wound nurses, UKMSG dressing is easy to apply and removed. It is generally comfortable and does not need expensive secondary dressings. There was no adverse reaction in all patients. It had fewer peri-wound complications like itchiness, irritations, and eczema due to its remarkable absorptive ability. It is also a good chemical debridement agent. However, some patients did complain of a slight tingling sensation upon initial application of UKMSG dressing and an unpleasant odour if the dressing was kept for too long. But all these quickly go away once the dressing was changed. Due to its transparency paste form, certain characteristics of bacterial infection like pseudomonas can be easily observed during wound inspection as the entire mixture of dressing would turn green. We found that UKMSG produced an ideal result in WBP, particularly in wounds with moderate to high exudative levels.

Case 1:

72-years-old man with lower abdominal necrotizing fasciitis, Fournier's gangrene. 8-surgical WD done. (1a) Started UKMSG for WBP along with serial surgical WD. (1b) A healthy less-exudative granulation tissue.



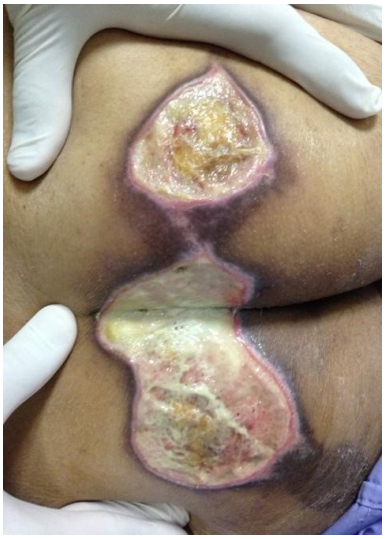
(a) Before UKMSG



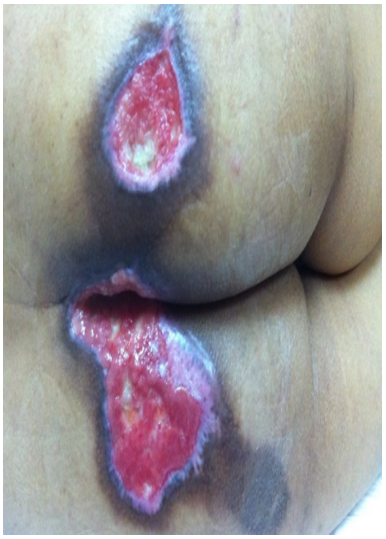
(b) After 24-days

Case 2:

64-years-old man, post CABG 2 weeks, excoriation at sacral region progressed into pressure ulcer, grade II. WD done once, refused further WD. (2a) slough with discharge before UKMSG. (2b) Healthy granulation tissue with minimal slough.



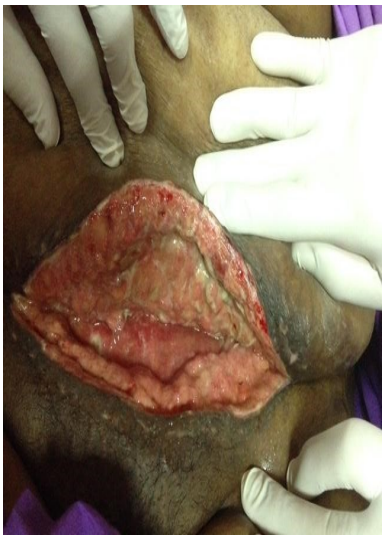
(a) Before UKMSG



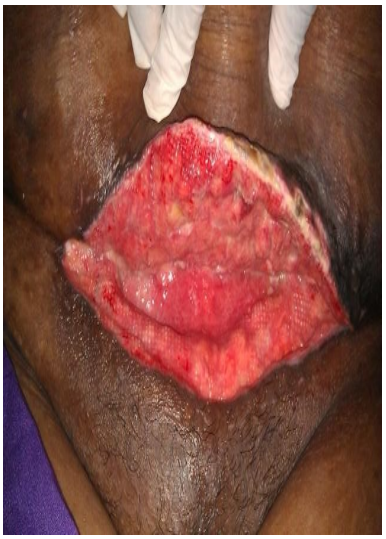
(b) After 20-days

Case 3:

41-years-old lady, post total hysterectomy for symptomatic multiple uterine fibroids. Presented with SSI and wound breakdown. Surgical WD did once. (3a) Highly exudative wound, slough at the base, and foul-smelling discharge before UKMSG. (3b) Healthy moist granulation tissue.

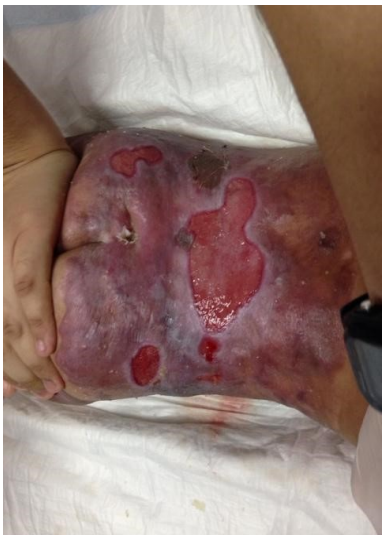


(a) Before UKMSG

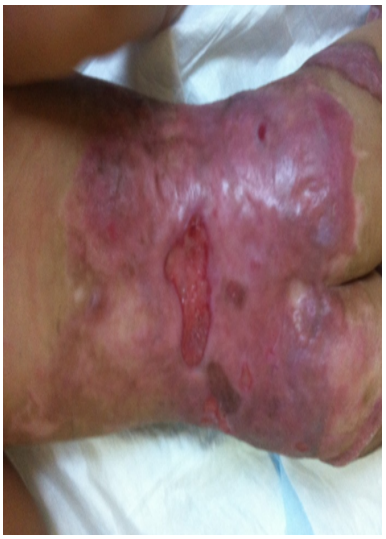


(b) After 7 days

Case 4: 2-years-old girl admitted for 23% mixed thickness infected burn wounds at the posterior trunk. 2 surgical WD done. (4a) Resistant exudative wound with discharge. (4b) Healthy epithelized wound.



(a) Before UKMSG

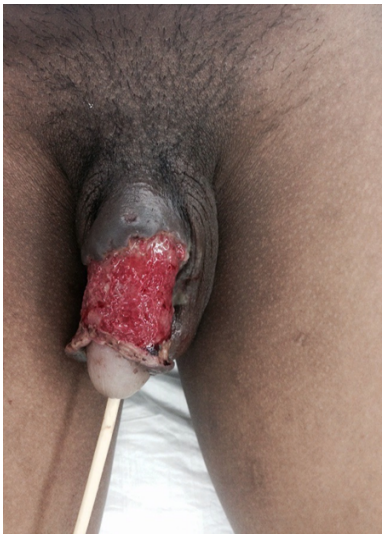


(b) After 42-days

Case 5:

30-years old man, Retro-viral (RVD) positive, presented with gangrenous penis due to penis siliconoma. Surgical WD did once. (5a) Sloughy base with discharge. (5b) Healthy granulating tissue.

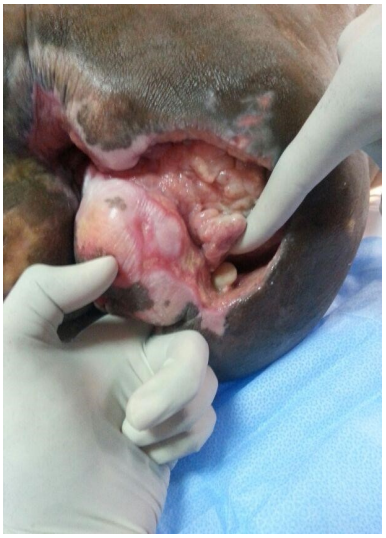
(a) Before UKMSG



(b) After 3 days

Case 6:

43-years-old man with traumatic paraplegia for 20 years and a complex network of clean, static pressure ulcers. Multiple admission for infected pressure ulcer at the sacrum, grade IV. At least 3-surgical wound debridement done. (6a) Deep communicating cavity with discharge. (6b) Obliterated communicating-cavity, clean.



(a) Before UKMSG

(b) After 24-days

Discussion

The right choice of dressing for a wound is important for optimum healing, therefore, improving the quality of patients' life (7). Studies have shown that recalcitrant, non-healing wounds contain exudate with high levels of inflammatory mediators like matrix metalloproteinases (MMPs) (8), polymorphonuclear granulocyte-derived elastase (PMN elastase) (9) with high concentrations of free radicals (10); which causes a shift in the balance of matrix synthesis leading to tissues destruction. Another study attributed the increase of protease activities in exudates as the main pathology of non-healing wounds. Therefore, removal of the above will have a major therapeutic effect on WBP and granulation tissue formation (8). Eming S at al showed that SAP can inhibit MMP activity in vitro and ex vivo (11). SAP also exhibits a high binding capacity for PMN elastase, and protease and is able to inhibit free radical formation in vitro (12). It also takes up multiple amounts of water (bio-fluids/exudate) of their dry weight which is crucial in chronic wounds and wounds with moderate to high exudative levels. Due to its ability to take up and retain proteins as well as cell debris and micro-organisms (12), it serves as an excellent autolytic debridement agent.

Collagen, on the other hand, creates the most physiological interface between the wound surface and its environment and it is impermeable to bacteria (13). It is easy to apply, being natural, non-immunogenic, nonpyrogenic, hypo-allergenic, and pain-free (14). Collagen also inhibits the actions of MMPs and the facilitation of migration of fibroblasts into the wound (5; 15). Glycerine is found in many common products such as cosmetics, conditioners, soaps, foods, etc. It is a humectant by definition and has the ability to absorb moisture from the wound. We believe that by combining Gold Dust® and Stimulen® gel in UKMSG, both dressings augment each other therefore producing promising dressing as results in our case series.

Conclusion

The UKMSG is part of our Wound Care Team approach to wound management across a variety of wounds. We conclude that UKMSG is ideal for the treatment of recalcitrant, non-healing, moderate to highly exudative wounds. It produces a good result in WBP. It is also easy to apply and removed, comfortable, has fewer peri-wound complications, and does not need an expensive secondary dressing. In the future, we aim to perform an RCT and comparison study to further evaluate the UKMSG method.

Disclosure

Authors have no potential conflicts of interest to disclose.

Author Contributions

Dr. Sim Lin Kiat; author/ correspondence Associate Professor Dr. Farah Hani; supervisor All authors have read and agreed to the published version of the manuscript.

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