Superficial partial burns and donor sites are unique wounds: case series of extended wear Cutimed® Sorbact®

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Background: Superficial partial burns and donor site wounds are unique and do not behave like other wounds, warranting a unique approach. A dressing with an antimicrobial effect to prevent infection and minimise trauma at the wound by extending wear time promotes spontaneous healing by epithelialisation. The properties of Cutimed® Sorbact® achieve this goal in its temporary skin-like substitute action. This audit aims to illustrate that our management of superficial partial burns and donor sites is successful.

Methods: A prospective audit was done from January to June 2019 at the Harry Gwala Regional Hospital, where Cutimed® Sorbact® was used at the burn surgeon's discretion. Sorbact® was typically chosen for acute superficial partial-thickness burns at presentation and donor sites.

Results: A total of 27 patients were included. There were 14 superficial partial-thickness burns (nine children and five adults) treated with a mean wear time of 14 days to healing, with two patients having a wear time of 17 and 22 days, respectively. There were 13 donor sites treated (eight children and five adults), with 12 cases healed by day 17 and one complication of depth conversion.

Conclusion: Frequent removal of the primary Cutimed® Sorbact® dressing in the epithelialising wound causes trauma to the wound, leading to delayed healing despite the absence of infection. Leaving the primary Cutimed® Sorbact® in situ while monitoring for complications leads to successful outcomes. This has been adopted as standard management in our service for superficial partial burns and donor sites.

Keywords: superficial partial burns, donor site wounds, Cutimed® Sorbact®

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Introduction

Despite their vast differences in pathophysiology, burn wounds heal following the three phases of wound healing, i.e. inflammation, proliferation, and remodelling.[1] The superficial partial-thickness burn heals spontaneously by epithelialisation through keratinocyte migration from viable skin appendages in the dermis. Deep partial-thickness and full-thickness wounds should not be left to heal spontaneously and require skin grafting due to the destruction of all or most basal epithelial cell islands in the skin appendages.[1] The donor site is akin to a superficial partial-thickness burn with healing by re-epithelialisation.

Several decades ago, there was a paradigm shift to moist wound healing, which transitioned wound care to using closed rather than open dressings. The moist environment promotes the growth and migration of new cells and is the usual approach to wounds. Chronic wounds are more complex, and the balance of moisture and biofilm formation should be addressed.[2] Many concepts in chronic wound healing are carried over to burn wounds. Superficial partial burns and donor sites are different, and in the era of modern wound care, the use of temporary skin substitutes or dressings that behave like temporary skin substitutes can provide a cost-effective solution, since a single application can be applied.

This audit aims to illustrate that our management approach to superficial partial burns and donor sites with Cutimed® Sorbact® is successful. The dressing can be left in situ much longer than originally thought, leading to epithelialisation of the wound with a temporary skin-like substitute action. This is resource-sparing in an environment where cost and labour are limited.

Setting

The Pietermaritzburg Burn Service (PBS) consists of Greys Hospital (six paediatric and six adult burn beds) and Harry Gwala Regional Hospital (24 burn beds). Greys Hospital is the tertiary surgical service for western KwaZulu-Natal, comprising 3 million inhabitants, taking referrals via the Vula Medical Referral application (Mafami Pty Ltd). Harry Gwala Regional Hospital also receives referrals, but two-thirds of patients present directly to the hospital's Emergency Department (ED). Patients are assessed by the ED, which refers to the PBS, and decisions for further management are made by the PBS team.

Methods

A prospective audit was done from January to June 2019 at the Harry Gwala Regional Hospital, where Cutimed® Sorbact® was used at the burn surgeon's discretion. Sorbact® was typically chosen for scald burns assessed to be superficial partial-thickness at presentation or donor sites at the time of operation where the size of the burn injury or donor site was less than 10% of the total body surface area (TBSA). Less than 10% was chosen due to the physiological factors potentially complicating larger surface area wounds (for example, fluid resuscitation complications or systemic infection, such as pneumonia).

Wound care may have been for an inpatient or outpatient, depending on social circumstances. Data was collected for three dressing changes on three components: whether the Cutimed® Sorbact® was wet or dry, whether it was removed or not at each dressing, and whether the wound was healed or not. The outcome was described for any continued wound care longer than three dressing changes. Demographic data, burn size, and mechanism were also recorded. This forms part of the PBS burns electronic registry, and the data is exported to Excel spreadsheets (Microsoft Corporation) for analysis. Patients were grouped into single Cutimed® Sorbact® use or non-single Cutimed® Sorbact® use and donor site group after data collection for ease of describing results. Simple descriptive statistics were used.

Ethics

Ethical approval is granted for the registry from the University of KwaZulu-Natal Biomedical Ethics and Research Committee, BCA 106/14.

Sorbact® protocol

Wounds are washed under procedural analgesia, or general anaesthetic in the case of donor site harvesting for a skin graft, with chlorhexidine soap (4% chlorhexidine gluconate B-Braun Bioscrub, South Africa) and water, with the removal of all blisters and debris. Haemostasis is achieved with a topical adrenaline solution of 1 : 1 000 sprayed onto the wound with a bulb syringe in the case of a donor site. The Cutimed® Sorbact® swab is placed, with a second buffer Cutimed® Sorbact® swab in the case of donor sites, and gauze, secured with Hypafix® (BSN Medical GmbH, Germany), or bandage, or Elastomesh® (BSN Medical GmbH, Germany).

Review is done on days 4–6 depending on practicality (for example, clinic day). The first wound review comprises the removal of the outer fixation and gauze. Inspection of the primary Cutimed® Sorbact® is done. If dry and adherent, new gauze is placed and fixed, and again reviewed in 4–6 days. If the Cutimed® Sorbact® is wet, it is removed, the wound is washed with chlorhexidine soap (4% chlorhexidine gluconate B-Braun Bioscrub, South Africa) and water, and a new Cutimed® Sorbact® swab applied, and the wound again reviewed in 4–6 days. This process is repeated until healing, usually between 14 and 21 days.

When the wound is believed to be epithelialised, removal is attempted. If it peels off easily with little resistance, removal continues. The wound is likely deeper if not epithelialised at this stage; the Cutimed® Sorbact® dressing is changed every 3–4 days, and skin grafting is planned. This protocol is presented as a flow diagram in Figure 1.

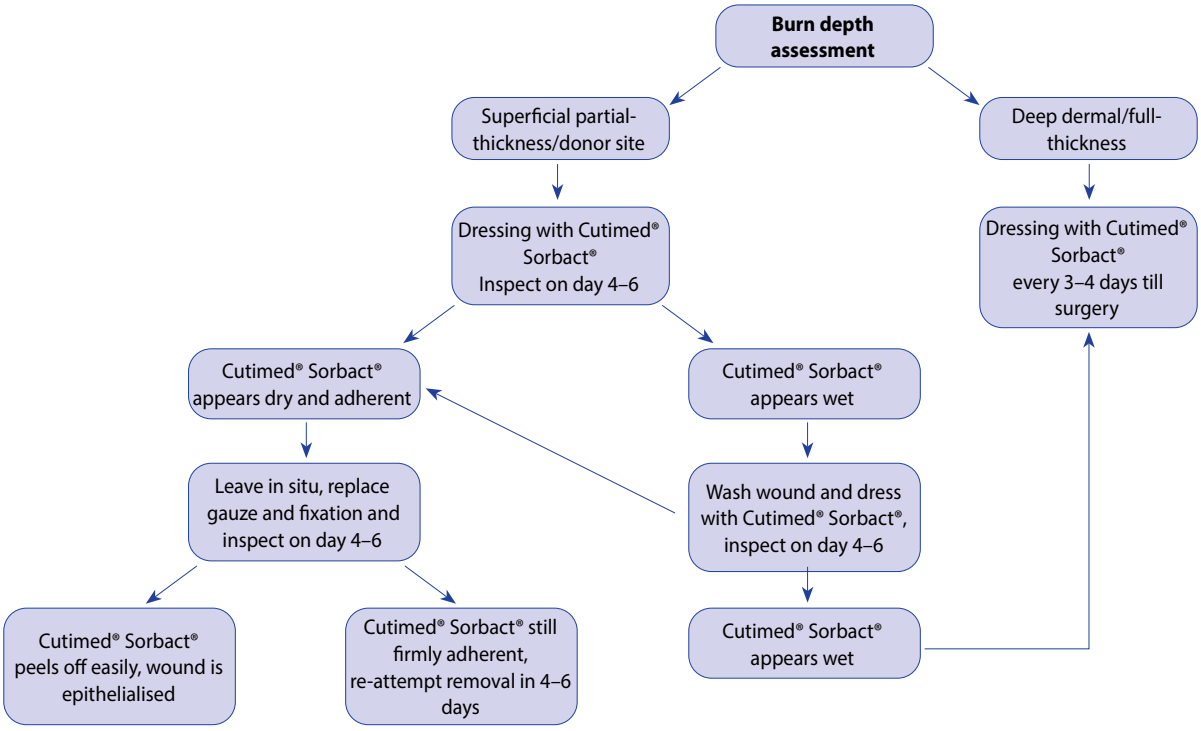

Figure 1

Results

A total of 27 patients were included. Results are presented in Table I. Demographics and injury details are presented in Table II. Dressing review details and outcomes are described below.

Superficial partial-thickness group

This group consisted of 14 patients. Six children under five years, four male children and a mean age of 27 months (range 10–48 months), three children under 12 years, two males and a mean age of six years (7–8 years), and five adults, three men and a mean age of 36 years (19–60 years). The mean TBSA was 5% (3–9%), with three facial burns, five torso burns, and nine limb burns (three patients had wounds in more than one area). Scald was the mechanism of burn in all cases except one, which was flash burn. Patients were divided into two groups, single Cutimed® Sorbact® to healing and non-single Cutimed® Sorbact® to healing.

Single Cutimed® Sorbact® group

Nine patients did not have Cutimed® Sorbact® removed at the initial dressing review. Five patients had Cutimed® Sorbact® removed at the second review, and wounds were healed on day 13 in four cases and day 14 in one case. Cutimed® Sorbact® was removed at the third review, and healing was found in four cases on days 10, 14, 17, and 19, respectively. Cutimed® Sorbact® wear time had a mean of 14 days, ranging from 10 to 19 days, with no adverse effects.

Non-single Cutimed® Sorbact® group

Five patients had Cutimed® Sorbact® removed as the initial dressing according to the protocol because the dressing was

Table I: Demographics and injury details

Patient number	Adult (age in years)	Child > 5 years (age in years)	Child < 5 years (age in months)	Gender	Mechanism	% TBSA
Single Sorbact® group						
1	24			M	Scald	3
2	43			M	Scald	5
3		7		F	Scald	7
4			10	F	Scald	4
5			24	M	Scald	4
6		8		M	Scald	9
7			19	M	Scald	7
8	19			M	Flash	4
9	32			F	Scald	3
Non-single Sorbact® group						
10		6		M	Scald	8
11	60			F	Scald	4
12			38	F	Scald	5
13			22	M	Scald	6
14			48	M	Scald	5
Donor site group						
1	52			F	N/A	3
2	33			M	N/A	4
3	29			M	N/A	2
4			34	M	N/A	3
5			18	M	N/A	4
6			22	F	N/A	5
7			27	M	N/A	2
8			31	F	N/A	1
9			14	M	N/A	2
10			34	M	N/A	4
11			28	M	N/A	7
12	22			M	N/A	8
13	47			F	N/A	3

F – female, M – male, N/A – not applicable, TBSA – total body surface area

Table II: Dressing review details and outcomes

Patient number	First review: day postburn	Sorbact® wet or dry?	Sorbact® removed?	Second review: day postburn	Sorbact® wet or dry?	Sorbact® removed?	Wound healed?	Third review: day postburn	Sorbact® wet or dry?	Sorbact® removed?	Wound healed?	Days to healing	Outcome if not healed by third review
Single Sorbact® group													
1	5	D	N	12	D	N	N	19	D	Y	Y	19	
2	6	D	N	13	D	Y	Y					13	
3	3	D	N	7	D	N	N	10	D	Y	Y	10	
4	6	D	N	13	D	Y	Y					13	
5	5	D	N	13	D	Y	Y					14	
6	3	D	N	10	D	N	N	14	D	Y	Y	14	
7	7	D	N	14	D	Y	Y					14	
8	6	D	N	13	D	Y	Y					13	
9	4	D	N	7	D	N	N	17	D	Y	Y	17	
Non-single Sorbact® group													
10	4	W	Y	7	D	N	N	14	D	Y	Y	14	
11	7	W	Y	10	W	Y	N	13	W	Y	N		Sorbact® every 3 days, depth conversion, granulation tissue grafted on day 21 postinjury
12	6	W	Y	9	W	Y	N	12	W	Y	N		Sorbact® every 3 days, depth conversion, granulation tissue grafted on day 21 postinjury
13	5	W	Y	8	D	N	N	15	D	N	N	22	Reviewed on day 22 postinjury, Sorbact® was dry and was removed, wound healed
14	4	W	Y	7	W	Y	N	10	D	N	N	17	Reviewed on day 17 postinjury, Sorbact® was dry and was removed, wound healed
Donor site group													
1	5	D	N	10	D	N	N	17	D	Y	Y	17	
2	5	D	N	10	D	N	N	17	D	Y	Y	17	
3	5	D	N	10	D	N	N	17	D	Y	Y	17	
4	5	D	N	10	D	N	N	17	D	Y	Y	17	
5	5	D	N	10	D	N	N	17	D	Y	Y	17	
6	5	D	N	10	D	N	N	17	D	Y	Y	17	
7	5	D	N	10	D	N	N	17	D	Y	Y	17	
8	5	D	N	10	D	N	N	17	D	Y	Y	17	
9	5	D	N	10	D	N	N	17	D	Y	Y	17	
10	5	D	N	10	D	N	N	17	D	Y	Y	17	
11	5	D	N	10	D	N	N	17	D	Y	Y	17	
12	5	D	N	10	D	N	N	17	D	Y	Y	17	
13	4	W	Y	7	W	Y	N	11	W	Y	N		Donor conversion, grafted on day 23 after initial harvest

D – dry, N – no, W – wet, Y – yes

wet. Two patients had Cutimed® Sorbact® changes every three days due to wetness; these wounds were declared deeper wounds and grafted on day 21 postinjury. On the second review, three patients were found to have dry Cutimed® Sorbact®, which was not removed according to the protocol until healing on days 14, 17, and 22, respectively.

Donor site group

The donor site group consisted of 13 patients, five adults, three men and a mean age of 37 years (22–52 years), and eight children under five years, six males and a mean age of 26 months (14–34 months). All donor sites were on the legs, with a mean TBSA donor site of 3.7% (1–8%). Donor

Figure 2: Premature removal of Cutimed® Sorbact® with removal of epithelial cells and bleeding

Figure 3: Dry adherent appearance of Sorbact® over the donor site

Figure 4: Complete epithelialisation of a superficial partial-thickness burn after easy removal of Cutimed® Sorbact®

sites were inspected on days 5, 10, and 17 postharvesting in 12/13 cases, with dry Cutimed® Sorbact® at first and second dressing and removal on day 17. A single Sorbact® dressing was used with a wear time of 17 days till healing in those 12 cases. One adult donor site was complicated by depth conversion. The wound was wet on initial inspection; Cutimed® Sorbact® was replaced and changed again on days 7, 11, 15, and 19, and the donor site was grafted on day 23.

Discussion

The PBS manages a high burden of injury in a resource-limited setting. Versatile and cost-effective dressings are in high demand. The PBS started using Cutimed® Sorbact® (Abigo Medical AB, Askersund, Sweden) in 2016 due to its bacterial binding properties with an antimicrobial effect alongside its versatile nature. Adhering to product guidelines, dressings with Cutimed® Sorbact® were done twice a week, and the dressing was removed on each occasion. However, we noticed firm adherence to the wound bed in the case of superficial partial wounds and donor sites, and that removal was traumatic, leading to bleeding and removal of the newly formed epithelium.

Contrarily, this was not the case in wet, older wounds, like granulation tissue or skin grafts. We subsequently changed our wound management practice in the case of adherence of the Cutimed® Sorbact® to the wound bed where the wound was assessed as superficial partial thickness or a donor site. The Cutimed® Sorbact® was left in situ for 2–3 weeks until the wound appeared epithelialised beneath the dressing and peeled off easily.

We believe that superficial partial burn and donor site wounds are unique and do not behave like other acute or chronic wounds, warranting a unique approach. Choosing a dressing with an antimicrobial effect to prevent infection and minimise trauma at the wound-dressing interface by an extended wear time promotes spontaneous healing of these wounds by epithelialisation. The properties of Cutimed® Sorbact® appear to achieve this goal.

In this patient group, complete healing by re-epithelialisation occurred on days 10–22 postinjury in the superficial partial-thickness group and day 17 in the donor site group with the extended wear time of the Cutimed® Sorbact® dressing, which has previously not been described. The time to healing is consistent with other authors.[3,4] These results demonstrate that Cutimed® Sorbact® can be left on the wound for much longer than originally thought by the manufacturer, with healing by epithelialisation of superficial partial-thickness burns and donor sites.

Three patients had depth conversion complications and required grafting. In these cases, where the Cutimed® Sorbact® appeared wet, it was changed every three days, as we do with other burn wounds (acute full-thickness burns or granulation tissue). These three patients illustrated standard complications of depth conversion, regardless of dressing type, and we believe the type of dressing used is unrelated.

It was our experience prior to this audit that led to the change in approach. Where Cutimed® Sorbact® was removed from a wound that it was adherent to, a layer of epithelial cells was seen on the removed Cutimed® Sorbact® with bleeding at the wound bed, illustrated in Figure 2. Repeated dressing changes appeared to delay final healing by epithelisation of the wound, despite no local signs of infection or systematic factors that could contribute to delayed healing. This led to our practice of leaving the Cutimed® Sorbact® in place until it peeled off easily, revealing a completely epithelialised wound. Figure 3 illustrates the appearance of the dry, adherent Cutimed® Sorbact® left in situ. Figure 4 illustrates the completely epithelialised superficial partial-thickness wound when the Cutimed® Sorbact® is removed easily without trauma, typically on days 14–22 in our series.

Reviews and meta-analyses typically report heterogeneity in the time to wound healing of donor sites and dressing comparison in published studies. Initial studies reviewed and published before 2003 on the use of moist wound-healing dressings in the management of split-thickness skin grafting donor sites concluded that moist wound-healing products

are advantageous over non-moist products, specifically relating to healing, pain/comfort, and infection rates.[5] The comparator was typically fine mesh gauze or tulle-gras compared to hydrocolloids or polyurethane films, which were considered moist wound-healing.

In a more recent review published in 2018 of 35 publications, a vast array of modern products was used for donor sites. Some reported the superiority of moist wound-healing regarding pain and healing time. Others had no convincing evidence to support the superiority of moist dressings compared to dry dressings in donor site wound healing. One also needs to consider the secondary dressing as it influences the process of healing, which is not entirely dependent on the primary dressing.

Our approach differs from the usual frequently changed moist dressings and is similar to the temporary skin substitute approach with a single application removed only on healing. Other authors have described a dry-dressing approach with spontaneous separation of the dressing from the wound bed, reporting the dressing removal time as the mean healing time in days.[4] This aligns with our approach.

We would like to clarify that this extended wear Cutimed® Sorbact® approach until spontaneous separation occurs, applies strictly to acute superficial partial-thickness burns and donor sites. We believe these wounds are unique and unlike other wounds in general, as well as other full-thickness or chronic burn wounds where the Cutimed® Sorbact® would be changed every three days. The bacterial binding properties of Cutimed® Sorbact® are advantageous in preventing infection in acute superficial partial-thickness burns and donor sites, and likely contribute to the success of this approach.

Conclusion

The frequent removal of the primary Cutimed® Sorbact® dressing in the epithelialising wound (superficial partial-thickness burns and donor sites) causes trauma at the wound-dressing interface and can lead to delayed healing despite the absence of infection. Instead, leaving the primary Sorbact® layer in situ, with a protocol to monitor for complications, led to successful outcomes in our cohort. This practice has been adopted as standard management in our service, including large surface area burn injuries and large surface area donor sites.

Conflict of interest

The author declares no conflict of interest.

Funding source

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Ethical approval

Ethical approval was obtained from the University of KwaZulu-Natal Biomedical Ethics and Research Committee Approval, BCA 106/14.

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