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A comparison of Zenoderm^{R} with DuoDERM E^{R} in the treatment of split skin graft donor sites

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SUMMARY. **A prospective, randomised, controlled study compared Zenoderm^{R} (ZM) with DuoDERM E^{R} (DE) in the treatment of split skin graft donor areas in 64 patients. The donor site comfort was similar in the two groups. DE usage resulted in significantly faster healing but also a higher leakage rate than ZM. Two patients in the ZM group developed infection in their donor sites. The cost is significantly less with ZM than DE.**

DuoDERM E^{R} (Squibb ConvaTec Ltd, USA), an occlusive hydrocolloid dressing, has been well studied and shown to result in rapid re-epithelialisation and to reduce discomfort of split skin graft donor sites (Blitz *et al.*, 1985; Champsauar *et al.*, 1986; Madden *et al.*, 1989; Porter, 1991; Tan *et al.*, 1993). It is, however, known to have disadvantages of leakage, odour and increased cost (Tan *et al.*, 1993).

Zenoderm^{R} (Zenith Technology Co., New Zealand), is a newly introduced semiocclusive hydrogel dressing. It is a flexible, transparent, stable hydrogel membrane comprised of polyacrylamide gel, a polysaccharide and a phospholipid. It maintains a moist interface at the wound site and simultaneously avoids excess exudate accumulation by allowing water vapour loss and absorbing up to 7 times its own weight in plasma (Nangia and Hung, 1989, 1990a, b).

We conducted a prospective, randomised, controlled study to compare the relative advantages of Zenoderm^{R} (ZM) and DuoDERM E^{R} (DE) in the management of split skin graft donor sites with regard to healing, donor site discomfort, convenience, incidence of infection, and cost.

Materials and methods

75 patients who required a split skin graft were entered into the study. The patient selection, graft harvesting, donor site assessment and statistical analysis were in accordance with our previous study protocol (Tan *et al.*, 1992) except that the maximal donor length was restricted to 14 cm and all donor sites unhealed at 10 days were redressed with the same dressing, to be reinspected at 5-day intervals until healing was complete.

Four patients with the length of their donor sites greater than 14 cm, and 7 patients with a donor depth judged to be too thick or too thin were excluded from the study. The remaining 64 patients were randomly assigned to a dressing regime of either ZM or DE. If DE was used the margins were taped down using 3 inch Microfoam^{R} (3M, USA). ZM margins were not taped. The dressing in each case was completed with gauze, cotton wool and a crepe bandage.

Two patients in the ZM group were excluded during the course of study due to violation of the protocol. A further 2 patients in this group developed clinical infection of their donor sites and had their dressing regime changed. The remaining 28 patients in the ZM group and 32 patients in the DE group were available for final analysis of wound healing, donor site discomfort, convenience and cost. The groups were well matched (Table 1).

Results

(*1*) *Healing.* 31 donor sites of the DE group (97%) and 21 donor sites of the ZM group (75%) showed complete healing on day 10 ($p = 0.02$). The only unhealed patient in the DE group had 10% of the total donor area unhealed. The mean percentage of the

Table 1 Demographic data and graft details

		ZM	*DE*
Sex	M	13	15
	F	15	17
Age (years)	Mean ± SD*	68.5 ± 18.3	62.5 ± 22.9
	Range	24–92	18–93
Anaesthetics:			
General		14	16
Regional		4	5
Local		10	11
Donor Sites:			
Inner thigh		25	29
Inner arm		3	3
Conditions requiring SSG:			
Leg ulcers		8	9
Traumatic loss		11	11
Burns		1	2
Tumour excision		8	10
Donor areas (cm^{2}):			
Mean ± SD*		68.2 ± 30.3	78.0 ± 35.8
Range		35–140	30–156

* Standard deviation

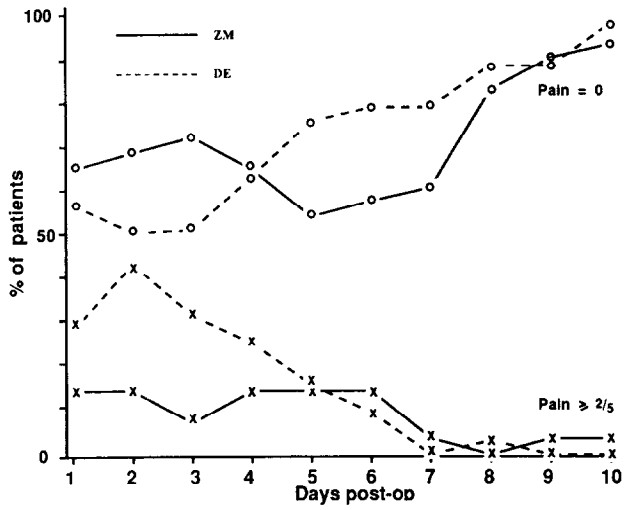

Fig. 1

Figure 1 – Donor site discomfort ratings. The percentage of the patients in each group with pain score of zero (upper tracings) and 2 or more (lower tracings) versus time.

Table 2 Estimated average cost per donor site until healing ($NZ)

	Dressing	*Number*	*Cost per dressing*	*Subtotal*	*Total*
ZM	First 10 days	1.4	$9.30†	$13.02	
	After 10 days	0.25	$4.80‡	$1.20	$16.16
	Repadding	0.8	$2.42§	$1.94	
DE	First 10 days	1.8	$17.24*	$31.03	
	After 10 days	0.03	$6.36‡	$0.19	$36.30
	Repadding	2.1	$2.42§	$5.08	

Dressings used: * average of 15 × 15 cm and 20 × 20 cm.
† 15 × 20 cm. ‡ 10 × 10 cm. § Medium sized gamgee and 6 inch crepe bandage.

unhealed donor areas in 7 patients of the ZM group was 23% (sd 12.7) of total donor area. All donor areas, however, healed by 15 days.

(2) *Donor site discomfort.* The intensity and duration of pain in the donor site were similar in both groups (Fig. 1). It is noteworthy that only 2 patients in the ZM group and 4 patients in the DE group had a pain score of more than 2 for the first 3 postoperative days. Further, only one patient in each group had this pain score beyond day 3 and none beyond day 6.

(3) *Convenience.* In the ZM group, leakage occurred on 34 occasions. On 12 occasions (7 patients), this was due to slippage of dressing requiring complete replacement of dressing (average 0.4 per donor site). In the DE group, leakage occurred on 94 occasions without slippage of dressings. Twenty-seven replacement dressings were required for major leakage in 18 patients (average 0.8 per donor site). Leaking DE dressings resulted in an offensive odour.

(4) *Infection.* Two patients, one of whom was on perioperative antibiotics, the other not, in the ZM group developed clinical infection (confirmed by swab). Neither of these was associated with slippage of dressing. No infection occurred in the DE group ($p = 0.23$). Nineteen of 30 patients in the ZM group and 20 of 32 patients in the DE group received antibiotic therapy for their primary pathology.

(5) *Cost.* An estimate of the average cost per donor site appears in Table 2.

Discussion

Re-epithelialisation was more rapid with the use of DE than with ZM. The differential wound angiogenesis associated with different degrees of occlusion may help to explain this (Pickworth and De Sousa, 1988).

Wound leakage is a major problem with occlusive hydrocolloid dressings in split skin graft donor sites (Porter, 1991; Tan *et al.*, 1992). We attribute the reduced leakage seen with the use of ZM to its permeability to water vapour and its ability to absorb exudate (Nangia and Hung, 1989). The ZM membrane, having absorbed tissue fluid, becomes very soft, pliable and slippery. This, together with the fact that it is not intrinsically adherent, may have led to the dressing slippage. DE is adherent to the normal skin surrounding the wound, reducing this tendency. We have subsequently found that securing the ZM membrane to the skin by the application of Mefix[R] (Molnlycke Health Care, Sweden) over its entire surface prevents slippage.

Both ZM and DE significantly reduce wound adherence by creating an exudate interface between the dressing and the wound. This appears to reduce the postoperative discomfort. The direct contact between non-occlusive dressings and the wound surface frequently results in wound pain and may lead to epithelial damage on removal.

The leakage (and healing) rates and donor site comfort of DE were consistent with our previous study (Tan *et al.*, 1992).

Two donor sites of the ZM group and none of the DE group developed clinical infection, although the incidence is not statistically significant. In neither of the two patients did the dressing slip. ZM was shown to be impermeable to various bacteria and *Candida albicans* (Nangia and Hung, 1990a) and it is presumed that in the absence of dressing slippage, donor site contamination occurred during harvesting of the skin graft or by haematogenous spread.

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