Alginate cavity dressings for the diabetic foot

Clare Williams

Introduction

Seaweed was first discovered to be an effective treatment for wounds in the early 1800s, but there were no further developments until 1947 when Blaine, an army major, reported very good results with alginate, a man-made fibre manufactured from seaweed, during the Second World War. Alginates, however, were not developed further until the 1970s (Williams, 1994). This article focuses on the development and use of alginate cavity dressings for diabetic foot lesions.

Alginate dressings are a popular choice for wound management among healthcare professionals, particularly for wounds with moderate to high levels of exudate and bleeding wounds.

Practitioners are normally split between those who favour a firm alginate because of its integrity, and those who prefer a soft alginate because of its fast-gelling property and low integrity (Williams, 1998c).

What are alginates and how do they work?

Alginates are composed of guluronic and mannuronic acid residues linked together. The proportions and distribution of these residues determine the physical and chemical properties of the alginate dressing. For example, Sorbsan is rich in mannuronic acid and produces a soft, hydrophilic gel, whereas Kaltostat is rich in guluronic acid and tends to swell in the presence of exudate. Both dressings retain their basic structure in use (Williams, 1998a).

Essentially, the calcium ions from the calcium alginate are replaced by sodium ions from the exudate, resulting in the production of a gel at the wound surface. Alginate dressings vary in absorbency, but typically absorb up to 15-20 times their own weight in exudate (Thomas, 1992).

Alginates are also haemostats. Calcium ions released into the wound activate platelets, resulting in haemostasis and growth factor release, which control bleeding (Williams, 1999).

Alginate dressings are designed for use on moderately to highly exudating wounds, e.g. pressure sores, leg ulcers, grafts, donor sites, surgical wounds and diabetic foot wounds (Williams, 1998b). They should not be used on wounds with low or no exudate as they can stick to the wound and dry it out.

Managing cavity wounds with alginate packing, rope and ribbon

The management of a cavity wound can be a challenge for the healthcare professional. For many years, community nurses and practice nurses have not been able to obtain suitable dressings for cavity wounds (Williams, 1997). This year, however, for the first time, alginate ropes, ribbons and packs, as well as other cavity wound dressings, are available on the Drug Tariff.

Three main types of cavity wound occur in the diabetic foot (*Table 1*). Alginates can be used in a straightforward or complex cavity or sinus wound. They are suitable for granulating or epithelialising wounds or those

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Figure 1. Stump wound suitable for an alginate dressing.

ARTICLE POINTS

1 Alginates are rich in either mannuronic acid or guluronic acid residues, or a combination of the two.

2 The physical and chemical properties of the different alginate dressings vary, depending on the relative proportions and distribution of the two residues.

3 Alginate dressings are designed for a variety of wounds with a moderate to high level of exudate.

4 Alginate dressings can be used on a simple or complex cavity wound or a sinus.

5 Alginate dressings promote the optimum moist healing environment and are a cost-effective treatment option.

KEY WORDS
- **Alginates**
- **Wound healing**
- **Diabetic foot**

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Table 1. Types of cavity wound that occur in the diabetic foot

Cavity
A straightforward cavity wound with a regular shape

Cavity with undermining
A cavity that extends or tunnels under the skin edges

Sinus
A blind-ended track, usually ending in an abscess

containing a moderate amount of slough. They can be useful following amputation where dehiscence of the wound can be quite common (*Figure 1*).

The wound must have a moderate or high level of exudate. Alginates are not suitable for black, necrotic wounds, but can be used on infected wounds as long as the patient is receiving systemic antibiotics.

Alginates should be loosely packed into a cavity and left in place until all of the gel has become moist with exudate. This will take a varying length of time depending on the level of exudate. The wound must not be packed too tightly as there is a danger that this will form a 'plug' which can trap exudate, and increase pressure under the ulcer.

A secondary dressing — either a film or a low adherent dressing — will be required. The choice of secondary dressing will depend on the location of the wound and the condition of the surrounding skin.

Before removal, alginate dressings must first be irrigated with normal saline. Alginates that are rich in mannuronic acid, such as Sorbsan, will be totally solubilised and wash away. Alginates that are rich in guluronic acid, such as Kaltostat, swell with irrigation to form a partially gelled sheet that can be lifted off (*Figure 2*).

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Figure 2. Removal of Kaltostat from a wound.

Table 2. The range of alginate dressings

Product	Composition	Manufacturer
Sorbsan	Calcium alginate	Maersk
Kaltostat	Calcium-sodium alginate	ConvaTec
Kaltogel	Calcium-sodium alginate	ConvaTec
SeaSorb	Calcium-sodium alginate	Coloplast
Melgisorb	Calcium-sodium alginate	Mölnlycke
Algosteril	Calcium alginate	Beiersdorf
Tegagen	Calcium alginate	3M
Algisite	Calcium alginate	Smith & Nephew
Curasorb	Calcium alginate	Kendall

The range of alginates

Alginate dressings fall into two groups: those containing only calcium alginate and those containing calcium-sodium alginate (*Table 2*). They all vary slightly in appearance, application and removal, as well as in absorbency and presentation.

Many companies that produce and sell alginate dressings deliver a full range:

- *Standard alginate* — standard absorbency flat sheet of varying sizes, e.g. 5 cm x 5 cm to 60 cm x 30 cm.
- *Higher absorbency alginate* — for very highly exuding wounds. Again, a flat sheet of varying sizes.
- *Cavity dressings* — usually consist of a ribbon or rope that is generally thin and long, or packing which is normally thicker and shorter. The inclusion of a probe for measuring and gently inserting the ribbon alginate is useful.

In some dressings, alginate is combined with charcoal for use on malodorous wounds such as bleeding, fungating lesions. In others, alginate is presented as an island dressing with a film or self-adhesive border.

Conclusion

For the patient with diabetes and a cavity wound an alginate dressing can be an effective and comfortable dressing. Alginates promote the optimum moist wound healing environment and allow longer periods between dressing changes. They are easy to apply, and easy and painless to remove.

Alginates have many advantages over conventional dressings and play an important role in the management of wounds with a moderate to high level of exudate. ■

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