

PRE PRINT

**MEDIZIN &
PRAXIS** Special

**– IN FOCUS –
FISTULAS AND WOUND UNDERMINING**

**First clinical evaluation of a
new gelling fiber dressing
Biatain® Fiber**

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Deep wound cavities, fistulas and undermining of the wound margins require a wound filler for wound cleaning and exudate management. Gelling fiber dressings are commonly used for these types of wounds. Upon exudate absorption, the fibers form a gel, supporting autolytic debridement and maintaining a moist environment in the wound. In addition to the gelling capacity, wet strength is an important parameter for gelling fiber dressings. This enables one piece removal that is atraumatic, without leaving any fiber residues in the wound.

Wound fillers such as alginates, gelling fibers and cavity dressing should have close contact with the wound bed and the secondary dressing. They should absorb and retain exudate, slough and bacteria and ensure longer wear time. Also, exudate should not leak on the wound edges and the periwound skin to prevent maceration of these areas. Not all wound fillers are able to guarantee this through vertical exudate absorption.

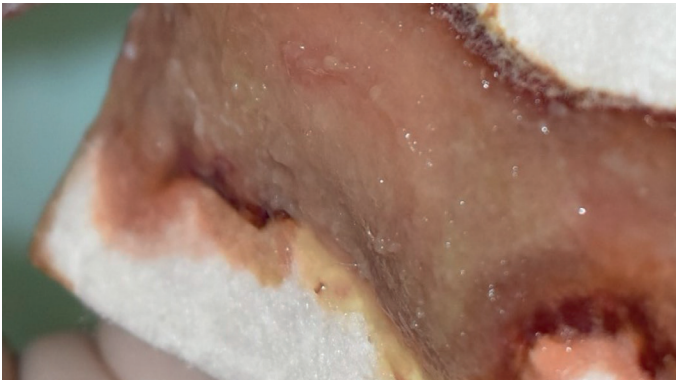


Fig. 1:
Removal of Biatain® Fiber after 48 hours, the dressing has created a cohesive gel.



Fig. 2:
An alternative gelling fiber adhering to the wound bed.



Fig. 3:
A completely gelled alginate dressing under a foam dressing. Visual inspection indicates signs of infection. Removal and cleansing of the wound is a challenge.

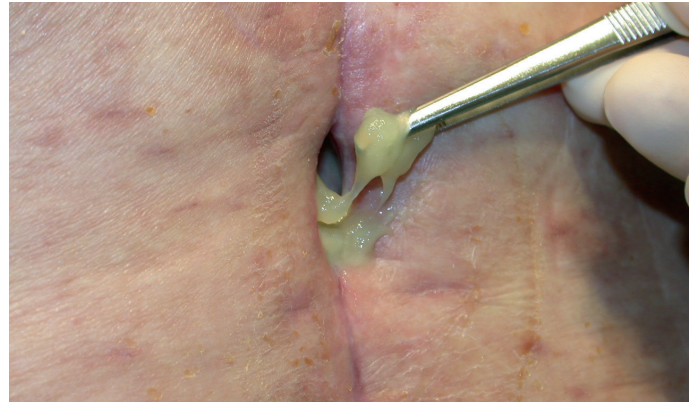


Fig. 4:
Incorrect application of an alginate dressing in a cavity. Removal in one piece is difficult.

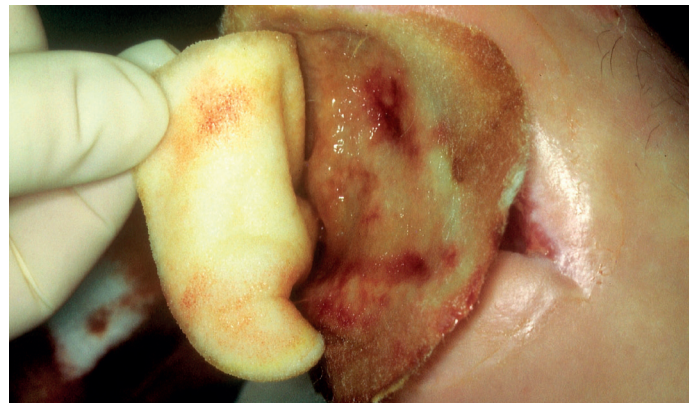


Fig. 5:
Incorrect use of an alginate dressing and foam dressing.

Comparing to alginates, gelling fiber dressings often gel quickly and has better exudate management and gel strength.

We would now like to present our first clinical experience using a new gelling fiber dressing, Biatain® Fiber, in clinical cases on the following wound types:

- Pressure ulcers in the sacral area and on a heel
- Diabetic foot ulcer
- Surgical wound healing by secondary intention
- Venous leg ulcers



Fig. 6:
 A sacral pressure ulcer, wound depth 48 mm and with undermining areas 55/75 mm. Wound duration 8 months.



Fig. 7:
 Sacral pressure ulcer with tunneling. Wound depth 54 mm and undermining up to 32 mm.



Fig. 8:
 A 6 months old heel ulcer. Wound depth 8 mm.



Fig. 9:
 Diabetic foot ulcer. Wound duration 10 weeks and wound depth approximately 10 mm.

Observations when removing Biatain® Fiber

They show stable gelling, easy swelling and atraumatic removal.



Fig. 10:
 Three Biatain® Fiber dressings have gelled and are being removed from the pressure ulcer (from Fig. 6).



Fig. 11:
 Removal of Biatain® Fiber after 48 hours (from Fig. 7)



Fig. 12:
 Removal of Biatain® Fiber after 48 hours (from Fig. 8). Vertical absorption of exudate is observed.



Fig. 13:
 Removal of the fitted piece of Biatain® Fiber after 72 hours (from Fig. 9)

Gelling fibers are applied to make direct contact with the wound bed. If the gelling fiber dressing shrinks too much, a gap can form where exudate can pool. Also, a gelling dressing should have both strong absorption and retention capacity. Retention of wound exudate within the dressing is important to avoid maceration of the wound edge and periwound skin.

A new gelling fiber dressing, Biatain® Fiber, has been developed to perform highly on parameters such as absorption and retention, gelling capacity, wet strength and resistance to shrinkage (*Larsen TRO et al. Wounds UK 2019 (no93)*).

In this first clinical evaluation, the aim was to evaluate the properties of the Biatain® Fiber in clinical practice.

Case 1

Patient information

The 72-year-old patient who during the past three years underwent a surgical operation twice of a sacral ulcer using flap surgery. To ensure wound healing, the patient received an ostomy, which still exists today.

A postoperative wound healing complication in the mobile patient again led to the pressure ulcer, which has now been present for 12 months. However, he refused to go to the hospital or go through any type of surgical procedure after this.

Wound assessment

Granulating decubitus over the sacrum. No signs of infection. The wound size in the diameter of 63 mm. The edges of the wound are undermined. 0° = 20 mm, 90° = 18 mm, 180° = 0 mm, 270° = 15 mm (measured clockwise). The wound depth was a maximum of 12 mm.

The edges of the wound are in a bad condition, no re-epithelization occurring from the wound edge. The wound bed is normal and no signs of maceration of the wound edge or periwound skin. The wound presented medium levels of exudate and the dressing was changed every second day. Biatain® Fiber was covered with a superabsorbent dressing.



Fig. 1.1:
 Wound before starting treatment with Biatain® Fiber. The scars are clearly recognizable after two flap surgery procedures in three years.

Wound management

After removing the previous dressing from the wound, the wound was cleaned with Ringer's solution and gauze. Biatain® Fiber was then placed in the undermining areas of the wound. Biatain® Fiber is applied into the wound cavity with close contact to the wound bed. The dressing is covered with a superabsorbent dressing.

The dressing is changed after two days. The wound bed shows signs of some sloughy tissue and pink granulation tissue can be seen. The dressing was removed in one piece from the wound and it did not stick or adhere to the wound bed. No fiber residues were left in the wound. No wound edge or periwound skin maceration was observed. It can be seen that excess exudate begins to flow laterally in the superabsorber. No exudate pooling is present between Biatain® Fiber dressing and the superabsorber.

It would be worth considering to apply the gelling fiber in combination with a foam dressing that conforms to the wound bed and absorbs exudate vertically, e.g. Biatain® Silicone. In this way, less wound filler is required and secondly, the conformable foam „seals“ the wound area (Fig. 8.1).



Fig. 2.1:
 After cleaning the wound with Ringer's solution and gauze, Biatain® Fiber is first cut into two pieces and placed in the undermining areas of the wound, and then covered with a secondary dressing. Fixation with an absorbing pad.



Fig. 3.1, 4.1:
 Dressing change after two days. The wound filler is removed in one piece. Biatain® Fiber has formed a cohesive gel and can easily be removed. Only a small amount of sloughy tissue present and needs to be removed from the wound bed. No maceration is present.

Case 2

Patient information

82-year-old, severely demented and immobile patient in a nursing home with a wound after hemicolectomy. The patient also received an ostomy after the operation. Postoperative wound healing disorder on the abdomen at the former drainage point.

The wound has a diameter of 14 mm. The edges of the wound are partially undermined. 90° = 10 mm, 180° = 6 mm (measured clockwise). The wound depth was a maximum of 38 mm.

The edges of the wound are thick and rolled, no epithelization from the wound edge. The wound environment is normal, no signs of maceration at the wound edge or periwound skin. The wound presented medium levels of exudate and the dressing was changed every second day.



Fig. 5.1, 6.1:
 Instead of two dressings, a rope which is easier to apply, is applied into the undermining areas of the wound



Fig. 7.1:
 The wound cavity is covered with a second dressing.



Fig. 8.1:
 Alternative care for the pressure ulcer would be to use a foam dressing with vertical absorption that conforms to the wound bed. Biatain® Fiber is inserted in the undermined areas and the remaining 12 mm deep wound bed covered with Biatain® Silicone Sacrum. Dressing change frequency was extended to every three days. Please note that this can only be done with a secondary dressing that conforms to the wound bed.



Fig. 1.2:
 Dressing removal of a foam dressing and an alternative gelling fiber after two days. No gel formation below the foam dressing. Probably, the wound filler was not applied close to the wound bed. The cover dressing remains completely dry.

Wound management

After removing the previous dressing, another gelling fiber dressing, it is noticeable that it has not formed a gel due to the lack of exudate. The foam dressing has not absorbed any exudate. Upon inspection of the almost 40mm deep wound, exudate is pooling in the base of the wound bed. This leads to the conclusion that the wound filler was not inserted correctly and did not have close contact to the wound surface.

The wound is then rinsed and cleaned with a wound irrigation solution and gauze. The Biatain® Fiber is now applied down to the wound bed including the undermining areas in the wound. In this case as well, the dressing is applied at the wound level, the wound is covered with an absorbent dressing.

As in the previous case, it could be considered applying the gelling fibre in combination with a foam dressing that conforms to the wound bed and absorbs exudate vertically, e.g. Biatain® Silicone (Fig. 8.2).



Fig. 2.2:
Wound area before application of the gelling fiber. Wound depth 38 mm, undermining 10 mm. Local signs of infection but some granulating tissue present. Low to moderate levels of exudate.



Fig. 6.2:
Gelled Biatain® Fiber.



Fig. 3.2:
Biatain® Fiber is applied with close contact to the wound bed. An absorbent dressing is selected as the secondary dressing.



Fig. 7.2:
Granulation tissue present, still local signs of infection.

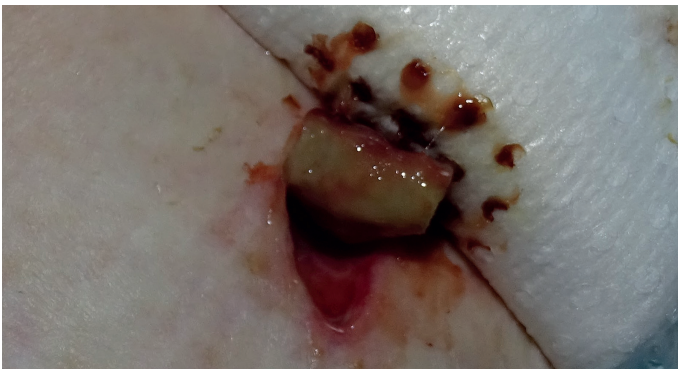


Fig. 8.2:
As in the previous case, it is possible to use a secondary dressing that conforms to the wound bed and gelling fiber, e.g. Biatain® Silicone. In this way, less wound filler is required.

Fig. 4.2, 5.2:
Dressing change after two days. Exudate has been absorbed into the gelling fiber dressing. The dressing is completely gelled. Fig. 5.2 shows Biatain® Fiber being removed from the wound cavity.

Case 3

Patient information

78-year-old mobile patient living at home. Severely handicapped by a Girdleston hip. Very stubborn patient who refuses almost any diagnosis regarding his semicircular ulcer on the left lower leg. Only Doppler sonography was possible. Further investigations were not possible. So the cause of the ulceration, which has now lasted 20 months, remains unknown.

Approved wound management by the patient was therefore limited to avoiding development of infection and good exudate management. This was and is a frustrating situation for the wound care staff, since healing / epithelization will not take place due to the patients unwillingness to agree to treatment.

Only through the dialogue with the desperate wife, the weekly inspection and the change of dressings is carried out in a clinical practice. Recurrent edematous swelling and redness of the skin are present.



Fig. 1.3 (outside), 2.3 (inside): Semicircular, large ulcer on the left lower leg with epithelial islands present in the wound bed. Irregular wound edges and no signs of healing. Clear signs of redness on the wound edge. No infection present.

Wound management

The dressing change and wound management was carried out as follows; wound consultation with a specialist (Mondays), the family doctor's office (Fridays) and the wife (Wednesdays). In a phase of marked redness and edematous swelling in the wound environment, which was not due to infection, the semi-occlusive dressing technique was stopped and the exudate management was carried out with a gelling fiber dressing (Biatain® Fiber) and a superabso-

rbent dressing. Despite of moderate to heavy exudate levels, the dressing change intervals were maintained.

After two dressing changes, there was a decrease in redness of the periwound skin. No redness was present after eight days.

It was noted positively that the absorption and retention of the wound exudate of Biatain® Fiber was very good. No exudate was present on the wound edge and there were no signs of maceration.



Fig. 3.3: Biatain® Fiber is applied and covered with a superabsorbent dressing (e.g. Curea® P1).

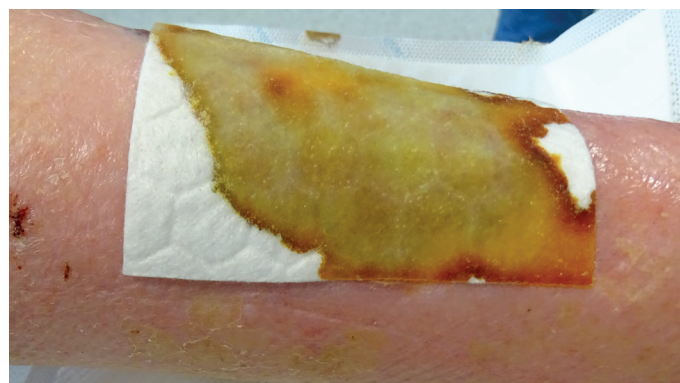


Fig. 4.3, 5.3: Dressing change after two days. The gelling fiber dressing has formed a cohesive gel in the wound bed. The vertical absorption of the dressing is easy to inspect. The retention of exudate has protected the wound edge and periwound skin from maceration. The part of the dressing that is applied over the wound edge remains dry indicating vertical absorption and retention of the exudate.

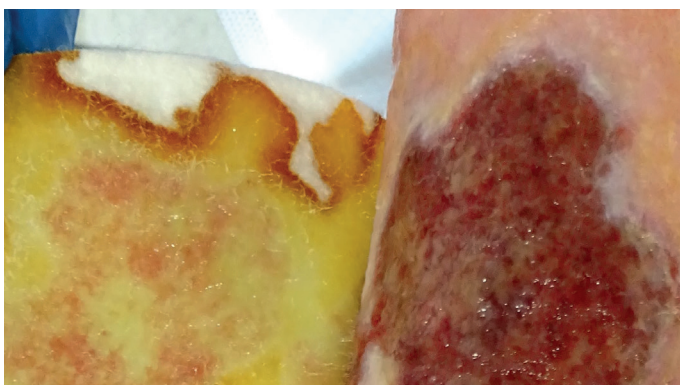


Fig. 6.3, 7.3:
 Detailed photos of Biatain® Fiber. There are no fiber residues in the wound bed. Vertical absorption of the exudate and therefore in signs of maceration on the wound edge or periwound skin.



Fig. 8.3, 9.3:
 The redness in the wound area has disappeared.

Discussion

What we learned from this first clinical evaluation is that, Biatain® Fiber has very good absorption and retention capabilities, does not shrink in the wound and can easily be removed in one piece without leaving residues in the wound.

Our experience has shown that using an absorbent silicone foam dressing (Biatain® Silicone) that conforms to the wound bed or to the primary dressing, further reduces the risk of exudate pooling and protects the wound edge and periwound skin from maceration. For example, when using Biatain® Silicone that conforms to the wound bed (up to 20 mm) and when there is not extensive undermining (up to 10 mm), a wound filler may not be required.

Deeper wounds, cavity wounds, including undermining, require a suitable wound filler.

Biatain® Silicone used as secondary dressing to a gelling fiber will conform to the gelling fiber and wound edges, absorb vertically and retain exudate within the dressing, thereby reducing risk of exudate pooling.

We have often observed that the exudate transported into the secondary dressing did not lead to the desired vertical exudate uptake. With only moderate exudation and the use of a wound filler, there was hardly any exudate absorption in the secondary dressing. It should therefore be carefully considered which secondary dressing should be used and whether it conforms to the wound edges and primary dressing.

Summary

Biatain® Fiber is particularly excellent for exudate management. The dressing has the ability to absorb medium to high levels of exudate, it forms a cohesive gel and is easy to remove without causing pain to the patient. No fiber residues are left in the wound. In addition, the dressing was observed to not only absorb wound exudate, it was also able to retain it. This is important in order to protect the wound edge and periwound skin from maceration. Even when the gelling fiber was applied on the wound edge, there were no signs of maceration.

The firm structure of the dressing when it was introduced into undermining areas of the wound did not influence the positive properties. Biatain® Fiber exists both as a rope and sheet dressing that can be cut to fit the wound. It is up to every clinician to build their own experience with this new gelling fiber dressing.

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