

In the professional journal „Deutsches Ärzteblatt“, vol. 77, 1980, issue 25, page 1621-1625 the article „**Therapeutische Anwendung von Polyester-schaumstoff**“ was released, an essay of professor Dr. med. Gerhard Weber and senior physician Dr. med. Karlheinz Galli, both then employed at the dermatological department of the clinic Nuremberg. In this article they have referred to more than 15 years of experience with the application of foam that is later known under the trade name LIGASANO®. This shows that the base of the development of LIGASANO® goes back to the 60s of the last century. Already in this article the most important modes of action of LIGASANO® are qualified.

„1. Mechanical effect at the wound:

The surface structure of the polyester flexible foam results from cutting through the vesicular material. A very fine honeycomb structure is then obtained.

Depending upon the requirements, pads of polyester flexible foam cut into flat 1 or 2 cm thick sheets that can be trimmed to any desired shape, are placed directly on the wound. Owing to the elasticity of the material, relatively uniform contact is achieved between the wound and the material. Through the action of the body's own weight - for example in the case of decubitus ulcers - or the pressure of an elastic bandage applied to it, the wound surface is constantly stimulated by the structure of LIGASANO®. This mechanical action itself is augmented by slight movements that additionally exert tangential tensile or thrust forces. Within days of application, this results in a visible increase in wound secretion, which is accompanied by the sloughing of fibrin and necrotic material. The result is a cleansing of the wound without the need for manual or medicinal measures.“

In the meanwhile it was recognised, that this mechanical stimu-

lus is not only effective at or in the wound itself, but also effects a local favouring of the blood flow at the intact dermis, with all positive aspects. With this, we are able to counteract effectively the most frequent disturbance of wound healing, the deficient perfusion.

„2. Absorptive effect:

The sponge-like internal structure of LIGASANO® exerts an appreciable absorptive effect. In consequence, the material absorbs wound secretion, thus preventing its accumulation and reducing the number of bacteria.“

Of our contemporary perception we have to add, that it is a great advantage of LIGASANO®, not to suck all the liquids in an uncontrolled way (like e.g. a sponge). The absorptive effect is „controlled“, thus prevents the risk of desiccating the wound. Only surplus liquid is absorbed, the wound always stays moist and warm.



Fig. 1a: Roentgen ulcer, after prolonged treatment by conventional means



Fig. 1b: Healing induced solely by the application of LIGASANO®

„3. Pressure relief through pressure distribution:

The relief of pressure is of particular importance in the case of bed-ridden, inactive patients. In such cases, where the subcutaneous tissue available is insufficient to distribute the pressure of the surface of the body, areas of very high pressure occur which, as is well known, lead to ischaemic necrosis, in particular in the sacral area and at the heels. Here the foam reduces the local maximum pressure, since, because of its elasticity, it takes over the pressure distributing function of the absent subcutaneous tissue. The mechanism behind this effect is, conceivably, that tiny blood vessels are less strongly compressed, with the result that the oxygen supply to the tissues is improved. This effect is of considerable importance both for prophylaxis and therapy.“

Unlike normal foam for cushioning, for LIGASANO® no durable elasticity is favourable - far from it! To make possible a preferably uniform pressure relief, LIGASANO® has the property to lose a great part of its pressure tension after a few minutes of deformation. Thus shapes with extensively uniform pressure distribution result. The **rapidly decreasing pressure tension** is considerably conducive to an easy, painless and quick change of the wound dressing, because the paddings and inlays need not to be cut very precisely.

4. Limited air permeability:

Not sufficient dignified were the helpful effect of the limited air permeability. On the one hand sufficient protection exists against external influence (temperature, germs, stroke, pression, etc.) if LIGASANO® has a thickness of 2 cm or more, otherwise this is a treatment „open to oxygene“ with a very good permeability to gases. Already in 1980 they were aware



Fig. 2a: Arterial ulcer



Fig. 2b: LIGASANO® applied to the defect



Fig. 2c: Healed defect

of the fact, that LIGASANO® has a wide range of indications. Described was:

„ I N D I C A T I O N S :

Prophylaxis and therapy of bed sores:

The indication for the application of foam arises from the above mentioned modes of action. Probably, the most common application is in the prophylaxis and treatment of bedsores. Squares of LIGASANO® measuring 50 x 50 cm and 2 or 4 cm in thickness (depending on the patient's weight) serve as a pad beneath the sacral area. While, as is well known, conventional support can lead to areas of high pressure and subsequent ischaemia, the use of flexible foam results in the uniform distribution of pressure due, on the one hand to the elasticity of the material and, on the other hand, to slight movements of the patient's body, for example during breathing. In addition, the constant compression and decompression of LIGASANO® reduces the accumulation of moisture on the skin and thus the maceration usually seen in such cases. The foam pads need to be tailored to the degree of immobility and the weight of the patient, and the use of cubical, cylindrical or wedge-shaped pieces of foam has been found to be necessary for prophylaxis in patients with transverse lesions of the spinal cord. This measures do not, however, obviate the need to

change the position of the patient at the usual regular intervals. In the case of heels or other frequently moved parts of the body, the foam is fixed in position with



Fig. 3a: Wound dehiscence after amputation



Fig. 3b: Overlapping graft, fixed in place



Fig. 3c: Dressing 1. gauze, 2. LIGASANO® pad, 3. covering of LIGASANO®



Fig. 3d: Healing graft

the aid of a bandage. If decubitus ulcers have already developed, the defect can be filled with sheets, wedges or sheres of foam, cut to the appropriate size, and the patient then bedded on a large foam sheet. In the case of ulcers of the heal, the foam sheet is held in position with an elastic bandage.

With both forms of application, considerable secretion observed within a matter of days, even in the case of otherwise dry ulcers. This is accompanied by the sloughing of detrius and the formation of fresh granulation tissue, which is subsequently followed by epithelization.

cal effect of the LIGASANO® pad on the venous ulcer, while also improving venous return.

In the case of arterial ulcers, however, this additional bandage must be avoided. Here the foam dressing should be held in place under moderate pressure using, for example, strips of plaster or a gauze bandage.

In the case of extensive ulcers, as soon as the cleansing effect has been achieved and fresh granulation tissue has formed, a split-skin graft is employed to accelerate healing. Under the conditions described, such grafting is more likely to succeed even in the case of arterial ulcers.

an elastic bandage under slight pressure. If, however, the wound is in the level of the skin, a single sheet of LIGASANO® larger than the graft suffices to cover it. To avoid adhesion in the case of excessive secretion by the wound, a piece of gauze expediently containing an antibiotic, is placed between the graft and the foam. Covering the graft with LIGASANO® has two advantages:

1. Wound secretion and blood are absorbed
2. Thanks to the elasticity of the foam, traction and compression forces associated with small movements are cushioned, so that a



Fig. 4: Burn patient bedded on LIGASANO®

If marked secondary infection of the ulcers occur, the short-term application of antiseptic solutions is indicated to accelerate cleansing, as a supportive measure.

Ulcus cruris

When treating venous and arterial ulcers of the leg with LIGASANO®, consideration must also be given to the underlying vascular insufficiency. Here, too, a foam sheet cut to match the configuration of the ulcer defect is applied. Since the use of foam is associated with an increase of secretion, the skin adjacent to the ulceration must be covered with zinc lotion to prevent maceration. Here, ointments or creams are not recommended. A firm elastic bandage applied starting at the forefoot, augments the mechani-

Post-operative wound dressing and graft covering:

At our department, this foam was originally used as a post-operative wound dressing. The foam dressing does not have the disadvantages of the conventional gauze bandage - accumulation of secretion and body moisture, adhesion to the wound with the associated risk of secondary infection and inadequate elastic padding. Its advantages are particularly important for the covering of skin grafts. If the graft bed is below the level of the surrounding skin, a sterile piece of LIGASANO® foam cut to match the shape and size of the graft is placed over it and fixed in position with strips of plaster. This pad is covered by a larger sheet of foam and held in place with

constant and uniform pressure is applied to the graft.

In an analogous manner, LIGASANO® can also be employed as a "dosed pressure bandage" to cover a sliding flap. At our department, deep excisions that cannot be closed primarily, are treated with skin grafting at a later date, when the defect has filled with granulation tissue. In such cases, foam, cut to the appropriate shape and size, is applied in order to accelerate the growth of granulation tissue, and to keep the wound clean.



Fig. 5a: Third-degree burn, mechanical debridement of necrotic material

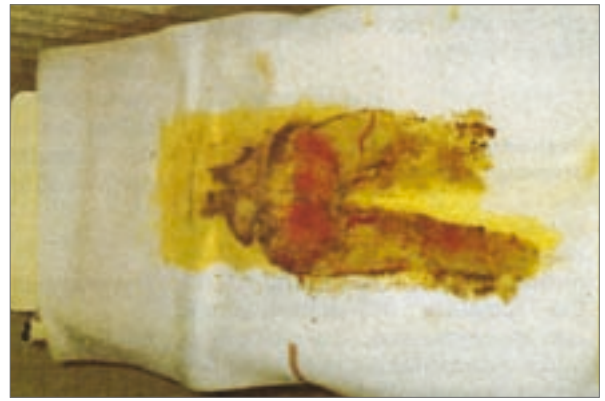


Fig. 5a: Impression of burn wound

Burns

For the treatment of burns, we have been using the polyester foam LIGASANO® for about ten years now, mainly for mechanical debridement of the wound surfaces, in particular on areas of the body in contact with the mattress. The following procedure has proved expedient: The mattress is first protected by a waterproof plastic sheet. Over

changed daily. Secondary infection is additionally treated by daily spraying the wound with antiseptic solutions, or by the application of an antibiotic-containing ointment to the foam. When the foam is changed, its cleansing action is impressively revealed. It bears a complete imprint of the burn wound comprising infected secretion and ne-

treatment were laid, thus also for LIGASANO®. However many of the pretended innovations were forgotten after a short time, others have kept up and were enhanced. LIGASANO® was one of the first foam dressings at all and for a long time the only serious preparation at the market, that was always enhanced.



Fig. 6a: Post-operative wound



Fig. 6b: Wound treatment with LIGASANO® white



Fig 6c: Wundheilung

this sheet, a layer of Moltex or similar material is placed, and over this a disposable absorbent sheet to prevent displacement of the underlying layers. Upon the sheet is placed a sheet of LIGASANO® with the same dimensions as the mattress and a thickness of 2 to 4 cm, on which the patient is then bedded. The LIGASANO® sheet is

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From the fifties to the sixties of the 20th century the essential cornerstones of the modern wound

Meanwhile there is hardly a producer of modern wound dressings, which does not offer a foam dressing. But the therapeutic valuation and the intended scheduled applications are in most cases less, partly also quite different than LIGASANO®.