

In vitro evaluation of the debridement performance of a new debrider* compared to conventional cotton gauze



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Introduction

Wound debridement is a major challenge in the treatment of patients with chronic wounds, especially if wounds are covered with a firm fibrin slough. Here, conventional debridement methods relying on cotton gauze may not be enough. However, surgical debridement requires trained personal, an operation theatre and, moreover, is often associated with severe pain for the patient. A new debrider* consisting of polyester monofilament fibres may present a novel, fast and almost painless option for wound debridement (figure 1). Hence, we have investigated the debridement performance of this new debrider* *in vitro* and compared it to conventional cotton gauze**.



Figure 1: Mechanical debridement with the new debrider*. ©Weindorf and Dissemond, Department of Dermatology, Venerology and Allergology, University Hospital Essen.

Material & Methods

The wound debridement model used (figure 2) consists of glass plates coated with a thick protein crust, to imitate the wound slough, which is stained with haematoxylin. The debrider* and conventional cotton gauze** were used to debride/clean the glass plates under standardized conditions ($p = 0.067\text{N/cm}^2$, $v = 1.6\text{ cm/s}$). Plate images were obtained before and after treatment. All images were processed using ImageJ 1.45m (NIH, Bethesda, Maryland, U.S.).

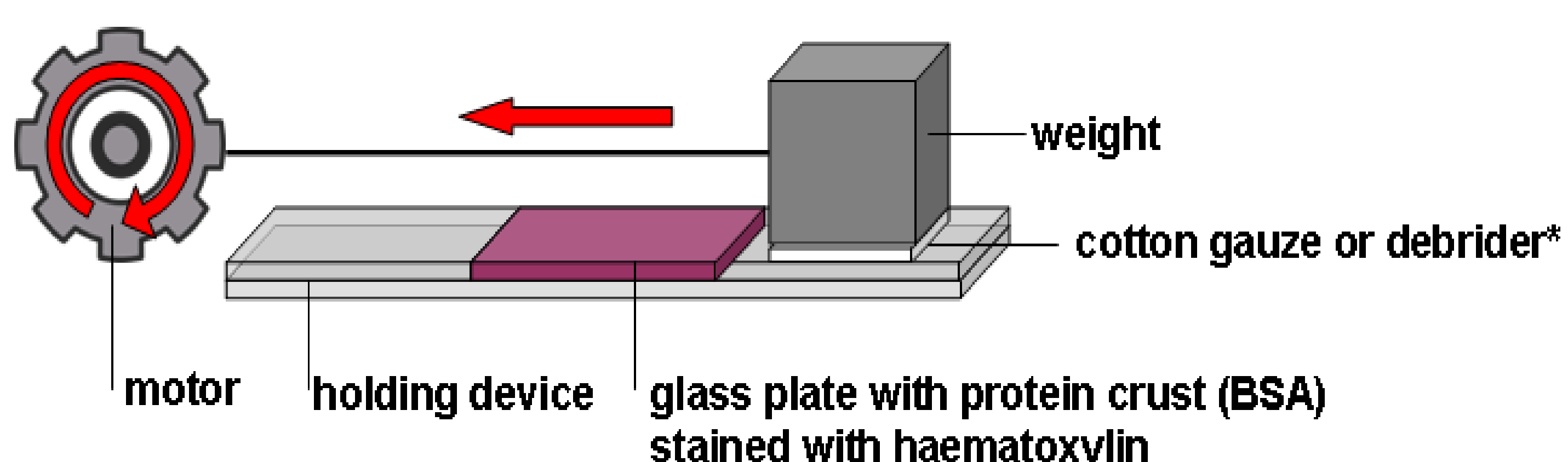


Figure 2: The wound debridement model: Glass plate with BSA cover was put into the holding device and cotton gauze or debrider* were attached to a weight. The weight was pulled over the glass plate at a constant speed of 1.6 cm/s.

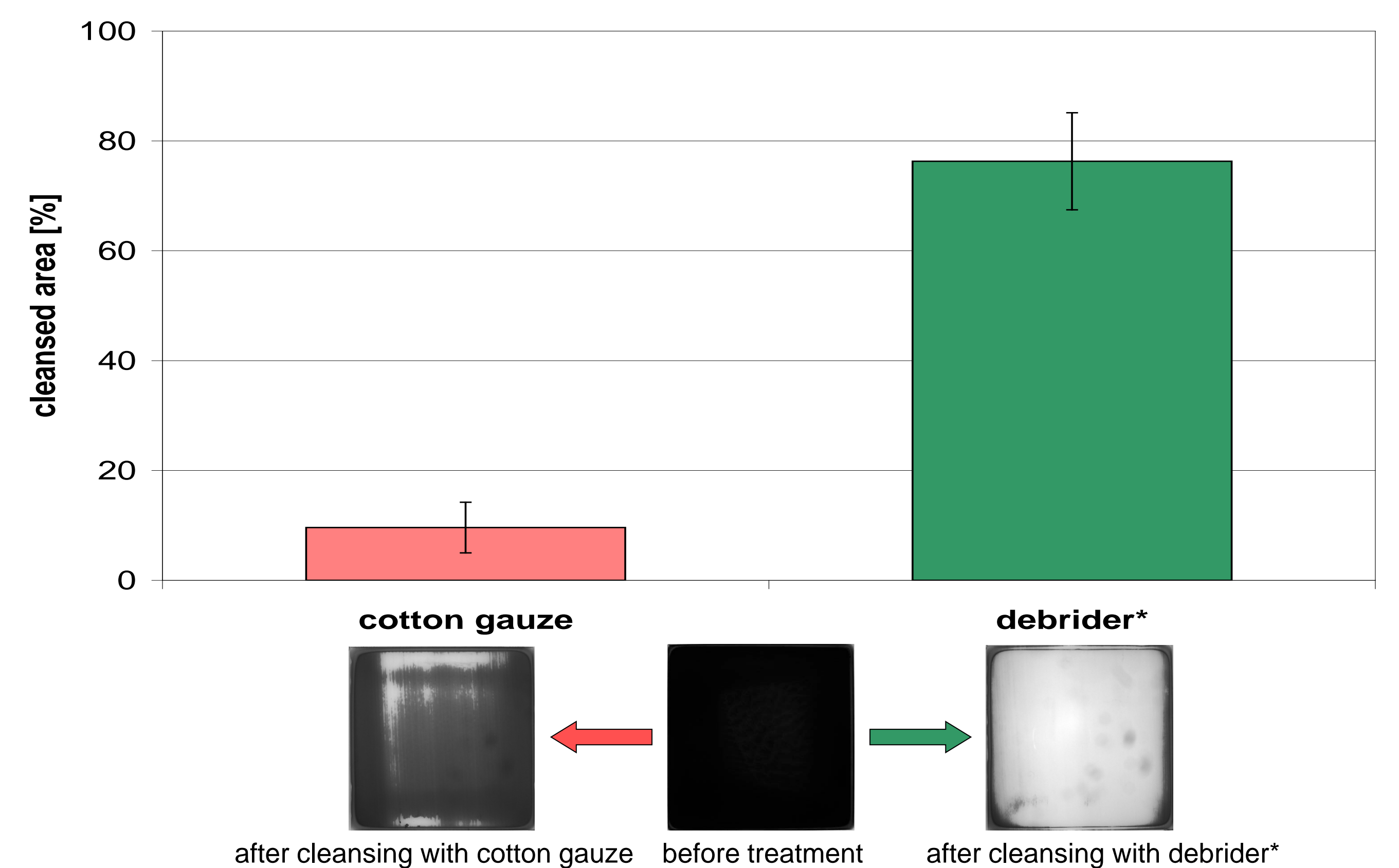


Figure 3: The debrider* exhibited a significantly higher cleansing efficacy compared to cotton gauze when glass plates prepared with 1.5% BSA simulating a thick protein crust were used in the wound debridement model. Data presented as mean \pm SD. Images show representative examples of glass plates before and after cleansing.

Results

It could be shown that the debrider* exhibited a significantly higher debridement/cleansing performance than conventional cotton gauze** *in vitro*. The debrider* was able to remove more protein slough from the glass surface compared to the cotton gauze** used, e.g. cotton gauze** reduced the clogged area about 10% while the debrider* removed more than 70% of the slough, respectively (figure 3). Moreover, the debrider* was able to achieve a significant debridement/cleansing effect (area cleansed > 70%) for at least four applications (one pad was used to clean four glass plates) while cotton gauze** quickly lost its efficacy from the first to the second glass plate (figure 4).

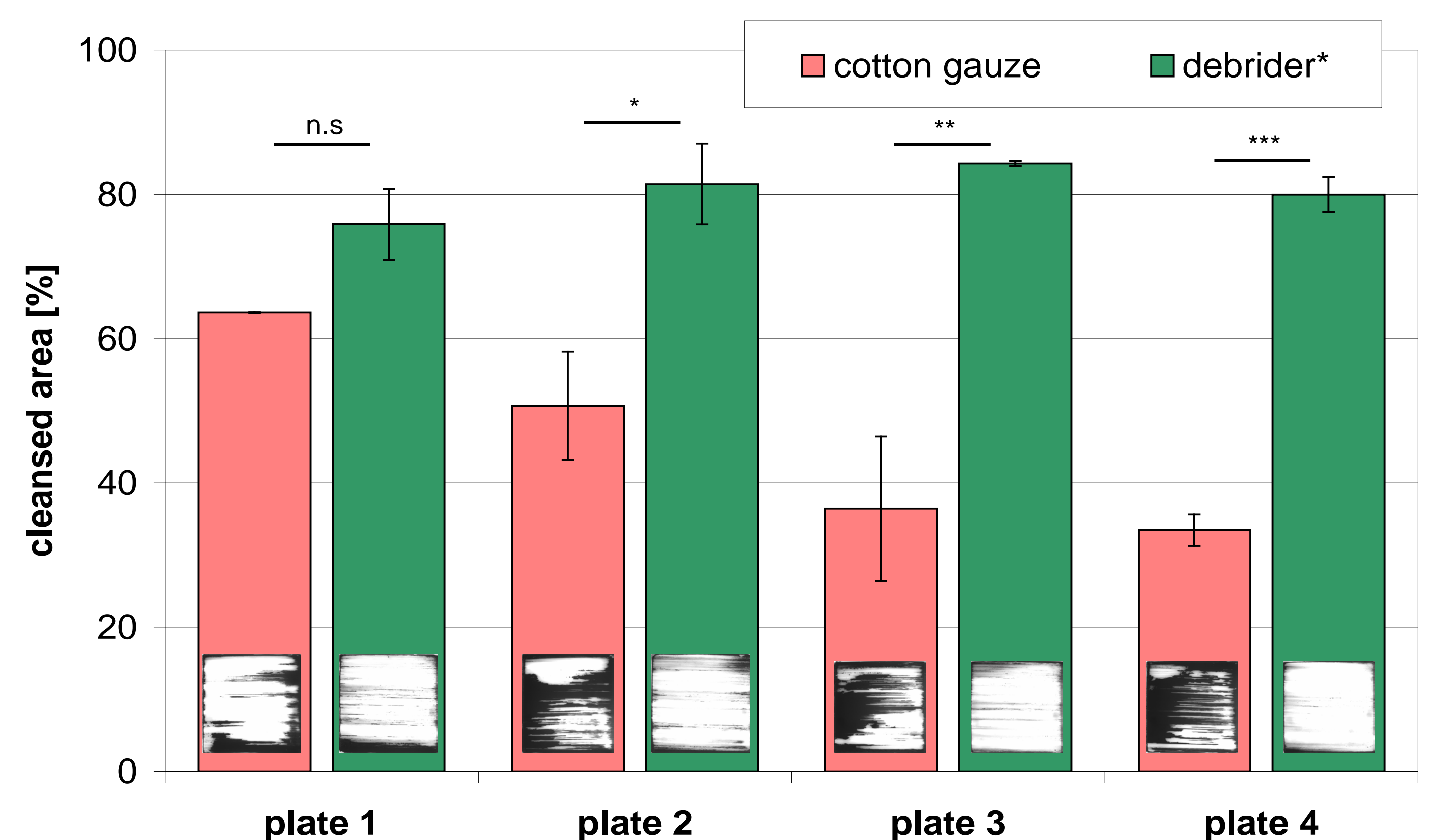


Figure 4: Cotton gauze or debrider* were used to subsequently cleanse four glass plates (0.45% BSA) each. While cotton gauze quickly lost its efficacy, a significant cleansing effect of the debrider* was observed. Data presented as mean \pm SD. Inserts show representative examples of the glass plates after cleansing.

Discussion

It could be shown that the debridement performance of the new debrider* is significantly higher than that of conventional cotton gauze**. Moreover, the debrider* presents a non-invasive and therefore almost pain-free alternative to other techniques and can be performed without major expenditure in terms of time or materials. Hence, this new technique should provide a valuable tool in the treatment of patients with chronic wounds to improve the quality of life as well as to safe costs.

* Debrisoft®; Lohmann & Rauscher

** cotton gauze, Fuhrmann