

# New method of treating buttonhole entry site that does not lead to scab formation

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## Methods:

### New buttonhole entry site treating method

By modifying the moist-healing method that is used for skin abrasions or burns, we developed a new buttonhole entry site treating method by which either no scab at the buttonhole entry site.

### Our modified moist-healing method

1. Bleeding must be completely stopped.
2. The buttonhole entry site is disinfected with diluted povidone iodine solution.
3. The wound must be kept moist.

### Disinfection of buttonhole entry site

We disinfected the site with diluted povidone iodine solution. This is based on the fact that diluting povidone iodine solution increases its bacteriocidal activity through increased free iodine concentration while decreasing activity that damages the skin.

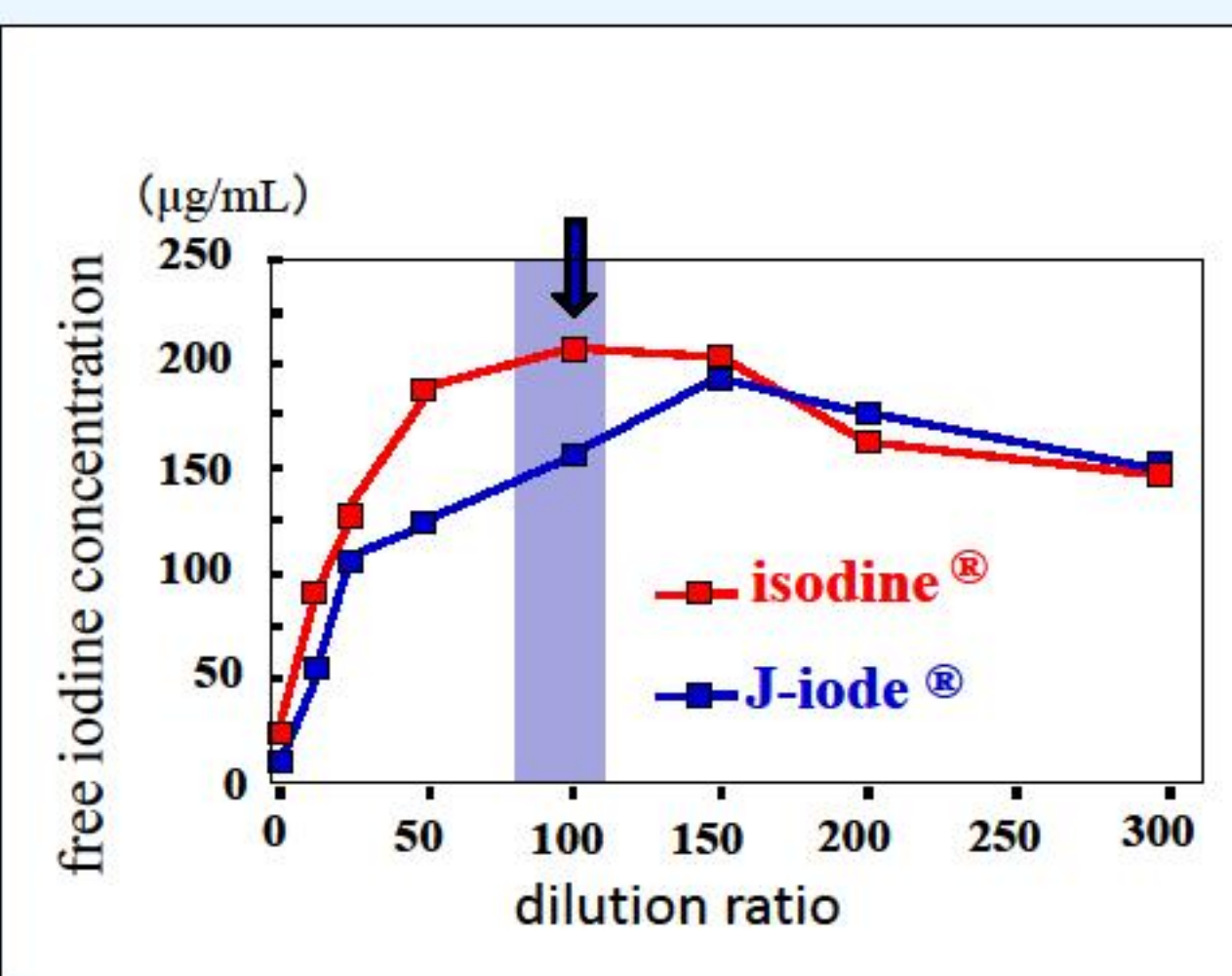


Fig. 1. Free iodine concentration and dilution ratio

### Application and removal of anti-microbial film dressing to and from the buttonhole entry site

Immediately after we disinfected the buttonhole entry site with diluted povidone iodine solution, we applied an anti-microbial film dressing to the site.

## Discussion:

### Buttonhole cannulation

When treating the buttonhole entry site with the moist-healing method, we used a blunt needle of intermediate dullness rather than a conventional blunt needle (see Fig. 4).

Thanks to the use of this blunt needle, buttonhole cannulation could be done quickly, penetrating the thin membrane that covered the buttonhole entry site.

## Results:

When we removed the anti-microbial film dressing after 24 hours, a thin membrane had formed instead of a scab with some treatments. With the remaining treatments, a small scab had formed on the site (see Fig. 2).

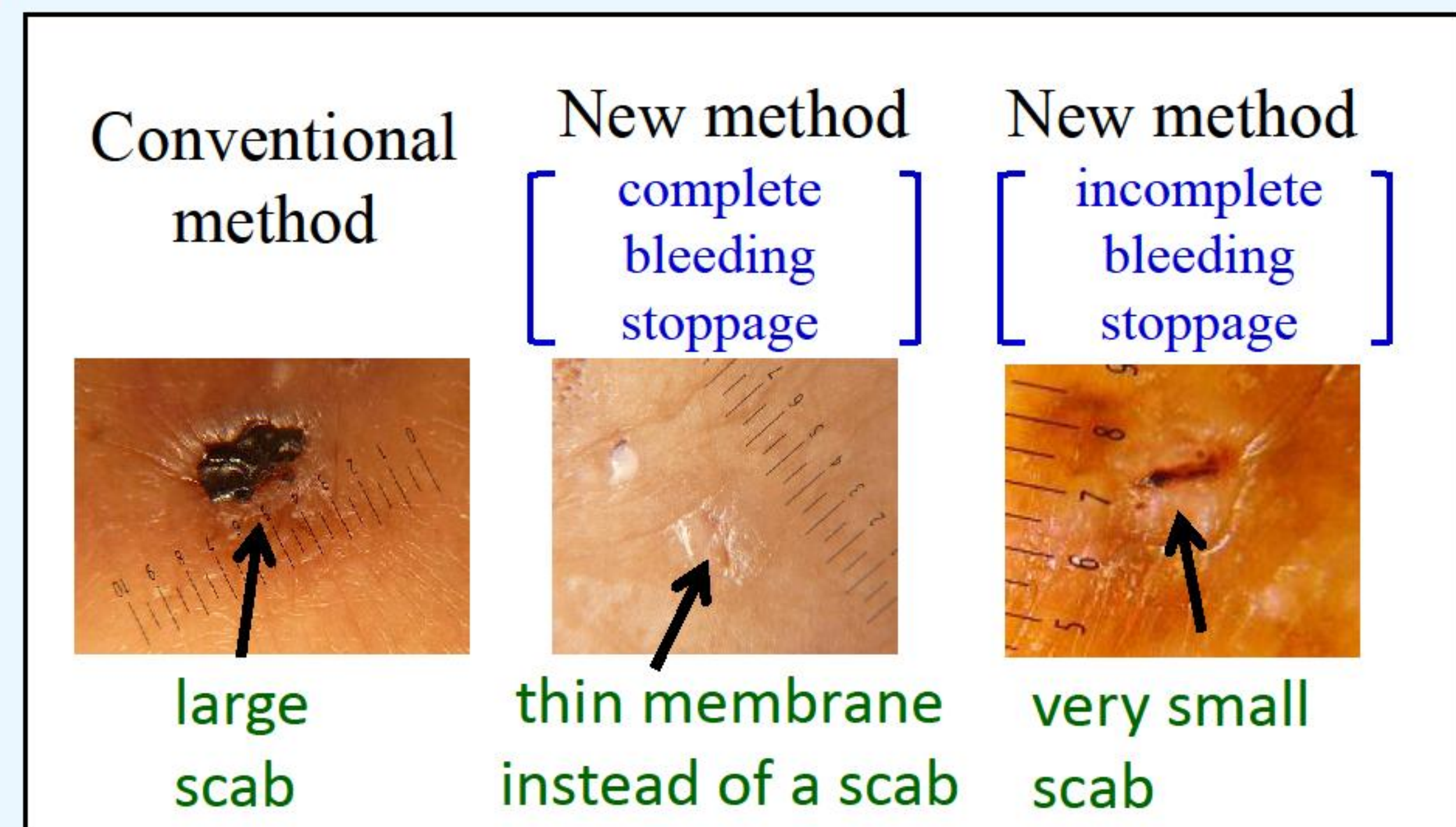


Fig. 2. Results of treating buttonhole entry site with different method

### Results of histological examination of thin membrane formed at the buttonhole entry site (see Fig. 3)

The thin membrane formed at the buttonhole entry site is the stratum corneum with parakeratosis.

A component leaked from the blood vessel is seen to form fibrin deposits, and in the fibrin deposits, neutrophils are seen that are thought to have been included in the original leaked components.

The stratum corneum is seen on the fibrin deposits. In general stratum corneum, nuclei are not seen in keratinocytes, whereas in the stratum corneum in this sample, nuclei are still seen in keratinocytes. In other words, enucleation of keratinocytes is incomplete. This condition is called parakeratosis. This finding shows that turnover of the stratum corneum is very accelerated.

General cornification is not completed in 2 to 3 days, but in parakeratosis, it is completed in a short time.

The information that this stratum corneum is formed in one day is consistent with the histological findings.

Moreover, the fact that a number of neutrophils were found beneath the stratum corneum suggests that this stratum corneum can effectively prevent bacterial invasion.

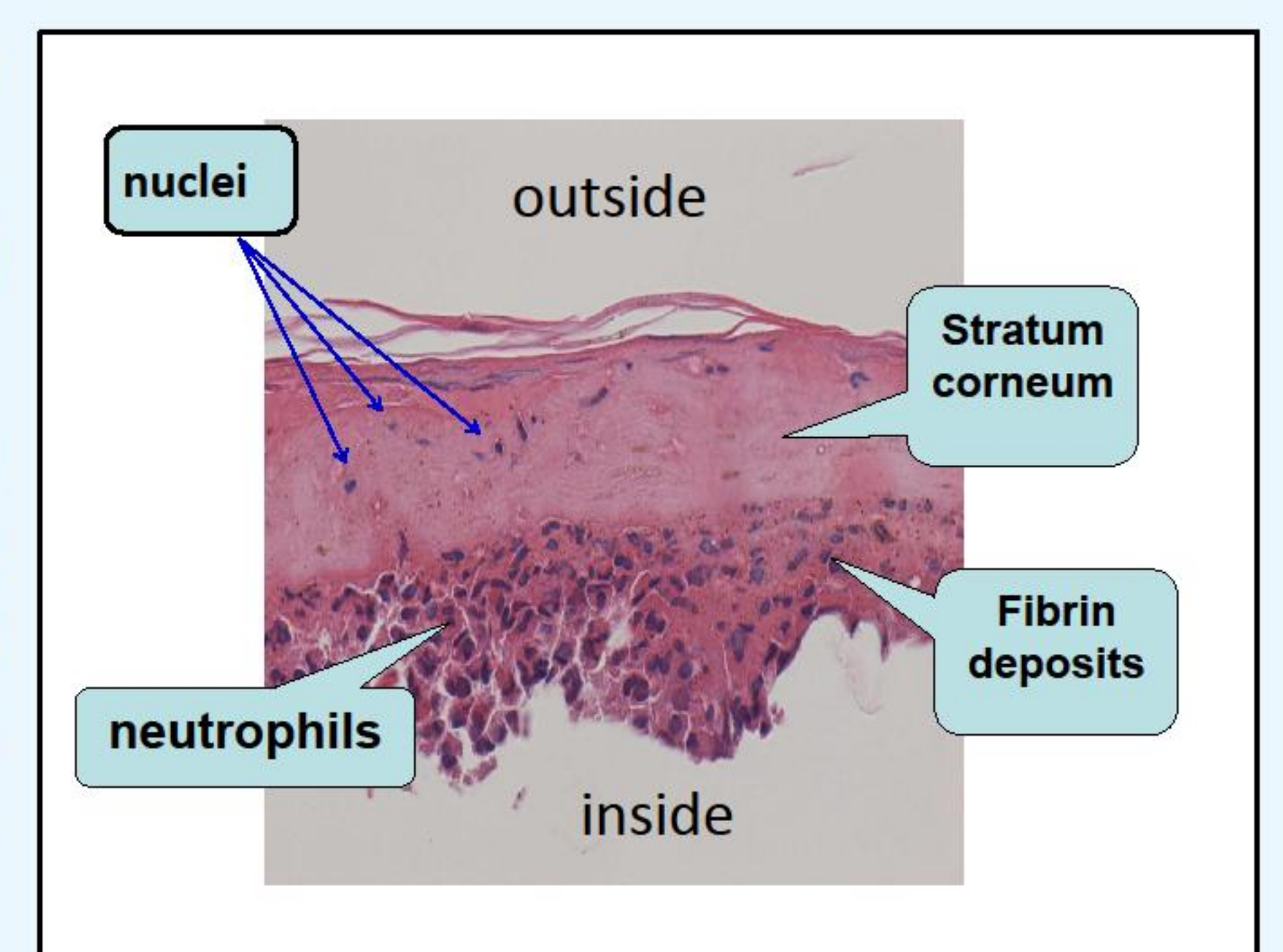


Fig. 3. Histological findings of thin membrane formed at the buttonhole entry site

## Conclusions:

By modifying the moist-healing method, we developed a new buttonhole entry site treating method with which no scab at the site.

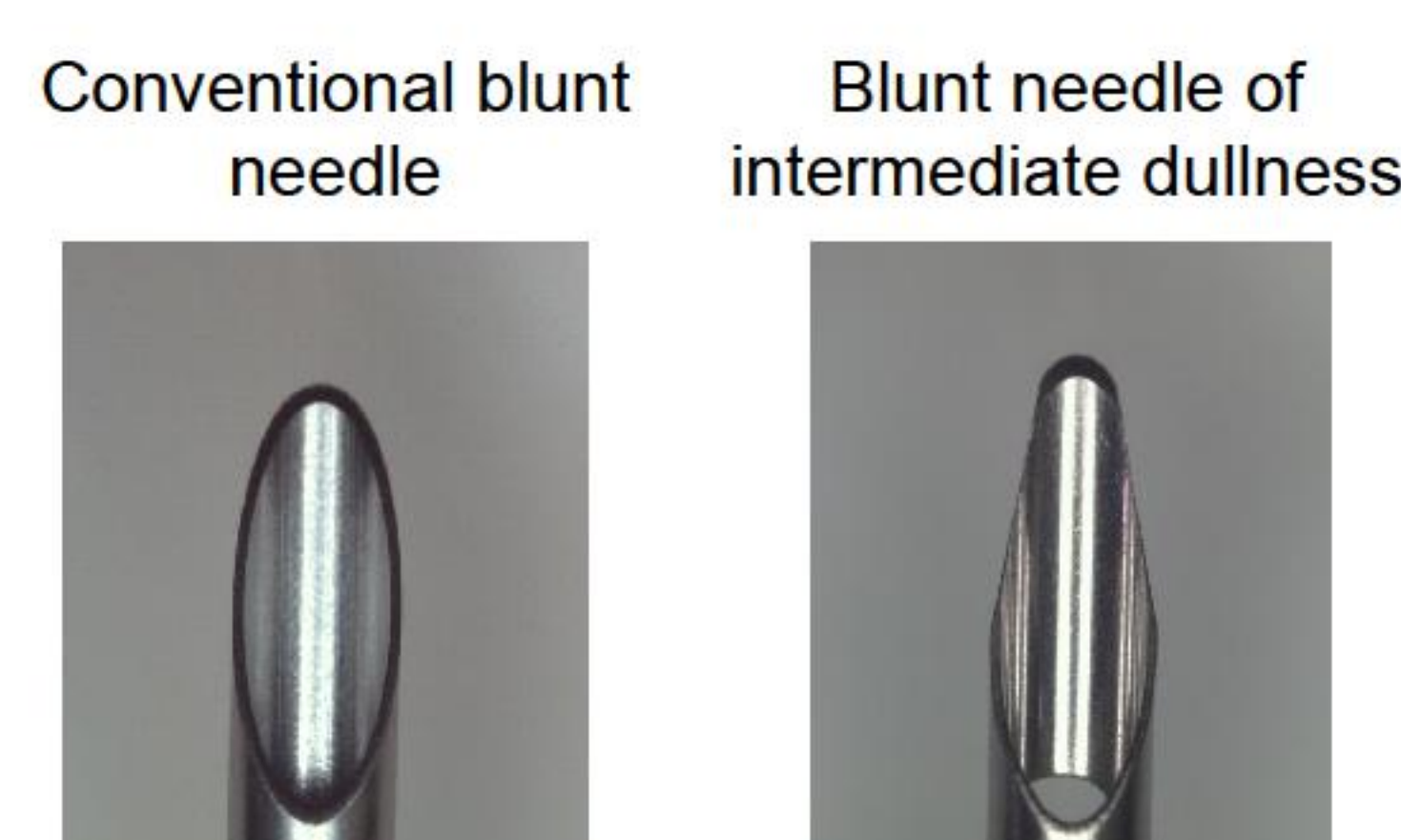


Fig. 4. Blunt needle

