

External tissue stretching for closing skin defects in 22 patients

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In this prospective study, we treated 12 women and 10 men with a newly developed skin-stretching system. The stretching device was used for the closure of 9 fasciotomies and for preoperative skin extension before excision of 6 tattoos, 7 splitskin transplants, 4 giant naevi, and 3 scars. The stretching device was placed under the skin, using local anaesthesia. The patient stretched the skin. The mean

stretching time was 4 (2–11) days. 20 patients completed the expansion successfully, with no pain or only slight discomfort. In 2 cases, we observed minor complications during the expansion. The external skin-stretching system can be used to obtain primary closure of defects where splitskin transplants otherwise would be necessary. The method can be applied in out-patients, using local anaesthesia.

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During the past 10–15 years, different techniques have been developed for stretching the skin (Bashir 1987, Cohen and Cosmetto 1992, Hirsowitz et al. 1993). We have evaluated a newly developed device for rapid stretching of the skin (Blomqvist and Steenfoss 1993). We tested the skin-stretching system in primary closure of defects following fasciotomies and excision of giant naevi, cicatrices, splitskin transplants and tattoos and we report the outcome.

Patients and methods

We treated 12 women and 10 men, mean age 33 (15–67) years. The stretching device was used for the closure of 9 fasciotomies and for preoperative skin extension before excision of 6 tattoos, 7 splitskin transplants, 4 giant naevi, and 3 cicatrices. The widths of the defects were 7 (3–15) cm and the lengths 16 (6–31) cm. All patients gave informed consent, according to the Helsinki II Declaration. The study was approved by the local Ethics Committee.

The device is made of polyamide or silicone rubber and consists of two holding bars with several straps placed between them. Each strap is blocked at one end and has a one-way locking device at the other end. The expander is placed under the skin, using local anaesthetics. The straps are placed through a subcutaneous canal on each side of the defect, parallel to each other at a distance of 2–3 cm. To protect the skin from tension, the straps are placed in the holding bars

on each side of the defect. On the other side, the locking device is attached and tension is applied. The patient is instructed to increase tension twice daily by moving the one-way lock. After 1–2 weeks, the stretching is completed and the device is removed. The interjacent skin is excised and the wound is closed, primarily by subcutaneous and intracutaneous, resorbable sutures. Prophylactic isoxazolyl penicillin is used during the expansion until 3 days after the closing of the defects.

The intensity of pain during the expansion was recorded on a visual analogue scale (0–10 cm). Skin biopsies, 1 cm from the skin edge, were taken before expansion, during the excision and 3 months after the excision. The biopsies were examined by a pathologist, using light microscopy.

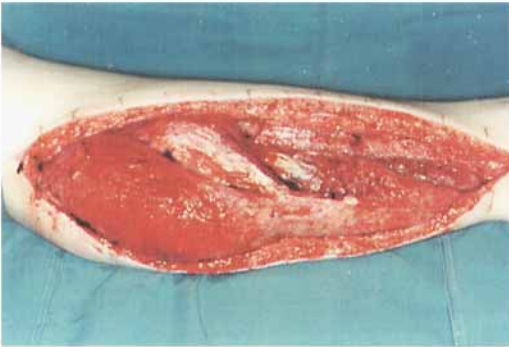
Results

The mean stretching time was 4 (2–11) days. It was shortest for the defects following fasciotomies and longest for the defects following removal of splitskin transplants (Table 1). The mean pain score during the stretching was 2.2 (0–9.0) cm. In most cases, the patients described the pain as of burning character. There were no infections. In 2 patients, rupture of the skin surrounding the central strap entrance occurred after 6 and 8 days. In both cases, the stretching system was used to expand the skin before excision of splitskin transplants and, despite earlier removal than

Table 1. Patients and results. Mean (range)

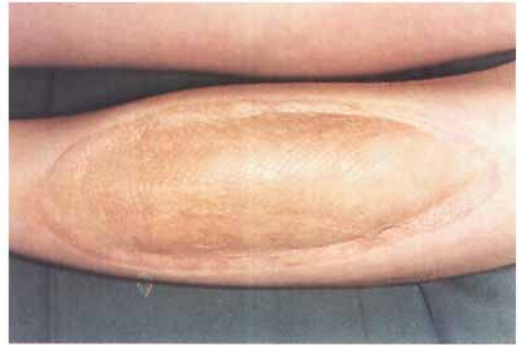
	No. of patients	Age	Width (cm)	Length (cm)	Expansion time (days)	Pain VAS (mm)
Fasciotomies	9	33 (16-46)	9 (6-15)	26 (13-31)	3 (1-4)	30 (0-80)
Tattooes	6	34 (23-39)	7 (4-10)	8 (6-9)	7 (4-11)	22 (5-50)
Splitskin	7	37 (15-64)	8 (5-10)	13 (5-25)	7 (7-8)	24 (10-90)
Naevi	4	19 (17-23)	8 (5-10)	11 (7-14)	6 (3-8)	40 (15-75)
Scars	3	41 (15-67)	5 (3-7)	22 (15-25)	7 (7)	31 (4-80)

Figure 1.

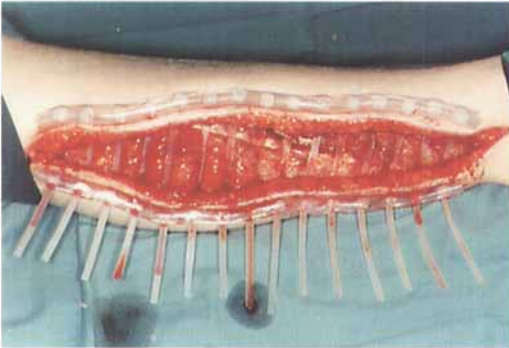


Medial fasciotomy of the lower leg, 30 x 15 cm.

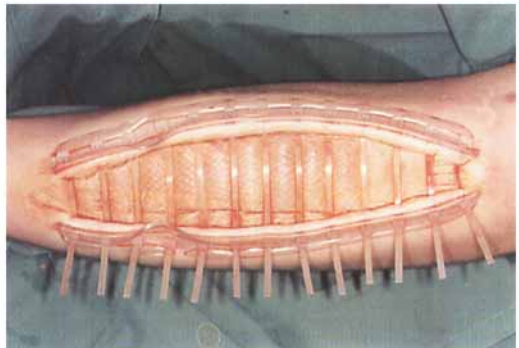
Figure 2.



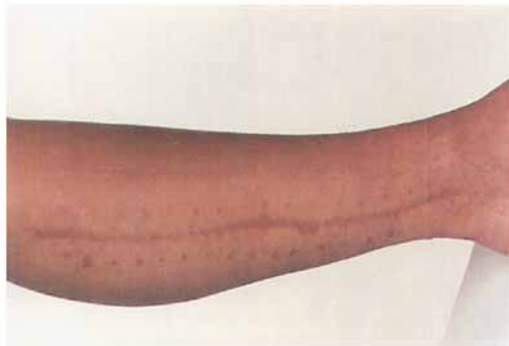
Splitskin transplant on the anterolateral aspect of the lower leg, 25 x 11 cm.



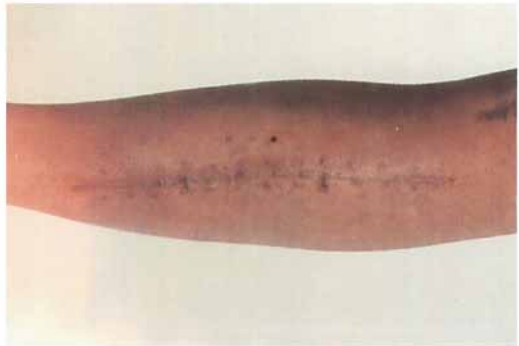
During expansion.



During expansion.



3 months postoperatively.



3 months postoperatively.

planned of the stretching device due to the rupture, most of the splitskin transplant could be removed. The cicatrices were evaluated after 3 months and the width of the scars was then 2 (0-10) mm. All the patients, including the 2 who had experienced central rupture during the stretching, were satisfied with the cosmetic result.

The skin biopsies taken during the excision showed no epidermal changes, but slight dermal edema. After 3 months, the biopsies showed mild reactive inflammation and perivascular infiltration with mast cells in the dermis, while the epidermis was normal.

Discussion

The external stretching device is very efficient for skin extension after fasciotomies to make secondary skin closure possible when the primary defect is large. Today we employ the device in most cases of fasciotomies and avoid the use of splitskin transplants.

The method is economical and easy to use and is also efficient in stretching skin before removal of giant naevi, cicatrices and tattoos. Sometimes it can be difficult to remove a splitskin transplant after stretching, because of adherence of the splitskin to the subcutaneous tissue. It may be better to excise the splitskin before insertion of the stretching device.

References

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