

The mesh skin graft—true expansion rate

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Summary

Using the mesh graft II dermatome (Zimmer) for split skin graft expansion, the 3 to 1 and 1.5 to 1 expansion rates were evaluated for true clinical expansion. In one hundred and one 1.5 to 1 expanded grafts the actual expansion was 1.2 and in sixty 3 to 1 expanded grafts, it was 1.5.

INTRODUCTION

IN SEPTEMBER 1964, James Tanner and Jacques Vandeput published their first paper on the technique of "The mesh skin graft". Using the "mesh-dermatome" with two rollers, one cutting and one knurled, they claimed "at least a 3 to 1 ratio of recipient area to donor area", meaning that a split skin graft could be stretched to three times its original surface area, allowing a 30 per cent body surface area (BSA) burn wound to be covered with a 10 per cent BSA donor site.

For over 8 years in our burn centre we have used the Meshgraft II dermatome (Zimmer) which promises a 1.5 to 1, 3 to 1, 6 to 1 or even a 9 to 1 expansion rate with different dermacarriers ("using a specific expansion such as 6 to 1, one square inch, when fully expanded will cover six square inches in the recipient area"; Zimmer). We usually use a 3 to 1 expansion rate in our burn patients, and in an extensive burn try to stretch the graft as much as possible when the donor site area is limited. The grafts are not sutured in place but are fixed with glue or staples to save on operating time.

However, we felt that, when using this technique, we needed a larger donor site than could be expected with a 3 to 1 expansion rate. To evaluate this 'deficiency' in expansion, we set up a very simple protocol to measure the obtained clinical expansion.

MATERIALS AND METHODS

Grafts were obtained, using an electrical Brown dermatome (Zimmer) set at the 0.12 mark (? 0.012 in), to produce a graft as thin as possible that would still give an acceptable clinical result.

We then measured the donor site defect (in some cases), the graft before expansion, flattened out on the dermacarrier and the meshed graft, fully expanded on a wet and flat surface. Measurements were made with a precision of 5 mm using a sterile tapemeasure.

For the 1.5 to 1 expansion, 60 measurements were made, for the 3 to 1 rate 101, and for the 6 to 1 rate, 14 split skin grafts were measured. All the results were fed into an Apple II personal computer and calculations were made for donor site surface area and graft surface area, unexpanded and fully expanded. The expected surface area was also calculated for the expanded grafts, starting from the surface area of the unexpanded grafts and taking into account the used expansion rate.

From these results the increase in surface area for the different expansion rates could be derived and compared with the expected surface area values. Statistical analysis was done using a computer program by Massart, edited by Elsevier Science Publishers (this program compares two series of data using a paired *t* test).

RESULTS

Donor site surface area vs. graft surface area

Most surgeons we consulted about this problem stated that a split skin graft shrinks after harvesting, due to the elasticity of the skin. However, when taking rather thin skin grafts as in our series, this shrinking is certainly not obvious as shown in Fig. 1. Forty-four donor sites were measured and compared to the 44 corresponding non-expanded split skin grafts.

There was no significant difference between both groups at the 95 per cent level of significance. Some grafts were even somewhat larger than their donor sites, probably due to the stretching effect of the mechanical dermatome.

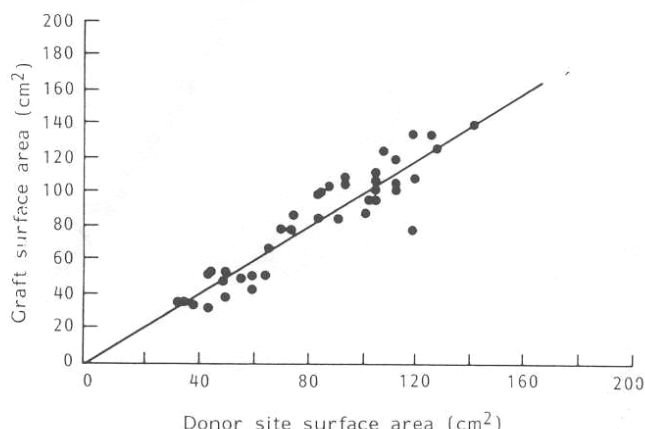


Fig. 1. Donor site surface area versus obtained graft surface area.

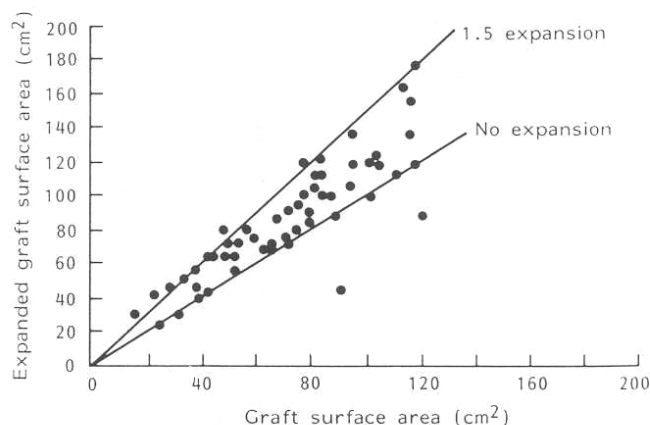


Fig. 2. Expansion rate of 1 to 1.5—obtained expansion versus predicted expansion.

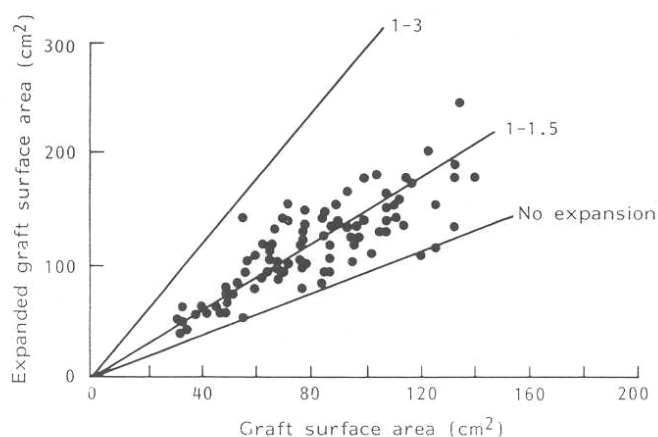


Fig. 3. Expansion rate of 1 to 3—obtained expansion versus predicted expansion.

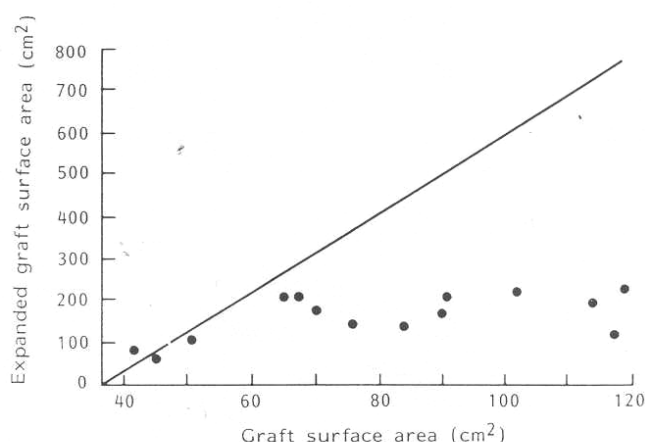


Fig. 4. Expansion rate of 1 to 6—obtained expansion versus predicted expansion.

1.5 to 1 expansion rate

Sixty grafts were measured before and after full expansion. Fig. 2 shows most of the grafts did not reach a 1.5 expansion rate. The obtained clinical mean expansion was 1.23 to 1. Statistical analysis between obtained and expected expansion shows that there is a significant difference ($P=0.001$) between the two groups of data.

3 to 1 expansion rate

At this expansion rate 101 grafts were measured. Fig. 3 shows that no meshed graft reached a 3 to 1 expansion and that a significant number did not even reach a 1.5 to 1 expansion. There is a statistically significant difference ($P=0.001$) between the obtained and expected expansions. The mean obtained expansion was 1.5 to 1.

6 to 1 expansion rate

Only 14 grafts were measured (Fig. 4) and no

statistical analysis was performed because of the small number of measurements.

CONCLUSION

This study has shown that, although the mesh graft technique was a major breakthrough in burn surgery and that there is commonly an 80–100 per cent take of the graft, due to the drainage of haematoma from under the graft, it is not fulfilling its promise in expanding the graft to the expected size. The lesser the promised expansion rate, the closer the obtained results approach the expected ones.

REFERENCE

Tanner J. C., Vandeput J. and Olley J. F. (1964) The mesh skin graft. *Plast. Reconstr. Surg.* 34, 287.

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