Predicting Allograft Requirement in the Management of Patients with Major Burn Injuries

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Introduction

- Early debridement and coverage of burn wounds saves lives.
- Allograft is the 'gold-standard' for temporary coverage of acute burns.

The benefits of allograft include:

- Physiological closure of the debrided burn wound.
- Avoidance of creating additional wounds in the unwell patient.
- Added certainty that the burn wound is adequately debrided before using valuable autograft.

In New Zealand our allograft is stored by the New Zealand Blood service:

- Approximately 50,000cm^2 are available immediately.
- If need exceeds 25,000cm^2 an overseas order is placed to the USA.
- Orders can take upto 5 days to arrive.

Predicting allograft requirement is challenging. The only published predictive model[1] is based principally on the 'sandwich grafting' technique.

Aim

To produce a guide for the calculation of allograft ordering in acute burn care suitable for the model of care at the National Burn Centre
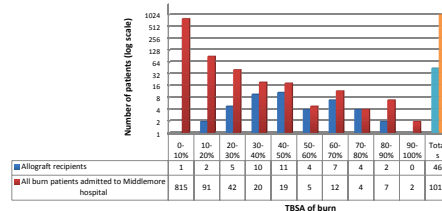
Method

- 5 year retrospective review (2006–2011).
- Included all adults admitted to the National Burn Centre of New Zealand with burn injuries on whom allograft was used as a temporary wound coverage.
- Data sources included clinical records, electronic records, tissue bank records.

Demographics

- 46 patients...   14 (30%) female   32 (70%) male
- mean = 37 years...   16–76 years
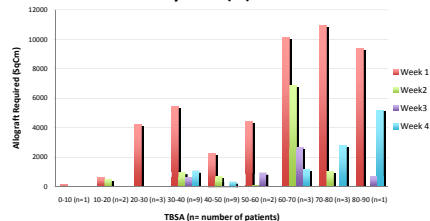- mean 44% TBSA...   0.5%–80% TBSA
- 15% mortality

References and Acknowledgements
1. Horner C. et al. Estimating the usage of allograft in the treatment of major burns. Burns. 2011 June;37(4):590-93. UK
2. Saffle J. Closure of the excised burn wound: temporary skin substitutes. Clin Plastic Surg 36 (2009) 627–641. USA
3. Chua A. et al. The impact of skin banking and the use of its cadaveric skin allografts for severe burn victims in Singapore. Burns. 2004 Nov;30(7):696-700. Singapore.
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Results

TBSA of allograft recipients compared to all patients admitted with burn injuries

Predicting Total Allograft requirement
(Probability that predicted order will be sufficiently large)
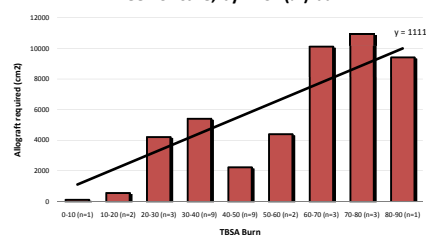
1017 patients admitted with burns 2006 –2011:
- *55% of patients with burn injuries over 30% TBSA used allograft.*
- *<1% of patients with burn injuries under 30% TBSA used allograft.*

A logarithmic relationship exists between TBSA (%) burn and total allograft requirement (cm^2).

Significant variations in the amount of allograft used exist. These most likely reflect rationale behind allograft use.

In our unit allograft is:
- *Used for deep and full-thickness burns.*
- *Only used in a 'sandwich-technique' in 6% of operations.*
- *The 'dressing-of-choice' for temporary wound cover in 74 % of patients.*
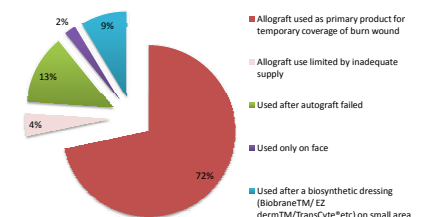- *Usually meshed.*

Average allograft used per patient per week by TBSA(%) burn

- 60% of all allograft used is used in the 1st week.
- Amount used decreases rapidly after this.

Rationale for using allograft

- Allograft used as primary product for temporary coverage of burn wound
- Allograft use limited by inadequate supply
- Used after autograft failed
- Used only on face
- Used after a biosynthetic dressing (BiobraneTM/ EZ dermTM/TransCyte®etc) on small area

Predicting allograft requirement for the first week of care, by TBSA(%) burn

$y = 1111.x$

Week one Allograft requirement (cm^2) = 1111 x TBSA (%)

Allograft index

Using Height and weight to estimate Body Surface area (Mosteller formula) an allograft index can be estimated
AI= Allograft used (cm^2) / Burn size (cm^2)

- **Week one Allograft index = 0.62cm^2**
  0.62cm^2 of allograft is needed for every cm^2 of burn

- **Total allograft index = 0.9cm^2**

Conclusions

- *Allograft is used in the care of the majority of patients with >30% TBSA burns.*
- *Variables in the amount of allograft needed include surgical technique and the rationale for allograft useage*
- *In our unit and with our practice we need (on average)*
  - *in the first week... 0.62cm^2 / cm^2 of burn*
    or 1,111 x TBSA (%) if height & weight unknown
  - *0.9cm^2 / cm^2 of burn for the duration*