Use of bioartificial dermal regeneration template for skin restoration in combat casualty injuries

A letter in response to: Seavey JG, Masters ZA, Balazs GC, Tintle SM, Sabino J, Fleming ME & Valerio IL. Use of bioartificial dermal regeneration template for skin restoration in combat casualty injuries. *Regen. Med.* 11(1), 81–90 (2016).

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It was with great interest that we read the article by Dr Seavey *et al.* titled ‘Use of bioartificial dermal regeneration template for skin restoration in combat casualty injuries’ [1]. We congratulate the author on this important study, its outcome and conclusion where the point is made that efforts should be made to promote and develop the use of dermal substitute for complex plastic surgery reconstruction. We found four advantages to the uses of dermal substitute in plastic reconstructive surgery [2]: the technique allows for a significant degree of contour restoration after extensive tissue loss. In the case of insufficient resurfacing or insufficient bulk, two or three layers of Integra® can be added to the first layer using the same procedure. The major disadvantage of tissue flaps is the persistent bulky aspect at the end of the procedure. Conversely, skin grafting is an inherently 2D technique and can result in a hollow at the reconstructed side when compared with the contralateral nonoperated side [2]; the method uses an off-the-shelf tissue substitute. In other words, if an initial application of Integra fails or needs to be revised, no native tissue is lost. This technique avoids donor site functional morbidity and scars [3,4]; reconstruction with Integra is a relatively simple and short procedure when

compared with alternative approaches: the patient’s state (shock, infection and instability), the treatments initiated (vasopressins), and the local conditions of the recipient site (local inflammation) might contraindicate certain extensive and difficult operative procedures, such as free flaps [2–4]; finally, the use of Integra allows not only unexpected limb salvage in some instances, but also more rapid restoration of function for activities of daily living. Indeed, rehabilitation can be performed once the matrix vascularization is effective, approximately 1 week after reconstruction [2]. Then, following skin grafting, rehabilitation can commence following healing, after approximately 10 days.

In cases with extensive bone exposition and poor local tissue, skin graft, dermal substitute and pedicle flap may not be suitable and a free flap would be indicated [5,6]. Therefore, we have one question: do you have experience with the use of dermal matrix as a complementary tool for free flap pedicle coverage in lower limb reconstruction?

In addition to the advantages of dermal matrix for complex reconstruction described in the literature, we have found additional benefits for the specific indication of free flap pedicle coverage. It avoids skin tension and compression at the level of the pedicle.

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A compression of the free flap pedicle would result in a thrombosis of the vessels and flap necrosis. Additionally a hematoma at the level of the pedicle will be highly visible due to the change of color of the Integra. This renders this complication easy to identify permitting rapid intervention: the Integra can be removed easily while awaiting surgical revision. This avoids compression of the pedicle and thrombosis of the vessels.

Recently, Leclère *et al.* published a series of ten lower limb reconstructions including free flaps with Integra, where Integra was used to cover the free flap pedicle [7]. This shows that dermal matrices are complementary to conventional flap procedures and that their development and growing indications will contribute to better surgical management of patients, particularly after

combat casualty injuries, where large defects and open fractures are frequent.

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