Dermal equivalents, a surgical alternative for the treatment of massive burns and post burn reconstructive surgery: A French experience

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Summary
The Management of burns evolves and progresses, decade by decade. The progress in intensive care, with the development of adequate resuscitation formulae for major burns in the acute phase, was followed by surgical progress which benefited patients who would formerly have died from the initial shock of the burn. In the seventies, early excision and immediate grafting were developed. The surgical procedure enabled a reduction in morbidity and enhanced the probability of survival of patients who, formerly, died when the wounds exceeded 30% of body surface area. Currently, it is not rare to save patients who have suffered burns over 80% of the body area, thanks of the combined advances in intensive care and surgery. Skin coverage requirements have thus become more acute. It is currently recognized that prompt and permanent coverage of deep burns is indispensable, not only in order to ensure the survival of major burn victims but also to prevent the emergence of hypertrophic sequelae and contractures that may seriously compromise the social and functional future of the patients thus saved. However, in the event of very extensive burns, the areas available for skin graft procurement are frequently inadequate. Research has thus addressed the development of epidermal, dermal and composite dermal and epidermal skin replacements. In 1981, Yannas and Burke were the first to develop an extracellular dermal regeneration template intended to ensure definitive coverage of burns, following excision. The template, which is available without delay, enables initial coverage of the burns. Then, following ingrowths by the recipient’s cells, the template is slowly biodegraded and replaced by autologous dermis with normal architecture. Following vascularisation, the dermis is covered by a thin epidermal graft and the assembly thus reconstitutes equivalent full-thickness skin in vivo. The two major complications, immediate septic shock and secondary hypertrophic sequelae, are thus avoided. Marketed under the proprietary name, Integra®, the template has been available in France since 1997. The long-term clinical assessment has shown, apart from the risks of infection between the two surgical steps needed, that when the dermis has taken, the cosmetic and functional results are markedly superior, thanks to the final suppleness of the skin obtained. Since 2007, a new dermal template, under the name of Matriderm®, is available, made of collagen fibers (obtained from bovine dermis and contains the dermal collagen type I,III and V),and elastin (obtained from bovine nuchal ligament by hydrolysis), without any chemical cross linking. This one millimetre matrix could be epidermalized in a one single stage surgical procedure. The healing time and the numbers of surgical procedures are reduced. Long term evaluation has shown quick and good functional and cosmetic results with a reduction of the inflammation. Dermal equivalents thus constitute a supplementary surgical alternative in the treatment of deep and extensive burns and their sequelae, particularly when healthy zones for use as split thickness skin grafts, whole skin or flaps are note available.