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Real-time demonstration of split skin graft inosculation and integra dermal matrix neovascularization using confocal laser scanning microscopy.

Greenwood J, Amjadi M, Dearman B, Mackie I.; Eplasty. 2009 Aug 20;9:e33.

ABSTRACT

OBJECTIVES: During the first 48 hours after placement, an autograft "drinks" nutrients and dissolved oxygen from fluid exuding from the underlying recipient bed ("plasmatic imbibition"). The theory of inosculation (that skin grafts subsequently obtain nourishment via blood vessel "anastomosis" between new vessels invading from the wound bed and existing graft vessels) was hotly debated from the late 19th to mid-20th century. This study aimed to noninvasively observe blood flow in split skin grafts and Integra dermal regeneration matrix to provide further proof of inosculation and to contrast the structure of vascularization in both materials, reflecting mechanism.

METHODS: Observations were made both clinically and using confocal microscopy on normal skin, split skin graft, and Integra. The VivaScope allows noninvasive, real-time, in vivo images of tissue to be obtained.

RESULTS: Observations of blood flow and tissue architecture in autologous skin graft and Integra suggest that 2 very different processes are occurring in the establishment of circulation in each case. Inosculation provides rapid circulatory return to skin grafts whereas slower neovascularization creates an unusual initial Integra circulation.

CONCLUSIONS: The advent of confocal laser microscopy like the VivaScope 1500, together with "virtual" journals such as ePlasty, enables us to provide exciting images and distribute them widely to a "reading" audience. The development of the early Integra vasculature by neovascularization results in a large-vessel, high-volume, rapid flow circulation contrasting markedly from the inosculatory process in skin grafts and the capillary circulation in normal skin and merits further (planned) investigation.