VASCULARISED BONE GRAFTS

Essay

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By

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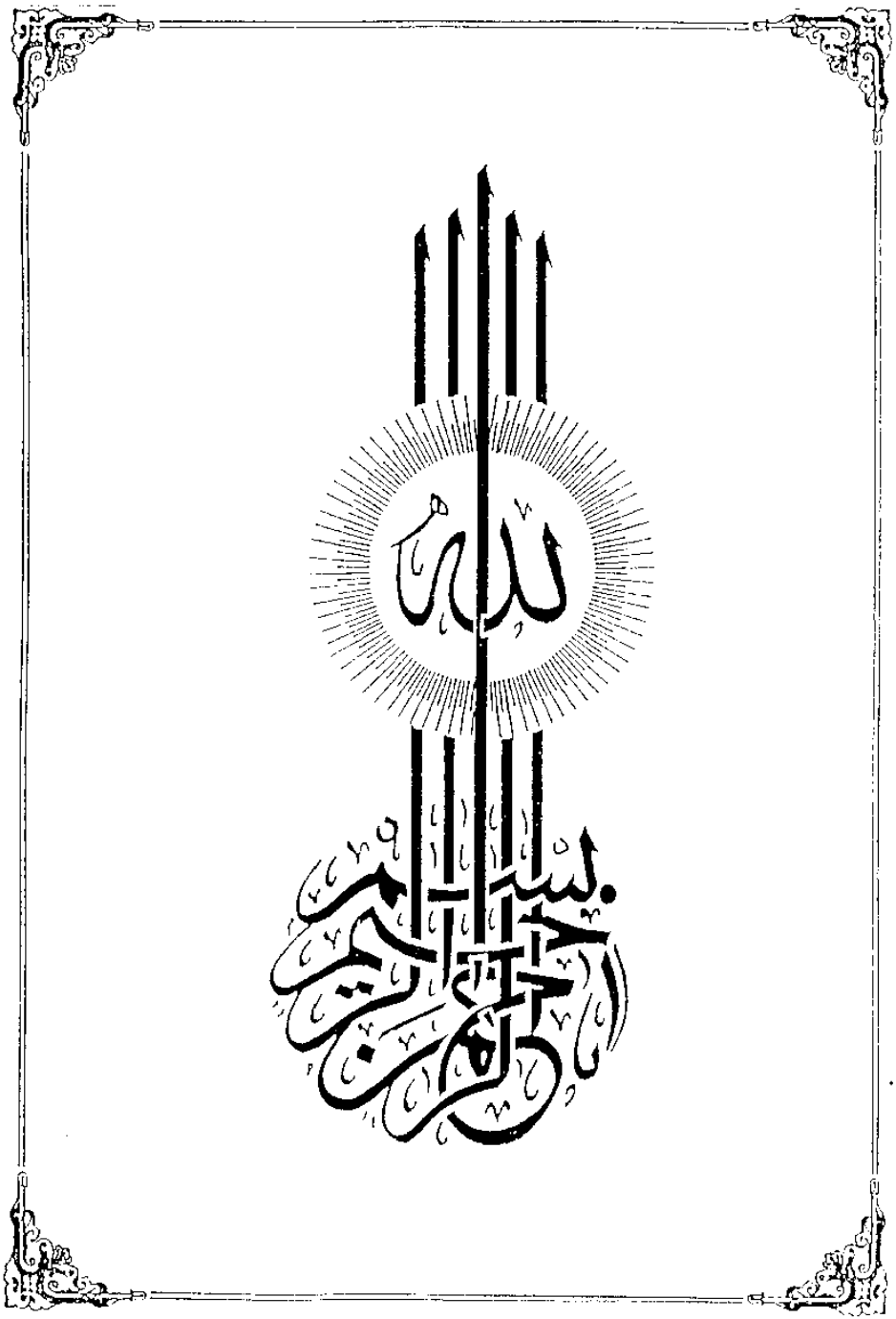

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Introduction

The past two decades have witnessed a change in the use of bone grafting in the human biologic system from the mere fact of use and observation of the outcome, to a dynamic scientific endeavor. The coming decade will certainly witness one of the most fascinating challenges in the application of bone grafts, perhaps to the extent of the fantasies of the late 1800s becoming a reality in the late 1900s.

(Habal, Reddi 1992)

Bone grafts are used, in general, as a framework both to provide stability and to augment healing.

They come in different forms and shapes, and the manner of their application is dependent on the configurations and structure of the grafts that are used or the deformity to be corrected. This is extremely important because bone graft healing is now believed to be primarily determined by the degree of vascularization that takes place. The degree of revascularization is also related to the stimuli in surrounding tissue that allow surrounding vessels to start budding into the freely applied grafts. Free vascularized bone grafts do not usually go through this biologic cascade of events before they become a viable unite to produce solid healing.

(Habal 1992)

Experimental and clinical studies indicate that immediately vascularized autografts enjoy improved osteocytes survival and enhanced bony incorporation. These studies suggest that the vascular grafts mature and hypertrophy more consistently than nonvascularized bone grafts when placed in an orthotopic site.

(Goldberg 1987)

Historical Review

Bone Grafting has a long history. In 1867 after literature reveiw and from his own research, Ollier concluded that bone and periosteum transplanted from one site to another remained osteogenic under appropriate circumstances.

Barth and Marchand disagreed with Ollier's conclusion, stating instead that transplanted bone dies and is replaced with surrounding tissue. They were the first to propose the theory of creeping substitution, which is still valid today. (Chase, Herdon 1955)

In the early 1900s, various cases were reported in which bone grafts were mobilized with a vascular pedicle and seemed to do well. With these reports, studies began as to the importance of the vascular supply to the bone graft. In 1926, Dax report that there was delayed healing or non union in fractures in which the nutrient artery was injured. (Dax. 1926)

Johnson, in 1927, confirmed Dax's observation and also concluded that the peripheral vessels contributed little to graft survival. He found that 75% of blood flow was marrow based and only 25% came from the periphery. (Johnson, 1944)

In 1944, Albee found that the haversian systems in grafted bone