Special lecture 1.
The Concepts of Functional Reconstruction in Replantation of the Head

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Replantation surgery is the best form of reconstruction for an amputated hand or part of it. If correctly selected, properly reconstructed and vigorously rehabilitated the functional recovery can be very good and better than any other forms of reconstructions.

Amputation is a complex injury to the "six" tissues of the hand. In severe cases there is a zone of tissue loss. The replantation surgery is a reconstruction of the "six" tissues. All the injured tissues have to be immediately restored and lost tissues quickly replaced. From a functional stand point the basic structures to be reconstructed are the bones, joints and skin.

This aims to achieve a quality skin cover over a stable skeletal scaffold. The next consideration in the reconstruction is the "cabling and piping". The tendons and nerves are reconstructed first(to provide the future movement and sensation) before the vascular anastomoses are done(to give the hand immediate viability). The reconstruction is certainly a paradox. The most "difficult" microvascular anastomoses seemingly so important, gives only viability but not the function.

The reconstructive technique emphasises on 1) Rigid bone fixation with preservation of joints. The fixation should be most rigid possible without violation of the joint, impinging on the tendon or protruding through the skin. 2) Quality skin cover with at least 50% of good skin edge appositihin and all residual defects to be covered with a flap to achieve primary intention healing. 3) Improved tendon repair to allow immediate active range of motion. Consider tendon graft, tendon transfer or redding if necessary. 4) Proper nerve repair and liberal use of nerve grafting if necessary. 5) Extensive vascular repairs are performed on as many arteries and veins as possible that can be indentified.

Indication for replantation is based on replantation effort over expected functional recovery. A rigid list of indications and contraindications is outdated. Replantability is a concept bases not on the level of amputation, but solely on the quality of the distal amputate. If a artery and possibly a vein can be indentified, that amputate is certainly replantable.

Rehabilitation in such severe injury should start "immediately" and performed "vigorously".

The concept is to give the therapist an ideal case that can withstand a vigorous therapy regime without fear of vascular compromise. Techniques for rehabilitation of combined flexor and extensor tendons have to be developed to overcome tendon adhesions. Early active use and integration has hastened functional recovery.

Replantation has been performed from the very young of 8 months old to the very old of 65 years old and for the very distal tip of the finger to the finger to the proximal upper arm. Viability of the replant cannot be considered as a successful outcome unless it is functional. The author will review the range of these cases and discuss the pitfalls in some of these cases and the reasons for the good success in the others.

Special lecture 2.
Influence of Intraarterial Infusion of PGE1 on Skin Flap Microcirculation

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Introduction

The skin flap is one of the most important concerns in plastic surgery. We have tried, in animal experiments and clinical experience, the regional arterial infusion of PGE1 with the aim of increasing the survival area of a skin flap, and have confirmed an excellent effect. In the present experiment, we confirmed there is a direct action on microcirculation of a skin flap.

Method

A large `12×20cm island skin flap was prepared on rabbit abdomens with a pedicle of superficial vessels. An intraarterial infusion catheter was inserted into the left femoral artery, and its tip was retained at the bifurcation of the abdominal aorta. This flap usually has a survival area of about 60%, but regional arterial infusion of PGE1 can increase this to about 90%(Ann. Plasts. Surg., 30:154, 1993).

The skin flaps were examined with the following points in mind. (1) Blood flow : 24 hours after preparation of a skin flap, the presumed area of survival was delineated by a fluorescein luminescence test. The blood flow before and after the administration of PGE1 was measured by laser Doppler blood flowmeter. (2) Microvascular diameter : The skin flap is so thin the microvascular system can be observed biomicroscopically. Microscopic images were successively recorded by video and the vascular diameter measured by the image-splitter method before and after the administration of PGE1. (3) Microvascular blood flow velocity : Blood flow velocity of the arterioles and venules was measured at 1,000 frames/sec using a high-speed video system(Kodak Ektapro, 1,000). (4) Red blood cells : The number of red blood cells passing through a capillary was counted for 30 seconds before and after the administration of PGE1 using a high-speed video system.

Results

(1) The relative blood flow increased concentration-dependently. The rate of increase was greatest at the borderline level of skin flap necrosis. (2) Arterioles showed distinct dilation while venules did not. Arteriole diameter increased concentration-dependently under arterial infusion of PGE1, and only slightly under intravenous injection. (3) Blood flow velocity in both arterioles and venules showed concentration-dependent increases 10 minutes after the commencement of PGE1 arterial infusion, but only slight increase under intravenous injection. (4) There was a great increase in the number of red cells passing through a capillary 10 minutes after following the start of PGE1 arterial infusion, but only a slight increase under intravenous infusion

Discussion

The increase in flap survival area due to the regional infusion of PGE1 has been suggested to be ascribable to the increase in intra-skin flap blood flow, especially at the borderline of necrosis. This blood flow increase proved to be due to dilation of the arterioles, the increase in blood flow increase proved to be due to dilation of the arterioles, the increase in blood flow velocity resulting from antithrombotic action, and improved red blood cell deformation. Arterial infusion is far more effective in generating a series of these actions than intravenous infusion.

No. 1.

Reconstruction of Defects of the Digits by Using Reverse Dorsal Digital Island Flap

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Among the digital injuries casued by mechanical damage and physical forces, when skin and soft tissue defects and accompanied, the funtional and cosmetic aspects of digits must be satisfactory by offering solid tissue maitaining normal length of digits and restoration of sensibility of damaged digits and durability for the satisfactory reconstruction of digits damage. Local