Evaluation of Skin Blood Flow

Using Laser Speckle Phenomena (II)

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Many methods have been studied assessing the viability of free flap transfer during the postoperative period.¹⁾ The new technique using laser speckle phenomena is a useful noninvasive, continuously reading method which can detect movement of red blood cells within the dermal capillaries.^{2) 3)}

To use a monitoring of skin blood flow after free flap surgery, the experiment was prepared to analize the power spectral distribution (PSD), which was previously mentioned, before and after clamping the vascular pedicle of animal flap. After a rabbit was anesthetized with intravenous pentobarbital (20mg/kg), a 5x3cm flap was designed to include the superficial epigastric artery and vein. The flap was raised and the nutrient vessels were dissected out. An hour after a microvascular clamp placed on the artery showed decreasing high frequency in PSD (fig.1). When the axial vein was obstructed with a microvascular clamp, same feature was observed shown in fig.2. There was no remarkable difference in PSD between arterial clamp and venous clamp in this experiment.

On the other hand we also utilized this method in clinical case , and analized the daily change of PSD in free flap. A 36-year-old women suffered from hemifacial atrophy for more than 6 years. A deepithelized free groin flap was transfered to the subcutaneous pocket of affected right cheek. A small 1x2cm skin of flap was exposed to monitor blood flow after surgery. Pre-operative PSDs of groin and left cheek for control showed in Fig.3. One day after surgery, PSD of the flap was resemble of control region of left groin (Fig.4). The PSD of the flap increased the component of high frequency 3 days after flap transfered (Fig.5). 10 days postoperatively PSD of the flap showed middle value between PSD of groin and cheek (Fig.6). Although

no further conclusion can be mentioned because of short follow up time, it is seen that the skin blood flow of flaps can be monitored by measuring the PSD.

References

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Fig.1

Fig.2

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