Thermography in Assessment of the Vascularity of Soft-Tissue Flaps

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- Tube pedicle grafts were raised on the back of eight rats. Infrared thermography was utilized to indirectly assess the vascularity of the grafts. The pedicle grafts were divided at seven or eleven days post-surgery and monitored thermographically. Flaps where the temperature was more than 4.5°C lower than that of the surrounding skin did not survive when divided. Infrared thermography can be utilized to assess the vascularity of pedicle flaps and may be helpful in determining the correct time to divide the pedicle.

Introduction

Flaps are a versatile technique for soft-tissue reconstruction. However, whether they are random flaps, axial flaps, or free microvascular flaps, the success of the flap depends on an adequate blood supply's being established. When the flap is raised, it must have an adequate blood supply in its pedicle to maintain viability, and after transfer a new blood supply must be established from the recipient bed if the pedicle is later to be divided. Many methods have been devised to monitor the blood supply, and hence the vitality of soft-tissue flaps, but none is routinely used, for a variety of technical and clinical reasons.

The infrared thermographic camera was used to detect the heat given off from the skin surface of rats, which depends on the cutaneous blood supply. Specifically, the infrared camera was utilized to monitor temperature changes in a soft-tissue flap to see if they would reflect the underlying blood supply and hence the viability of the flap.

Materials and Method

The infrared camera utilized for temperature measurement can monitor surface temperatures between −40°C and +26°C, with a discrimination of 0.1°C at ambient temperatures. Thus it is accurate enough to reproducibly monitor skin temperatures. Results can be displayed graphically or pictorially and can be stored on video tape.

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Figure 1. A tube pedicle flap raised on the back of a rat.

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