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Determining Transverse Rectus Abdominis Musculo-cutaneous Flap Viability using Fingerstall-type Tissue Oximetry as an Alternative to Indocyanine Green Fluorescence Imaging: A Case of a Patient with Iodine Hypersensitivity

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The blood circulation regions of Zone IV and Zone II in the transverse rectus abdominis musculo-cutaneous flap are known to depend on individual patients.[1] Conducting the indocyanine green (ICG) test helps ensure the safety of flap surgery; however, there have been reports of anaphylactic shock due to ICG intravenous injection.[2,3] Even a single small-dose administration (5 mg) of intravenous ICG can cause anaphylactic shock,[4] so its administration to patients with iodine hypersensitivity is contraindicated. We developed a noninvasive method using the fingerstall-type tissue oximetry system Toccare (Astem, Japan) to determine the skin perfusion area.[5] Accumulating results indicated the average tissue oxygen saturation (StO_2) matching the ICG border to be 41.4%. We applied this result to a clinical patient with iodine hypersensitivity for the first time.

CASE

The medical ethics committee of our institution approved this study. A 47-year-old woman underwent right breast reconstruction by a pedicle transverse rectus abdominis musculo-cutaneous flap. She had asthma and atopic dermatitis in her medical history. An asthma attack occurred during a previous session of iodinated contrast computed tomography performed at another hospital. She was therefore diagnosed with iodine hypersensitivity. No subsequent imaging inspections using contrast media had been performed. She also reported food allergies for shrimp and crab. We judged the risk of an ICG test to be very high and therefore contraindicated. As such, the Toccare system was applied as an intraoperative noninvasive evaluation method. For intraoperative use, an echo probe cover was used. Blue fabric was laid under the flap to avoid any influence of underlying structures. We searched for points at which the StO_2 was 45%, 40%, or 30% after elevation of the flap to describe the boundary lines (Fig. 1). Comprehensive StO_2 measurement of the entire flap and determination of the boundary lines took about 5 minutes. When the flap was cut with a 40% line, dark-red continuous bleeding was observed. After transferring the flap to the right chest, the skin was further

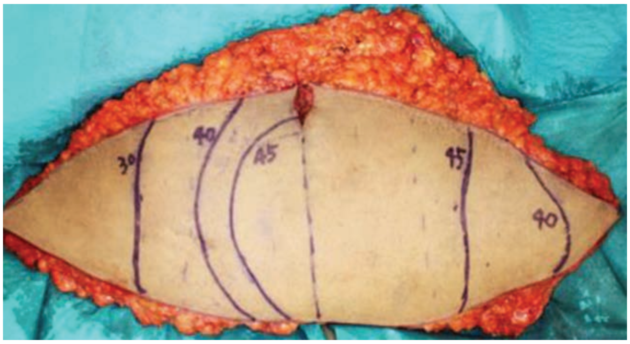

Fig. 1. Measurement of the StO2 value. Lines for 45%, 40%, and 30% were described.

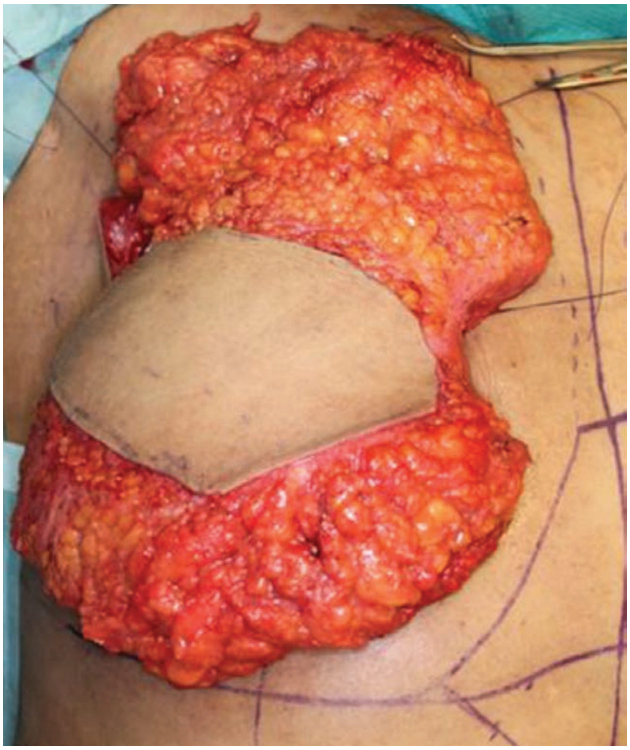

Fig. 2. Transfer of the flap to the right chest. The skin was trimmed on a 45% line. The fat was trimmed along a 40% line.

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trimmed to a 45% line and showed red bleeding (Fig. 2). The fat layer was excised along a 40% line, and dark-red, continuous bleeding was observed. The surgery resulted in no flap failure.

Anaphylactic shock has been reported even in cases with negative iodine test findings or no history of drug allergies.[4] The ICG test should be considered as an invasive method, even for patients with no history of allergy. Our novel method can be expected to be widely applicable as a new alternative method for evaluating flap viability.

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DISCLOSURE

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