Perfusion Assessment of the Deep Inferior Epigastric Artery Perforator Flap: A Blood Gas Analysis

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Purpose:

Tissue oxygen saturation is a commonly used method to assess and evaluate free flap physiology. However, it is an indirect proxy, subject to variation by position, lighting, and other systemic factors. In this study of abdominally-based breast reconstruction free flaps, blood gas samples from the deep inferior epigastric vein (DIEV) and the superficial inferior epigastric vein (SIEV) are compared to systemic arterial and venous values. By doing so, the authors aim to demonstrate the direct impact of perforator selection on flap physiology. To our knowledge, no study to date has evaluated the *in vivo* blood gas variations for breast free flap reconstruction.

Methods/Materials:

Ten consecutive patients undergoing deep inferior epigastric artery perforator (DIEP) free flap breast reconstruction were prospectively included. Demographic data were collected preoperatively. Intraoperatively, systemic arterial blood gas (ABG), venous blood gas (VBG), FiO_2, pulse oximetry, and end-tidal CO_2 were measured. Simultaneously, VBG from the SIEV and DIEV were noted. Flap characteristics and intra- and post-operative complications were recorded, with at least 30 days of follow-up.

Results:

Comparison of the venous blood gas samples demonstrated no statistical difference among the pH, $PaCO_2$, and base excess of the DIEV, SIEV, and systemic blood samples. However, the PaO_2 of the systemic blood samples was higher than its respective value in the DIEV and SIEV sample ($p < 0.01$). There were no cases of fat necrosis, partial flap loss, or total flap loss.

Conclusions:

The blood gas values, in particular oxygenation, of the DIEV and SIEV in DIEP flaps do differ from systemic values.