

procedures. Specifically, free flaps resulted in reduced compensation in wRVUs per minute compared with pedicled flap reconstruction. Plastic surgeons should be aware of their impact and the inconsistencies observed in procedure-specific assigned wRVUs in order to appropriately value their time and efforts.

Use of Infrared Thermography for Flap Monitoring: A Systematic Review

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PURPOSE: The refinement of microvascular techniques for tissue transfer have led to reductions in flap transplant complications; however, flaps are still susceptible to high vascular complication rates, which can lead to flap loss.¹ If vascular compromise is identified early, salvage of the flap may be possible. Despite this, there is controversy in the literature regarding which methods are best for flap monitoring. Infrared thermography (IRT) is a simple and noninvasive technology that has the potential to address these concerns. IRT functions by measuring the infrared emissivity of the skin, which correlates with blood flow.² Although its use has been described in other patient populations, the use of IRT for monitoring of flaps is not well described. Thus, we have conducted a systematic review to investigate the ability of IRT to serve as a tool for intraoperative and postoperative flap monitoring.

MATERIALS AND METHODS: A systematic review of the literature was conducted on PubMed, Ovid Medline, and Google Scholar in accordance with PRISMA guidelines using the keywords: FLIR, forward looking infrared, IR thermography, thermal imaging, thermography, flap, flaps, perforator, free, local, random, pedicle, transverse, rotation, transposition, advancement, interpolation, map, mapping, monitor, monitoring, viability, necrosis, design, and our last search was performed March 2021. After screening 206 titles and abstracts, 43 articles were selected for full-text review. We included all articles from 1990 to present investigating the use of IR thermography for monitoring flaps in adult and pediatric patients. We excluded reviews, non-English articles, and animal studies.

RESULTS: After inclusion criteria were applied, a total of 15 articles were included in our final review. The ability of IRT to detect intraoperative perfusion insufficiencies following anastomosis was investigated in 10 articles. IRT was able to detect increases in temperature as flaps were reperfused in 9 of 9 articles. Four articles found that IRT could identify vascular congestion or arterial insufficiency, which allowed surgeons to reposition the flaps and restore blood flow. The ability of IRT to provide postoperative flap monitoring was investigated in 12 articles. One study found that flaps with vascular compromise were significantly cooler than normal flaps, while another study found that the magnitude and speed of rewarming was lower in flaps with complications. Other articles consisted of preliminary studies or case reports describing the ability of IRT to monitor perfusion and identify flap necrosis. Two studies discussed the ability of IRT to monitor perfusion in dark-skinned patients, where traditional methods such as capillary refill would be more challenging to assess.

CONCLUSIONS: IR thermography is a promising technology for monitoring flaps; however, there is a lack of high-quality evidence, and the current literature consists primarily of preliminary studies or case reports. Further research is required to better understand how IRT can be applied to provide adequate flap monitoring.

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Growth and Development among Patients with Pierre Robin Sequence: National Center for Child Health and Development (Tokyo, Japan) Experience

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