

A Comparison of Free Autologous Breast Reconstruction with and without the Use of Laser-Assisted Indocyanine Green Angiography: A Cost-Effectiveness Analysis

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ABSTRACT:

Background: Laser-assisted indocyanine green angiography is a U.S. Food and Drug Administration–approved technology used to assess tissue viability and perfusion. Its use in plastic and reconstructive surgery to assess flap perfusion in autologous breast reconstruction is relatively new. There have been no previous studies evaluating the cost-effectiveness of this new technology compared with the current practice of clinical judgment in evaluating tissue perfusion and viability in free autologous breast reconstruction in patients who have undergone mastectomy.

Methods: A comprehensive literature review was performed to identify the complication rate of the most common complications with and without laser-assisted indocyanine green angiography in free autologous breast reconstruction after mastectomy. These probabilities were combined with Medicare Current Procedural Terminology provider reimbursement codes (cost) and utility estimates for common complications from a survey of 10 plastic surgeons to fit into a decision model to evaluate the cost-effectiveness of laser-assisted indocyanine green angiography.

Results: The decision model revealed a baseline cost difference of \$773.66 and a 0.22 difference in the quality-adjusted life-years, yielding an incremental cost-utility ratio of \$3516.64 per quality-adjusted life year favoring laser-assisted indocyanine green angiography. Sensitivity analysis showed that using laser-assisted indocyanine green angiography was more cost-effective when the complication rate without using laser-assisted indocyanine green angiography (clinical judgment alone) was 4 percent or higher.

Conclusion: The authors' study demonstrates that laser-assisted indocyanine green angiography is a cost-effective technology under the most stringent acceptable thresholds when used in immediate free autologous breast reconstruction.

KEY POINTS:

1. With improved clinical outcomes, yet increased cost, the goal of this publication was to perform a cost-effectiveness (utility) analysis to see whether there was a cost-utility benefit in using laser-assisted indocyanine green angiography in immediate breast reconstruction patients undergoing mastectomy followed by autologous free flap surgery.
 - a) This search revealed eight studies, including 152 reconstructed breasts in women who underwent TRAM, DIEP, superficial inferior epigastric artery, superior gluteal artery perforator, and gracilis myocutaneous free flap breast reconstructions with the use of laser-assisted indocyanine green angiography.
2. A comprehensive review of the literature revealed 14 published studies, which included 1497 reconstructed breasts in women who underwent either transverse rectus abdominis myocutaneous (TRAM) or deep inferior epigastric perforator (DIEP) free tissue autologous breast reconstruction.
3. Probabilities of health states with laser-assisted indocyanine green angiography were derived from a thorough review of the literature using the Cochrane and MEDLINE electronic databases with key words "laser assisted indocyanine green angiography" and "breast reconstruction," and limiting findings to human subjects undergoing free autologous breast reconstruction and English language articles.
4. Comprehensive literature review revealed that the overall complication rate without laser-assisted indocyanine green angiography was 26.5%, whereas the complication rate with laser-assisted indocyanine green angiography dropped to 5%.

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5. The reduction in postoperative complication rates is largely attributable to the objective ability of laser-assisted indocyanine green angiography to assess vascular abnormalities that the standard, traditional clinical examination cannot provide.
6. The comparison of laser-assisted indocyanine green angiography versus no laser-assisted indocyanine green angiography in immediate breast reconstruction led to a \$3516.64 per quality-adjusted life year gained in favor of laser-assisted indocyanine green angiography, demonstrating cost-effectiveness for this technology under even the most stringent guidelines for acceptable health care costs.

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