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Use of a novel laser projection grid to assess symmetry in breast surgery

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Introduction

In the field of breast reconstruction, many surgical methods exist to minimize complications while maximizing aesthetic appearance^{1–3}. However, all techniques still rely on subjective judgment to assess symmetry, often the most concerning parameter for the patient.

Assessing symmetry is challenging and increases operative time through repetitive patient repositioning and guesswork. Here, we demonstrate a novel laser projection grid that assists in evaluating symmetry during two cases of reconstructive breast surgery.

Patients and Methods

Our first patient underwent a bilateral reduction mammoplasty with a Wise-pattern technique and was reduced from a double D-cup size to a B-cup size. Our second patient underwent revision of a right-sided DIEP flap reconstruction and liposuction for superior pole fullness with a left breast mastopexy for symmetry. To assess symmetry intra-operatively, the patient was seated upright and we used a small handheld laser grid (Laser Grid GS1, GhostStop) with bolded central axes (Figure 1). The grid was registered to the patient's body by aligning the vertical axis to a midline mark drawn from the sternal notch to the umbilicus and the horizontal axis to the nipples or inframammary folds (Figure 2).

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Discrepancies between contralateral breasts, in terms of volume, nipple location, and breast borders were identified by counting boxes and by comparing the coordinates of contralateral structures (Figure 2). We then used this objective information to tailor the breast mound while addressing specific symmetry discrepancies.

Discussion

Despite advancements in breast reconstruction techniques that decrease negative outcomes such as scarring and flap necrosis, achieving a high level of symmetry remains challenging. In one retrospective multi-center study, 15% of vertical reduction mammoplasties resulted in troubling breast asymmetry⁴. Recently, three- and four-dimensional laser scanning has been described for preoperative planning of breast reconstruction⁵. However, this requires extensive scanning time and analyses not feasible intra-operatively. Our laser projection grid is an inexpensive, sterile, and facile method for achieving aesthetically excellent outcomes. Indications for usage include any reconstructive surgery, particularly when contralateral structures, such as the ears, cannot be viewed simultaneously. The grid also provides an objective measure that is useful when two surgeons operate in parallel on contralateral structures.

We used a commercially available Class 3B laser grid, which cannot be viewed directly but can safely be viewed in the operating room when reflected on the patient's skin or the wall and when the face is draped. A Class 1 or 2 laser grid can also be used, which would be safe for direct eye exposure and widely applicable in the office setting.

The laser projection grid does not remove the need for artistic vision or expert understanding of surgical anatomy and technique. It simply reduces the guesswork in pre-operative planning, intra-operative assessment, and post-operative follow-up. Even in the field of breast reduction surgery, which is considered to give fairly consistent results, a significant percent of patients have post-operative asymmetry. Our laser projection grid offers a quantitative metric in these situations that have traditionally been evaluated only qualitatively.

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Figure 1.

(A) The laser grid device is powered by 2 AA batteries and contains a class 3B laser. It is extremely portable ($7 \times 11\text{cm}$) and a tripod mount on the inferior surface can be used for stabilization and for consistent and reproducible measurements. (B) The projected grid is red and has bolded vertical and horizontal axes for alignment to anatomic landmarks. The size of the grid can also be adjusted based on distance from the subject.

Figure 2.

(A) Intra-operative use of the projected laser grid pattern in a breast reduction. The horizontal axis shows that the superior aspect of the nipple areolar complex is symmetric.
(B) Intra-operative use of the laser grid on a right breast reconstruction revision and left

mastopexy. Individual boxes from the grid pattern were compared to assess symmetry, location of the inframammary fold, and nipple position.