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Scalpel Versus Monopolar Electrocautery in Reduction Mammaplasty: An Intra-Patient Comparative Study

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Abstract

Background

The method of tissue dissection in reduction mammaplasty may influence intraoperative efficiency, postoperative recovery, and scar quality. While scalpel dissection remains the traditional standard, monopolar electrocautery is increasingly used due to its hemostatic advantages.

Methods

This retrospective split-breast study included patients undergoing bilateral reduction mammaplasty. One breast was dissected using a scalpel and the contralateral breast using monopolar electrocautery. Intraoperative parameters, postoperative pain, drainage, and scar quality, assessed using the Patient and Observer Scar Assessment Scale (POSAS) were compared within the same patient.

Results

Forty patients were analyzed. Monopolar electrocautery resulted in significantly reduced intraoperative bleeding and shorter hemostasis time, although excision time was longer. Early postoperative pain and drainage volume were higher on the electrocautery side but equalized during follow-up. Scar quality at 6 months was comparable between techniques.

Conclusions

Monopolar electrocautery provides effective hemostasis with comparable mid-term cosmetic outcomes to scalpel dissection in reduction mammaplasty. When used with careful technique, it represents a reliable alternative to cold knife dissection.

• Split-breast design allows direct intra-patient comparison.
• Electrocautery reduces bleeding and hemostasis time.
• Early postoperative pain may be higher with electrocautery.
• Mid-term scar quality is comparable between techniques.

Level of Evidence

Level III, therapeutic study.

Introduction

Reduction mammaplasty is a widely performed procedure in plastic and reconstructive surgery, primarily aimed at alleviating the physical symptoms and psychological burden associated with macromastia.[1] Patients typically report chronic neck and back pain, bra strap grooving, shoulder indentation, intertriginous rashes, and functional limitations, all of which significantly impair quality of life.[2] Beyond

functional improvement, breast reduction surgery also carries important aesthetic and psychosocial implications, making both surgical technique and outcomes critically relevant.[3]

Multiple operative approaches have been described over the past decades, differing mainly in pedicle selection, resection pattern, and surgeon preference.[4–5] Among these variations, the method of tissue dissection remains a fundamental determinant of intraoperative efficiency, hemostasis, postoperative healing, and scar formation. Traditionally, the scalpel has been regarded as the gold standard due to its precision and minimal lateral tissue injury.[6] With increasing technological advancement, energy-based devices such as monopolar electrocautery have gained widespread adoption across surgical disciplines, offering simultaneous cutting and coagulation with the potential to reduce bleeding and operative time.[7]

Materials and Methods

This retrospective case series included patients who underwent bilateral reduction mammaplasty between January 2024 and December 2025. Institutional ethics committee approval was obtained prior to data collection, and the study was conducted in accordance with the principles of the Declaration of Helsinki.

Inclusion criteria consisted of bilateral reduction mammaplasty cases performed by the same surgical team using a superomedial pedicle technique in conjunction with Wise-pattern skin excision. Cases in which the same dissection method was used for both breasts were defined as exclusion criteria; for intra-patient comparison, only patients in whom a scalpel was used on one breast and monopolar electrocautery on the contralateral breast were included. Side allocation was randomized intraoperatively.

Data were collected from surgical records, anesthesia charts, and outpatient follow-up documentation. Intraoperative variables included dissection time per breast, total operative time, estimated blood loss (based on sponge count), and time to achieve hemostasis. The use of tranexamic acid and the volume of tumescent infiltration were also recorded. Pre- and postoperative hemoglobin levels were analyzed to assess the physiological impact of blood loss.

Postoperative parameters included drainage volume from each breast until drain removal and pain intensity measured using the Visual Analog Scale (VAS) on postoperative days 1 and 3. Objective breast measurements (nipple-to-sternal notch distance, vertical pillar length, upper pole projection, chest circumference, bra size) were recorded preoperatively and at 1, 3, and 6 months postoperatively. Scar quality at 6 months was evaluated using the Patient and Observer Scar Assessment Scale (POSAS).

Paired statistical tests were used for intra-patient comparisons, with a significance threshold of $p < 0.05$.

Results

In this intra-patient comparative study, forty patients undergoing bilateral reduction mammaplasty were evaluated, with one breast dissected using a monopolar cautery device and the contralateral breast using a scalpel. This design enabled a direct and controlled comparison between the two techniques, minimizing patient-related variability. The mean patient age was 42.2 years (range: 20–60).

The average reduction in hemoglobin concentration postoperatively was 1.87 g/dL, with a maximum decline of 3.5 g/dL, and no patient required blood transfusion. Quantification of intraoperative bleeding based on soaked sponge count revealed less bleeding on the monopolar cautery side (mean 3.83) compared with the scalpel side (4.15, $p < 0.05$).

Excision time was significantly longer on the cautery side (32.1 minutes) compared to the scalpel side (27.3 minutes, $p < 0.05$). In contrast, hemostasis time was shorter on the electrocautery side (7.58 vs. 10.5 minutes, $p < 0.05$).

VAS pain scores on postoperative day 1 were higher on the monopolar cautery side (7.95 vs. 5.91, $p < 0.05$) but were comparable by postoperative day 3 ($p > 0.05$). Drain output was greater on the cautery side (81.7 vs. 65.1 mL, $p < 0.05$), whereas drain removal time did not differ significantly between groups.

POSAS evaluation at postoperative month 6 demonstrated similar patient- and observer-reported scar scores between techniques, with no statistically significant difference in total POSAS scores ($p > 0.05$). Representative preoperative and postoperative clinical photographs are shown in Figure-1.

Intraoperative and postoperative outcomes according to dissection technique are summarized in Table 1.

Discussion

The method of tissue dissection in reduction mammaplasty plays a pivotal role in both short-term postoperative recovery and long-term aesthetic outcomes. While traditional scalpel dissection has long been regarded as the gold standard for its tactile control and minimal thermal injury[10], monopolar electrocautery has gained increasing popularity due to its technical efficiency, particularly in hemostasis and time-saving benefits. Nevertheless, concerns regarding thermal spread, fat necrosis, and wound healing have limited its universal adoption in aesthetic breast surgery[7–11].

Recent studies emphasize that the choice of dissection tool can influence complication rates and patient satisfaction[12]. In our series, monopolar electrocautery demonstrated advantages in hemostasis time and intraoperative bleeding control.

This study aims to fill this gap by evaluating bilateral reduction mammaplasty in which one breast is dissected using a scalpel and the contralateral breast with monopolar electrocautery. By comparing operative time, blood loss, postoperative pain, drainage, wound-healing parameters, and scar quality within the same patient, this split-breast design provides a controlled and objective analysis of two commonly used dissection modalities.

Our split-breast design eliminates inter-patient variability and allows each patient to serve as their own control. Contrary to earlier concerns, mid-term follow-up revealed comparable cosmetic and scar outcomes between techniques. Patient- and observer-reported POSAS scores were similar, supporting the safety of electrocautery when applied with meticulous technique.

Conclusion

Both scalpel and monopolar electrocautery are viable and effective dissection tools in reduction mammaplasty. Electrocautery offers reduced intraoperative bleeding and shorter hemostasis time, with comparable cosmetic outcomes despite higher early postoperative pain. The retrospective design of this study represents an inherent limitation and may be associated with selection bias.

Declarations

Ethics approval

This study was approved by the local institutional ethics committee (Approval No: KÜ GOKAEK-2025/22/11; Project No: 2025/511) and was conducted in accordance with the principles of the Declaration of Helsinki.

Clinical trial number

Not applicable. This study was retrospective and was not registered as a clinical trial.

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Author Contribution

B.C. conceived and designed the study, collected the data, performed the statistical analysis, and drafted the manuscript. M.B, K.N.B. contributed to data collection, data interpretation, and manuscript revision. C.U. contributed to the surgical procedures, clinical data acquisition, and critical revision of the manuscript. E.K.Y. contributed to data interpretation, literature review, and critical revision of the manuscript. M.S.A. supervised the study, contributed to the study design and interpretation of the findings, and critically revised the manuscript. All authors reviewed and approved the final version of the manuscript.

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Tables

Tables are available in the Supplementary Files section.

Figures

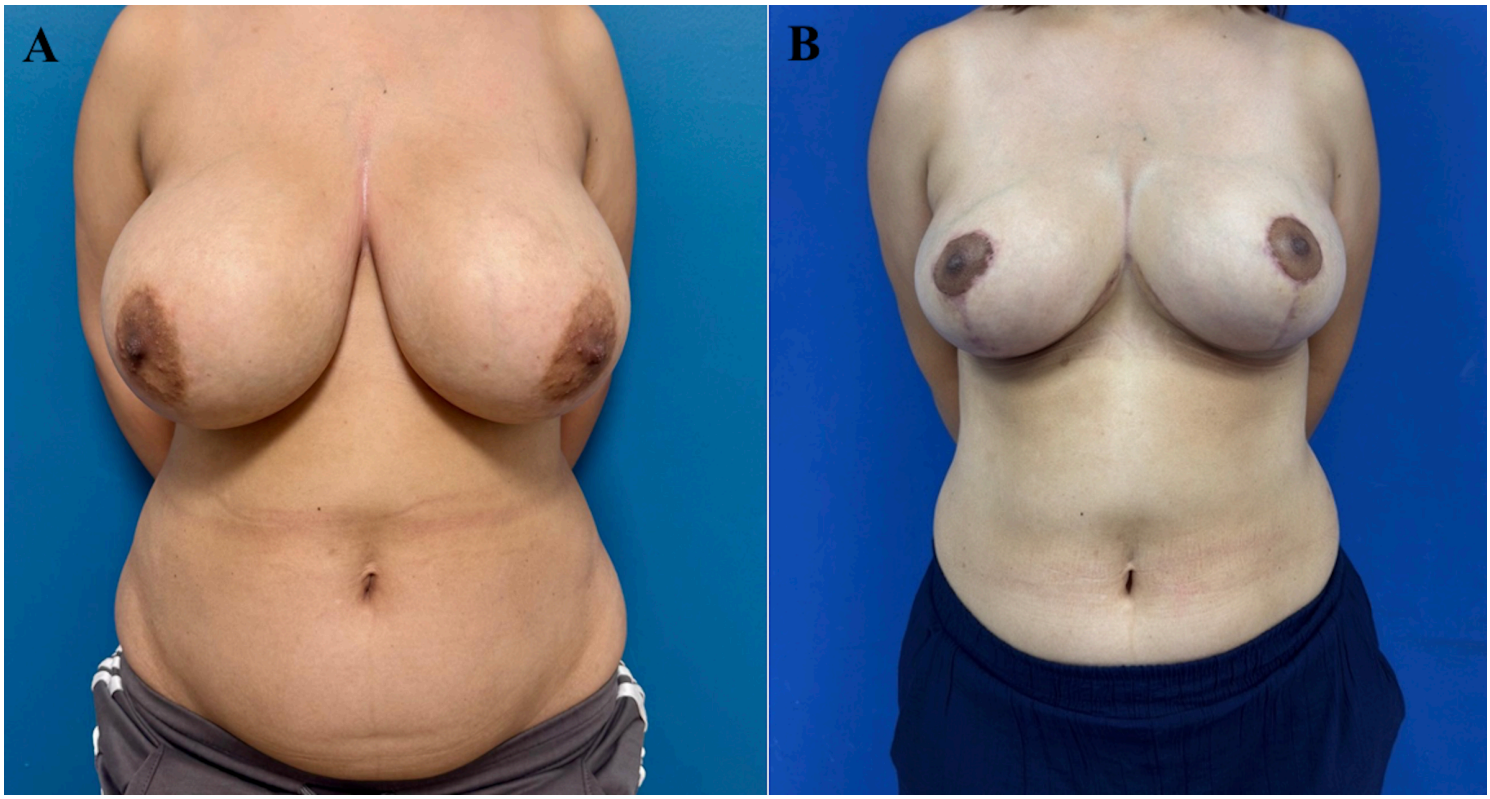


Figure 1

Preoperative and postoperative appearance of Patient 1

Figure 1. Frontal views of Patient 1 undergoing bilateral reduction mammaplasty.
(A) Preoperative appearance demonstrating marked breast hypertrophy and ptosis.
(B) Postoperative appearance at 6 months. The right breast was dissected using a scalpel and the left breast using monopolar electrocautery. No clinically apparent difference in scar quality was observed between the two sides.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

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