International Surgery Journal
Mathan PJ et al. Int Surg J. 2025 Aug;12(8):1372-1377
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: https://dx.doi.org/10.18203/2349-2902.isj20252293

Case Report

Endoscopic breast conservation surgery for early-stage invasive carcinoma: a case report-first case from India

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Received: 11 May 2025
Revised: 12 June 2025
Accepted: 21 June 2025

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ABSTRACT

This case report features a 60-year-old woman found during regular mammographic screening to have early-stage invasive tubular carcinoma. She had sentinel lymph node biopsy (SLNB) combined with endoscopic breast conservation surgery (EBCS). The operation was successfully carried out with great cosmetic results, little postoperative pain, and no instant side effects. Histopathological analysis confirmed invasive tubular carcinoma with negative margins and a tumor-free sentinel node. In suitably chosen patients, this case shows EBCS's viability, safety, and oncological adequacy. While observing oncological standards, it also highlights the possible advantages of minimally invasive methods in breast cancer surgery, such improved cosmetic results, lower morbidity, and greater patient satisfaction.

Keywords: Mammographic screening, EBCS, Case report

INTRODUCTION

Breast cancer remains a leading cause of morbidity and mortality worldwide, with early-stage invasive carcinoma accounting for a significant proportion of diagnoses.[1,2] The paradigm of breast cancer management has shifted toward therapies that balance oncological safety with aesthetic outcomes.[3,10] Breast-conserving surgery (BCS), combined with adjuvant radiotherapy, has become the gold standard for early-stage disease, offering survival rates equivalent to mastectomy while preserving breast anatomy.[2,9] However, traditional BCS often results in visible scars and suboptimal cosmetic results, which can negatively impact patient quality of life.[9,10] In recent years, minimally invasive endoscopic techniques have emerged as a transformative approach to address these limitations.[2,6,7] Endoscopic breast-conserving surgery (EBCS), pioneered in several Asian countries, utilizes small incisions and advanced imaging to achieve precise tumor resection with minimal tissue disruption.[1,2,9] This method leverages endoscopic visualization, intraoperative ultrasound, and lymphatic mapping to enhance surgical accuracy.[1,5,10] Technological advancements, such as indocyanine green (ICG) dye for sentinel lymph node biopsy (SLNB) and high-resolution imaging systems, have further refined the procedure.[1,3,4] Studies by Lai et al and Tamaki et al have demonstrated the feasibility of EBCS in achieving clear margins and excellent cosmetic outcomes, positioning it as a promising alternative to conventional techniques.[1,6]

Breast-conserving surgery, followed by adjuvant radiotherapy, remains the standard of care for early-stage breast cancer, with outcomes comparable to mastectomy.[2,9] Over time, surgical goals have expanded to encompass not only oncological safety but also cosmetic and psychological well-being.[10,11] EBCS) is a novel, minimally invasive technique designed to minimize scarring and preserve the natural breast contour, thereby improving patient satisfaction.[9,10,12] EBCS incorporates oncological principles with advanced endoscopic visualization, allowing precise tumor excision through small, remote incisions in concealed areas such as the axilla or peri areolar region.[1,2,5] This approach has

gained popularity, especially in East Asia, where the demand for better cosmetic results has driven the evolution of minimally invasive breast techniques.[1,2,7] SLNB when combined with EBCS, further reduces surgical morbidity by avoiding complete axillary lymph node dissection in clinically node-negative patients while maintaining accurate nodal staging.[1,9] This case report presents a patient with early-stage invasive tubular carcinoma who underwent successful EBCS with SLNB. The surgical technique, outcomes, and histopathological findings are discussed to highlight the feasibility, safety, and value of this approach in modern breast cancer care.

CASE REPORT

A 60-year-old female presented to our hospital following the detection of a BI-RADS IV(Figure 1) lesion on a routine mammogram with a history of bronchial asthma, prior hernia repair, bilateral cataract surgery, and hemithyroidectomy (2015). There was no relevant family history of breast cancer. Clinical examination revealed an ECOG performance status of 1, with normal cardiovascular and respiratory systems, and a soft, non-tender abdomen. Local examination of the left breast revealed no palpable lesion, and no axillary lymph nodes were palpable. The right breast and axilla were normal. Ultrasound-guided biopsy of the lesion confirmed invasive tubular carcinoma.

Surgical procedure

The patient was placed with the ipsilateral shoulder was abducted to 90 degrees and elevated to 30 degrees to prevent conflict between the operating table. The patient underwent EBCS with SLNB. The procedure was performed under aseptic conditions. Indocyanine green (ICG) dye was administered via peri-areolar injection, followed by a two-minute massage. Ultrasound-guided needle localization of the tumour was performed (Figure 2), and the tumour site was marked.

An axillary incision was made for SLNB (Figure 2), utilizing a dual-dye technique. Frozen section analysis of the sentinel lymph node was negative for malignancy. The incision was deepened along the subcutaneous plane, and tunnelling was performed using scissors (Figure 3). A wound retractor and glove port were placed to facilitate endoscopic access (Figure 4). Dissection was carried out through monopolar scissors (Figure 5,6).

Intraoperative ultrasound done to reconfirm the tumor, Margins were marked, and the tumour was excised completely (Figure 7). Intraoperative ultrasound was performed on the specimen post-excision to confirm tumour identification and adequate margins. Frozen section analysis of the margins confirmed they were free of tumour. The wound was irrigated, the cavity approximated with V-Loc sutures, and haemostasis was secured. The skin was closed with monocryl sutures (Figure 8), and a sterile dressing was applied.

Steps

Step 1: Tumor localization with intraoperative ultrasound

During the surgery, intraoperative ultrasound was employed to assist in the precise localization and excision of the tumor. The ultrasound images captured the 0.5×0.5 cm lesion in the upper outer quadrant of the left breast, providing real-time guidance to ensure the complete and accurate removal of the affected tissue.

Step 2: Guide wire localization

Guidewire localization of the tumor involves the precise placement of a thin wire into the breast to mark the location of the abnormal tissue. In this case, ultrasound guidance was used to ensure accurate positioning of the needle and subsequent placement of the guidewire. Once the guidewire was in place, it served as a map for the surgeon to follow during the excision of the tumor.

Step 3: Sentinel lymph node with ICG dye

SLNB is a critical procedure in the management of breast cancer, aimed at determining the extent of cancer spread. In this case, an ICG dye was administered via peri-areolar injection to help identify the sentinel lymph node. The dye travels through the lymphatic pathways, highlighting the node that is the primary recipient of lymphatic drainage from the tumor.

Following the dye injection, a two-minute massage was performed to facilitate the movement of the dye. A small axillary incision was then made, and a dual-dye technique was employed to enhance visualization. The sentinel lymph node, which is the first node to which cancer cells are likely to spread from a primary tumor, was identified and excised. Frozen section analysis of the sentinel lymph node was performed intraoperatively, providing rapid pathological assessment. In this case, the analysis revealed no metastatic cancer cells, indicating that the cancer had not spread to the lymphatic system. Sentinel lymph node frozen biopsy came negative.

Step 4: Hydro dissection with tumescent infiltration

Tumescent solution given adequately around 200ml in the subcutaneous plane.

Tunnelling technique

To facilitate skin flap dissection, subcutaneous tunnelling technique was performed.

Step 5: Port placement using glove port technique

A glove made port was placed using a size 5.5 glove. The setup included one 12 mm port in the center and two 5 mm ports. Carbon dioxide was insufflated to maintain a pressure of 8-10 mmHg.

Step 6: Endoscopic dissection using subcutaneous tunnelling

To facilitate skin flap dissection, subcutaneous tunnelling technique was applied, and the septa between the skin flap and parenchyma were dissected using monopolar scissors.

This method ensured a clear separation of tissues, allowing precise and minimally invasive access to the target area.

Step 7

Intraoperative images of the breast tissue (Figure 5).

Step 8

Positioning.

Step 9: Ultrasound-guided margin assessment

To ensure the accuracy of the resection, an intraoperative ultrasound was employed to reconfirm the location and extent of the tumor.

This real-time imaging technique provided additional guidance, enhancing the precision of tissue dissection and ensuring complete removal of the lesion.

Step 10: Oncologic margin confirmation-frozen section analysis

After excising the tumor completely, it was marked and sent for frozen section analysis. This step was crucial to ensure that the margins were clear.

Step 11: Wound closure

The final wound after completion of surgery was meticulously closed using subcuticular sutures. This technique contributed to an aesthetically pleasing closure, minimizing visible scarring and promoting optimal healing.

Step 12: Post operative wound assessment

The post-operative follow-up after two weeks showed favourable healing with no signs of infection or complications. The patient's incision sites were well-healed. Her clinical examination was unremarkable, indicating a successful recovery process.

Findings

Intraoperative findings revealed a 0.5×0.5 cm lesion in the upper outer quadrant of the left breast. The sentinel lymph node was negative for metastasis on frozen section analysis.

Figure 1: Mammogram showing BIRADS IV lesion.

Figure 2: Guide wire localization.

Figure 3: Hydrodissection tunnelinng technique.

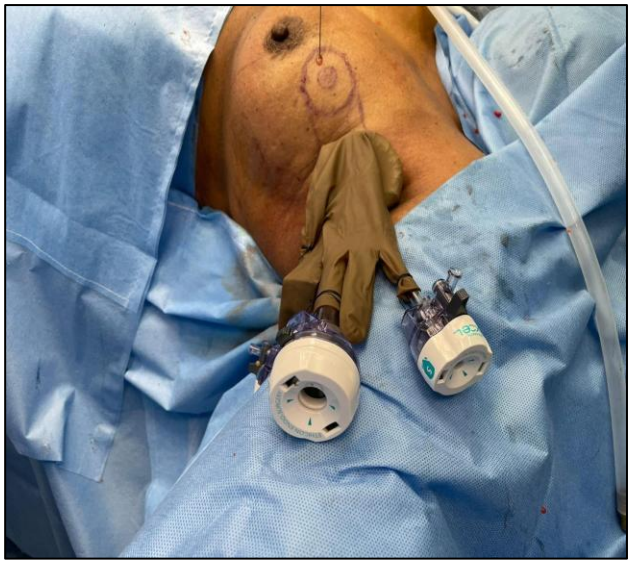

Figure 4: Port placement.

Figure 5: Intraoperative images.

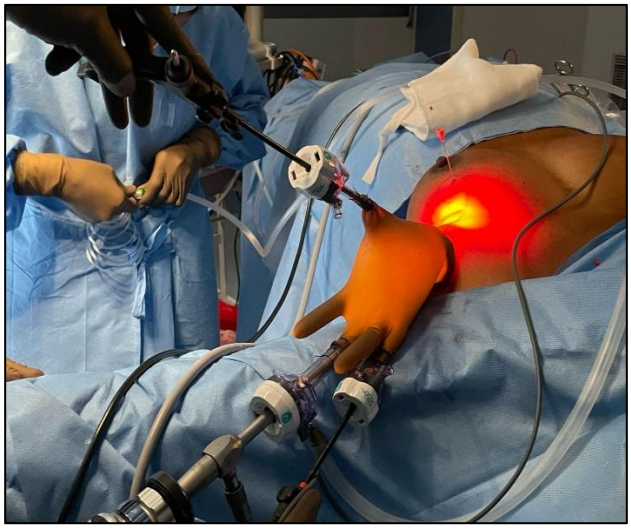

Figure 6: Endoscopic dissection.

Figure 7: Frozen section.

Figure 8: Wound closure.

Figure 9: Post operative wound assessment.

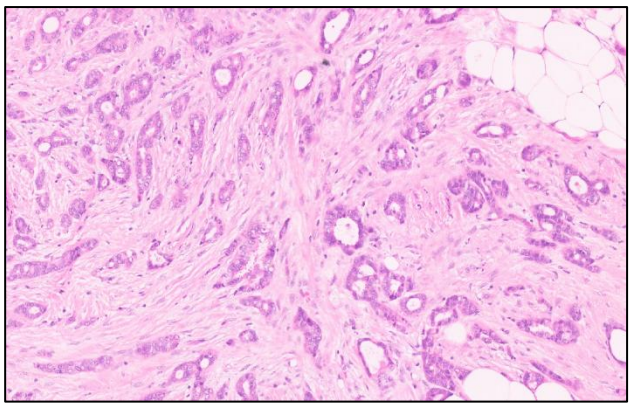

Figure 10: Histopathology.

DISCUSSION

The presented case of a 60-year-old female with early-stage invasive tubular carcinoma demonstrates the feasibility and effectiveness of EBCS combined with SLNB in achieving both oncological and cosmetic goals. Despite the patient's comorbidities and history of prior abdominal surgeries, the procedure was successfully completed using a minimally invasive, single-port endoscopic approach with CO_2 insufflation and intraoperative ultrasound for tumor localization. This approach is consistent with previous reports by Lai et al who emphasized the clinical utility of single-port, three-dimensional endoscopic systems in maintaining surgical precision while improving aesthetic results.[1]

The histopathological finding of pT1bN0 disease with negative margins confirms oncological adequacy, supporting the findings of Tamaki et al and Zhu et al who reported similarly clear margins and low recurrence rates with EBCS in early-stage tumors.[6,9] Furthermore, the use of indocyanine green (ICG)-guided SLNB facilitated precise lymphatic mapping, reducing the need for axillary dissection. This aligns with the results of Soybir and Fukuma, who advocated for SLNB in EBCS as a reliable staging tool with reduced morbidity.[8]

The cosmetic outcomes in this case were notably superior, characterized by minimal scarring through a periareolar incision and subcuticular closure. These findings are comparable to the aesthetic satisfaction levels reported by Lai et al and Alço et al where patients rated endoscopic and oncoplastic approaches more favorably in postoperative surveys.[10,11]

In terms of operative logistics, the surgical time in our case was slightly prolonged, reflecting the expected learning curve. Lef et al described similar challenges in early adoption, noting longer durations initially but significant reductions with experience.[7] Despite this, intraoperative navigation and margin assessment using real-time ultrasound and frozen section analysis enhanced surgical confidence and decision-making, as also reported by Wang et al and Mok et al.[2,11]

This case corroborates findings from multiple studies supporting the safety, efficacy, and cosmetic advantages of EBCS in well-selected patients. As emphasized by Harada et al the use of 3D/HD visualization and ergonomically advanced systems contributes significantly to precision and reduced tissue trauma.[4] While high equipment costs and limited availability may hinder widespread use, the evidence base for EBCS continues to grow, especially in East Asian centers, advocating for further integration into modern breast cancer management algorithms.[2]

Future studies should focus on multicenter prospective trials with long-term follow-up to evaluate recurrence rates, survival outcomes, patient satisfaction, and quality of life. Standardization of techniques, along with training initiatives, can further promote the adoption of EBCS globally.

CONCLUSION

Single-port endoscopic breast-conserving surgery (S-P E-BCS) represents a promising advancement in minimally invasive breast surgery. It has demonstrated safety and efficacy in treating both malignant and benign breast conditions while achieving high levels of patient satisfaction with aesthetic outcomes.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

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Cite this article as: Mathan PJ, Gandhirajan K, Bose JC. Endoscopic breast conservation surgery for early-stage invasive carcinoma: a case report-first case from India. Int Surg J 2025;12:1372-7.