

# Use of Animation Video and Clay Model for Surgical Decision-Making in Patients with Early Breast Cancer—A Prospective Study

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### Abstract



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**Introduction** Patient perspectives on breast cancer surgical techniques are influenced by various factors. The time given by the care providers to patients for appropriate decision-making is minimal in the developing world. Effective presurgical counseling is crucial for empowering patients, managing expectations, promoting informed decision-making, and optimizing outcomes. This study employed animation storytelling technique and clay model on patients to understand breast surgical techniques.

**Aims and Objectives** To evaluate the use of animation video and clay model in counseling patients eligible for breast conservation surgery (BCS) on the differences between modified radical mastectomy, BCS, and oncoplasty.

**Methods** A prospective observational study was undertaken including 40 patients under 60 years of age, eligible for BCS, at the Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow, India. Patients viewed a 4-minute animation video and a clay model demonstrating tissue displacement and reconstruction techniques. Responses from a three-question questionnaire were analyzed using SPSS 23 and compared with historical controls adapted from the study of Bothra et al.

**Results** Scores assessing awareness, understanding of surgical techniques, and interest in BCS among patients who underwent mastectomy, BCS, and oncoplasty were comparable. Patients exposed to both animation and clay models showed slightly higher scores across all groups, compared with historic controls, though not statistically significant ( $p = 0.144, 0.199, \text{ and } 0.198$ ). Overall, patients and relatives expressed satisfaction with the educational tools, finding them helpful in decision-making.

**Conclusion** Animation video and clay model are valuable tools in modern surgical education and patient care, enhancing understanding and facilitating informed decision-making. These visual aids empower patients and support health care providers in delivering comprehensive counseling on surgical options for breast cancer treatment.

### Keywords

- ▶ animation video
- ▶ breast conservation surgery
- ▶ clay model
- ▶ early breast cancer
- ▶ oncoplasty

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## Introduction

The global incidence of breast cancer is increasing.<sup>1</sup> The awareness of breast cancer among women from developing countries is also on the rise.<sup>2</sup> Increased availability of imaging, especially mammography has facilitated earlier detection of breast cancer especially in tier 1 cities.<sup>2,3</sup> This has led to a paradigm shift in the surgical management of these patients, from the most radical Halstedian mastectomy to the recent breast oncoplastic surgery,<sup>4</sup> including de-escalation of axillary surgery which may be omitted in selected cases.<sup>5</sup>

In this context, when health care providers discuss oncoplastic breast surgery, patients and their families often find it challenging to grasp the different options available, particularly given the complexities associated with tumors in various quadrants of the breast.<sup>6</sup> The authors have created an animation video with virtual characters for explaining the options of modified radical mastectomy (MRM) versus breast conservation surgery (BCS) versus oncoplasty. With the introduction of additional oncoplastic surgical techniques, the understanding of the procedure by the patient is of utmost importance, for successful outcome and regular follow-up from an oncological point of view.<sup>7</sup>

Since the animation video alone may not be sufficient to convey the details of the reconstruction process involved in oncoplasty, we had to supplement this aspect with an alternative tool. Clay modeling has been a traditional practice in India for several centuries and is deeply rooted in our culture.<sup>8</sup> Clay is inexpensive, readily available, and can be easily moldable. Hence, we used a clay model depicting tumors in a specific quadrant of breast to help patients understand the oncoplastic procedure that would be performed on them.<sup>9</sup> The aim of this study was to use and assess the effectiveness of animation video and clay model in counseling patients undergoing surgery for early breast cancer.

## Materials and Methods

We developed an animation video ([~Video 1](#)) with a running time of 4 minutes and 57 seconds. In this animated video, using a storytelling technique,<sup>10,11</sup> a female doctor explains the treatment options for early breast cancer in Hindi, followed by an overview of the operative procedure for BCS, MRM, and BCS with oncoplasty. Three animated characters share their surgical experiences and outcomes, and this animation was complemented by a detailed explanation of the procedure using clay model.

### Video 1 Link

Video explaining the procedures of Breast Conservation surgery, Breast oncoplastic procedures and modified radical mastectomy - <https://youtu.be/jjIH-XI0Fw1c> Online content including video sequences viewable at: <https://www.thieme-connect.com/products/ejournals/html/10.1055/s-0045-1802591>.



**Fig. 1** Clay model used for demonstrating oncoplastic breast surgery techniques.

We created an educational tool using a clay model illustrating the five quadrants of breast and axilla. The tumor was crafted from wheat flour and colored with edible powder. We then positioned the tumor and axillary node according to the mammography findings in the patient. The surgical team then demonstrated the surgical procedure to the patient and their relative using disposable surgical instruments such as scalpel and tooth forceps to hold the tissue, excise the tumor, and perform the reconstruction ([~Figs. 1–3](#)).

The project was approved by the institute ethics committee. The study was conducted from April 2023 to April 2024. It included 40 patients with early breast cancer. Patients younger than 60 years with early breast cancer eligible for BCS were included in the study. Patients with an advanced disease and/or not willing to participate were excluded from the study. The workup of early breast cancer was done according to our departmental protocol. Once the patient was thoroughly evaluated, they were then shown the animation video on a laptop and the oncoplastic procedure was demonstrated using



**Fig. 2** Surgical team demonstrating breast oncoplasty techniques using clay models.



**Fig. 3** Animation video viewed by patient and relative.

a clay model. After these demonstrations, the patients filled out a patient satisfaction multimedia questionnaire featuring three questions. Responses from this questionnaire were also compared with historic controls adapted from the study of Bothra et al.<sup>11</sup>

**Statistical Analysis**

All continuous values were expressed as mean and standard deviation. Comparison between the groups was done using independent samples *t*-test or Mann–Whitney’s *U* test as appropriate. The normality of scores was tested across the groups by applying Shapiro–Wilk’s test and if found non-normally distributed, then Kruskal–Wallis’ *U* tests were applied. A *p*-value of <0.05 was considered statistically significant. SPSS version 23.0 was used for data analysis.

**Results**

A total of 40 patients with early breast cancer were included in this study. Eighteen patients had right-sided tumor, while 22 had left-sided tumor. Two patients had cT1N0M0 disease, 11 had cT2N0M0, 2 had cT1N1M0 disease, while the rest had a higher clinical staging. Nine patients underwent oncoplastic breast surgery, 22 underwent BCS, and 5 patients underwent MRM. Four patients were receiving neoadjuvant chemotherapy during the study.

All 40 patients viewed the video and were shown the clay model. One patient refused to complete the questionnaire. To assess the efficacy of the clay model, we compared the scores of these patients with a historic control group who had only viewed the animation video. We found that the scores were higher across all domains in patients who were shown both the video and clay model (–Table 1), although the differences were not statistically significant.

In our cohort, when comparing the scores between patients who underwent oncoplasty versus BCS versus MRM, the scores were highest in the MRM group. However, there was no statistically significant difference between the groups. Additionally, when we compared scores between younger and older women, the older women had higher scores.

**Discussion**

In this study, we found that both patients and their relatives had a better understanding of the procedures, particularly the oncoplastic techniques, when using clay models. There were fewer postoperative cosmetic concerns and questions related to cosmesis. We devised this clay model since clay is a common material in Indian households, especially in rural areas. One kilogram of pottery clay costs \$1 or Rs. 100 and can

**Table 1** Comparison of scores between patients who were shown both animated video and clay model versus those who were shown the video alone

	Women who were shown both the animated video and the clay model (n = 40)			Women who were just shown an animated video (n = 40)			p-Value <sup>a</sup>
	Mean ± SD	Median (IQR)	Minimum–maximum	Mean ± SD	Median (IQR)	Minimum–maximum	
Improved awareness of breast surgical techniques	90.60 ± 18.77	100 (90–100)	0–100	88.50 ± 12.72	90 (80–100)	60–100	0.144
Better understanding of breast surgical techniques	92.78 ± 17.27	100 (92.75–100)	0–100	88.50 ± 14.94	95 (80–100)	50–100	0.119
Stimulated interest in relatives regarding BCS	91.80 ± 19.54	100 (91.25–100)	0–100	88.25 ± 15.67	100 (80–100)	50–100	0.198

Abbreviations: BCS, breast conservation surgery; IQR, interquartile range; SD, standard deviation.

<sup>a</sup>Mann–Whitney’s *U* tests applied across two groups (video and video + clay model).

be used for 3 to 4 days. It can be easily moldable, allowing us to shape it to create the desired breast and nipple contours. The tumor was made with wheat flour and colored with red artificial coloring to give a contrasting texture for easier understanding.<sup>8,9</sup>

The animation video employing a storytelling technique featured three characters, one explaining breast oncological outcomes, another discussing breast conservation outcomes, and the third focusing on outcomes of MRM. We saw better scores from patients who were shown both the video and the model. We believe that clay models effectively conveyed the surgical concepts, particularly for breast oncological surgery, which can be challenging to explain with animation video alone.<sup>10–12</sup>

In the context of the developing world, mannequins and simulators can be expensive, and their procurement and implementation in institutes often require considerable effort. Mammography-based simulators and three-dimensional-printed models may provide better understanding to the patients but cost continues to be a significant barrier.<sup>13,14</sup> Moreover, busy clinicians often share multiple responsibilities, as teachers, clinicians, and counselors, which can restrict their ability to engage in thorough patient communication and understanding.<sup>15</sup> Training breast cancer staff nurses in the different types of oncological breast surgery could serve as a valuable alternative for busy clinicians in counseling patients about their surgical options.<sup>16</sup>

The findings of our study suggest that when patients are educated about the various aspects of surgical management for breast cancer, their understanding of breast oncological surgery improves significantly. As a result, both patients and their relatives gain a clearer understanding of the procedure.<sup>17</sup>

Our study had the following strengths. It emphasized the importance of understanding patient perspectives and surgical decision-making in breast cancer addressing a critical gap in health care communication. The use of low-cost materials (clay and wheat flour) and animation storytelling provides an accessible, feasible, and culturally relevant educational tool in resource-limited settings, promoting wider application. Feedback from the patients and relatives also offers insights into the perceived value and effectiveness of the educational tools. Limitations of our study include a small sample size, lack of a control group, and absence of an objective assessment of the effectiveness of these educational tools.

## Conclusion

Our study shows that the use of animation video and clay model enhances patient's understanding and decision-making regarding the available surgical options for breast cancer. Despite the lack of any significant differences when compared with historical controls, these educational tools received positive feedback from patients and relatives. These inexpensive, easily available educational tools could educate patients, reduce their anxiety and concerns related to surgical procedures, and foster a more informed relationship

between patients and health care providers, particularly useful in the developing world. Studies with larger sample sizes and diverse populations are necessary to further evaluate the effectiveness and applicability of these methods in various clinical settings.

## Ethical Approval

Institutional Ethics Committee no. is PGI/ 2023–139-MCh-132. Research Registry registration no.: 9539, dated September 20, 2023.

## Consent

Written consent was obtained from the participants. A part of this manuscript was presented by Spandana Jagannath as a Poster at the 12th Annual Meeting of the Association of Breast Surgeons of India ABSICON 2024, Lucknow, India, and won the KGMU Best Poster Award.

## Conflict of Interest

None declared.

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