IMPLANT-BASED BREAST RECONSTRUCTION OUTCOMES USING BREAST-Q IN NORTH BORNEO MALAYSIA: A SINGLE-CENTRE STUDY

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(Received 19th December 2025; revised 22nd March 2026; accepted 08th April 2026)

Abstract. Implant based reconstruction had been used for centuries and was popularised by western country since 1964. Being a developing country, this oncoplastic technique is slowly gained trust and accepted by our people. In North Borneo Malaysia especially where the people generally are more conservative when it comes to breast cancer treatment, it takes longer time for this technique to be chosen and accepted by them. This paper aim to highlight our early experienced as the only breast and endocrine unit for whole North Borneo, Malaysia, with implant-based breast reconstruction following mastectomy in our breast cancer patient. Data was retrospectively analysed from 2017 till 2023. Total of 35 patients were enrolled in this study. Each of them was given BREAST Q questionnaire during follow up to assess patient satisfaction. Thirty patients were enrolled in this study. Mean age of patient was 40-year-old with most of them had early breast cancer. 46% (n=14) had received radiotherapy. Small percentage of the patient developed surgical site infection after reconstruction that required longer antibiotics and one of them needs re-operation for open drainage. In assessment of quality of life, more than 70% of patient give score of 75-100 for satisfaction with implant, psychosocial and physical well-being. However, in patient who received radiotherapy, the mean scores were much lower compared to those who did not received radiotherapy. Implant-based reconstruction had low complications and give high satisfaction with surgical outcome among patient in North Borneo Malaysia.
Keywords: *breast implant, breast cancer, reconstruction, patients*

Introduction

Breast cancer is the commonest cancer among Malaysian women since past 2 decades (MOH, 2018). 1 in 20 women have a lifetime risk of developing breast cancer (Yip et al., 2006). The incidents are keep increasing each year and majority of our cases was diagnosed at stage III and IV (MOH, 2018). Mastectomy with axillary dissection is traditionally accepted and it is the commonest surgical procedure performed for breast cancer worldwide. However, since last decades there is significant changes in surgical management where immediate breast reconstruction with implant based has been accepted as safe oncological treatment and gives a good cosmesis outcome. Breast reconstruction with implant based had slowly gained attention among patients. Breast implant had undergone the process of evolution since 1962 (Perry and Frame, 2020). The process is still on going to achieve most natural looking implant, and at the same time gives the lowest complications possible namely capsular contraction and rippling. First generation implant possesses more incident of capsular contracture and complication in view of its thick shell and high viscous gel. While second generation gives more durable implant with its thinner shell and less vicious gel, but the incidence of capsular contracture is still high. Thus, third generation implants were introduced to

overcome those chronic cosmetically disturbance complications, with its barrier coated shell. With advances in technology, newer generations implant was developed which contain silicon cross-linking to create more viscous gel. This cohesive gel will not only give more natural looks, but it also reduces systemic leaking or 'gel-bleed' incidence (Perry and Frame, 2020).

Generally, there are two shapes of implants in market; round or anatomical (tear drop). Tear drop is much preferred as it gives more natural looks compared to rounded one. The implants fill can be either silicone gel or saline. Gel filled implants gives more natural feeling compared to saline filled implant. The firmness of the implants fill is determined it cohesiveness. It can be categorised as mild, moderate and highly cohesive implant. Having said that, chronic complications related to implants are still unavoidable. The incidence of breast implant related aplastic B cell lymphoma has been reported in small percentage (Mempin et al., 2018). Since breast implants had slowly gain trust among our patients in Nort Borneo, Malaysia, we reported our early experience managing patient receiving breast implant as method of reconstruction after mastectomy. Apart from early and late complications, we also assessing the satisfaction among our patient through BREASTQ questionnaire. This includes 2 major domains, which is quality of life domain and satisfaction domain. The quality-of-life domain consists of psychosocial well-being, sexual well-being, physical well-being of chest. In satisfaction domain, it consists of satisfaction with breast, satisfaction with outcome and satisfaction with care (Pusic et al., 2009).

Materials and Methods

The data of 35 patients who underwent breast implant surgery were prospectively studied. First patient was operated in April 2017 and last patient was operated on august 2023. It gives follow-up duration of maximum 5 years and minimum 6 months. All patients provided informed consent. We exclude those who's BMI of 30 and above, active smoker, and those with uncontrolled diabetic, and immunological disorder. Demographics data and information about the stage of cancer, chemotherapy, radiotherapy, hormonal therapy, and acute and choring complications were retrieved. The information about the type of implant, shape and its surface area were studied from post operative notes. Surgical site infection (SSI) is defined as infection that occur within one month after surgery was evaluated as one of the acute complications from the implant operation. Capsular contracture is defined based on Baker's classification and it being to chronic complications of implant surgery. Patients' satisfaction score was evaluated using post mastectomy and reconstruction outcome questionnaire, BREAST Q. The score for each of 12 components will be recorded and analysed. BREAST Q is a validated scoring system to evaluate the patient's satisfaction with regards to different type of Brest surgery namely mastectomy, reconstruction, and augmentation. It gives a scale of zero to hundreds. It divided into 12 components, pre and postoperative conditions. It includes sexual well-being, psychosocial well-being. Satisfaction with Breasts, Psychosocial Well-being, Sexual Well-being, and Physical Well-being. Ideally, patient should fill up the questionnaire preoperatively and postoperatively. However, in our study, all patients were filled u the questionnaire postoperatively. Meaning they have to recall the preoperative experience before putting up the score.

Surgical technique and statistical analysis

All the reconstructed case were used either MENTOR Memory Gel Breast Implant or POLYTECH silicon breast implant. We include all patient who underwent skin sparing mastectomy or nipple sparing mastectomy under general anaesthesia. After removal of breast tissue, pre-pectoral space was created by elevating the Pectoralis muscle up to second intercostal space area proximally, parasternal area medially and inframammary fold distally. Laterally, serrates anterior fascia will be elevated for full coverage of the implant at lateral part. Prophylactic antibiotics was given prior to surgery and povidone irrigation of that surgical pocket were performed in all cases. The implants or tissue expander (TE) was soak with antibiotics solutions prior to its placement inside the pocket. If TE was inserted, it will be fill with up to 50% of measured implant volume. Drain will be placed behind the TE or Implant. If there was no skin or nipple necrosis, the TE will be expanded two-weekly and be expanded more than 20% of estimated implant volume for that particular patient. This to create ample space for the future implant placement, loosen up the skin for chance of ptosis later. All temporary TE will be exchanged to permanent implant within the duration of 6 months. This is to allows completion of cancer treatment including chemo and radiotherapy. During the second stage surgery, incision was made at same previous incision. Implant was removed, full circumferential capsulotomy performed to increase the degree of projection. Various sizer was tested before decided for the final prosthesis.

Descriptive statistics were employed to summarise numeric variables. Data were presented as mean, standard deviation, and range. Statistical significance was defined as a p-value of less than 0.05 The Student's t-test was applied for comparing normally distributed data, while the Mann-Whitney U test was used for non-normally distributed data. When evaluating the significance of changes in mean BREAST-Q scores before and after treatment, paired t-tests will be used for dependent samples. An unpaired t-test was used when two independent variables were compared. The statistical analyses were conducted using SPSS Version 25, with tests chosen based on their suitability for the data.

Results and Discussion

The descriptive characteristics of the study participants are presented in *Table 1*. A total of 30 patients were included in the analysis, with a mean age of 40.0 ± 8.5 years and a mean body mass index of 23.5 ± 2.1 kg/m², indicating that the cohort largely consisted of relatively young and normal-weight women undergoing breast reconstruction. Most participants were married (n = 23, 76.6%), while 20.0% were single and 3.3% were divorced. This marital distribution is clinically relevant, as spousal and family support may influence postoperative recovery, psychosocial adjustment, body image acceptance, and satisfaction following breast reconstruction. In terms of educational background, the sample demonstrated a relatively diverse profile, with high school and degree/PhD holders each representing 30.0%, followed by diploma holders (26.6%), others (10.0%), and primary school education (3.3%). This suggests that most patients had at least secondary or tertiary education, which may affect their understanding of treatment options, expectations toward reconstructive outcomes, and ability to engage in shared decision-making. Employment status showed that nearly half of the participants were working full time (46.6%), while 36.6% were housewives, 13.3% worked part time, and 3.3% were retired. This indicates that breast

reconstruction outcomes may have implications not only for physical recovery but also for social roles, return to work, domestic responsibilities, and overall quality of life. With regard to comorbidities, the majority had no medical illness (76.6%), while smaller proportions reported diabetes mellitus, hypertension, asthma, or other conditions. This relatively healthy clinical profile may have contributed positively to postoperative recovery and satisfaction outcomes, although the presence of diabetes, hypertension, or other medical conditions in a minority of patients remains important because such factors may influence wound healing, complication risk, and long-term reconstructive success. Overall, *Table 1* indicates that the cohort was composed mainly of married, medically healthy, middle-aged women with varied educational and occupational backgrounds, providing an important demographic context for interpreting postoperative BREAST-Q outcomes.

***Table 1**. The result of descriptive analysis.*

Category	Frequency	Percentage
Demographic data		
Marital status		
Married	23	76.6
Single	6	20
Divorced	1	3.3
Education level		
Primary school	1	3.3
High School	9	30
Diploma	8	26.6
Degree/PhD	9	30
Others	3	10
Emplyoment		
Full Time	14	46.6
Part time	4	13.3
Housewife	11	36.6
Retired	1	3.3
Co-morbidities		
HPT	1	3.3
DM	2	6.6
Asthma	1	3.3
No medical illness	23	76.6
Others	3	10
Sample size	30	
Mean Age ± SD, year	40.0 , 8.5	
Mean BMI ± SD, kg/m2	23.5 , 2.1	
Implant’s data and Oncological treatment		
Type of implant		
Textured	25	83.3
Smooth	5	16.6
Mean Implant volume (cc)	225	
Mastectomy type		
Skin sparing	18	60
Nipple sparing	12	40
Stage of implant insertion		
Immediate	16	53.3
Delayed	14	46.6

Neoadjuvant Chemotherapy	10	33.3
Adjuvant chemotherapy	5	16.6
Radiotherapy	13	43.3

The implant and oncological treatment characteristics shown in *Table 1* provide further insight into the clinical background of the study population. Most patients received textured implants (n = 25, 83.3%), while only 16.6% received smooth implants. The predominance of textured implants may reflect institutional preference, surgical decision-making, implant availability, or the reconstructive requirements of post-mastectomy breast contouring. The mean implant volume was 225 cc, suggesting a moderate reconstructive volume that may have been selected to achieve aesthetic symmetry while maintaining soft-tissue safety. Regarding mastectomy type, skin-sparing mastectomy was performed in 18 patients (60.0%), while nipple-sparing mastectomy was performed in 12 patients (40.0%). The relatively high use of skin- and nipple-preserving approaches is clinically significant because preservation of the breast envelope, and where possible the nipple-areolar complex, may contribute to improved aesthetic outcomes, body image, and patient satisfaction. In terms of timing, implant insertion was almost evenly distributed between immediate reconstruction (53.3%) and delayed reconstruction (46.6%). This balance allows interpretation of outcomes across different reconstructive pathways, as immediate reconstruction may reduce the psychological burden of breast loss, whereas delayed reconstruction may be influenced by completion of oncological treatment, tissue condition, and patient readiness. Oncological treatment exposure was also substantial: 33.3% received neoadjuvant chemotherapy, 16.6% received adjuvant chemotherapy, and 43.3% received radiotherapy. Radiotherapy is particularly important because it is commonly associated with capsular contracture, implant-related complications, tissue fibrosis, pain, and lower satisfaction with reconstructed breasts. Therefore, the inclusion of patients exposed to radiotherapy strengthens the clinical relevance of the findings, as the reported postoperative satisfaction outcomes were achieved despite the presence of treatment-related risk factors. Collectively, the implant and oncological characteristics in *Table 1* suggest that this study involved a clinically heterogeneous group of breast reconstruction patients, including both immediate and delayed reconstruction cases, different mastectomy-preserving techniques, and varying exposure to chemotherapy and radiotherapy. This diversity provides a meaningful basis for assessing postoperative patient-reported outcomes.

The postoperative BREAST-Q score analysis is summarized in *Table 2* and demonstrates a generally favourable pattern of patient-reported outcomes, particularly in relation to satisfaction with healthcare providers and overall reconstructive care. Among the assessed domains, the highest mean scores were recorded for Medical Staff (96 ± 9; range 70–100), Office Staff (94 ± 12; range 84–100), and Surgeon (87 ± 15; range 58–100). These findings indicate very high levels of satisfaction with professional support, communication, staff responsiveness, and the overall care environment. Such results are important because patient satisfaction after breast reconstruction is not determined solely by surgical appearance, but also by the quality of counselling, emotional reassurance, information delivery, and continuity of care throughout the cancer and reconstruction pathway. Satisfaction with outcome was also relatively high (72 ± 21; range 46–100), followed by psychosocial well-being (75 ± 20; range 47–100), suggesting that many patients experienced meaningful psychological adjustment and

acceptance after reconstruction. Satisfaction with breast scored 68 ± 19, while satisfaction with information also scored 68 ± 22, indicating moderate to good satisfaction, although the wide ranges suggest variability in patient experience. This may reflect differences in expectations, implant type, timing of reconstruction, mastectomy type, radiotherapy exposure, or individual perceptions of breast symmetry, softness, scarring, and natural appearance. The lowest score was observed for sexual well-being (51 ± 23; range 36–91). This is a clinically important finding because sexual well-being often remains more difficult to restore after breast cancer surgery and reconstruction, even when general satisfaction and psychosocial recovery are favourable. Concerns related to body image, femininity, intimacy, fear of partner response, treatment-related menopausal symptoms, scars, altered sensation, and emotional distress may contribute to lower sexual well-being. Therefore, *Table 2* highlights a key gap in survivorship care: while technical, surgical, and service-related satisfaction appear strong, sexual health and intimate well-being require more focused assessment and intervention. Overall, the findings suggest that implant-based breast reconstruction produced acceptable to high postoperative satisfaction, particularly in psychosocial and care-related domains, but future care should strengthen preoperative counselling, expectation management, sexual health support, and long-term psychosocial follow-up.

Table 2. *Postoperative Q Score analysis (n=30).*

Question	Mean	Range (Min - Max)
Psychosocial well-being	75 ± 20	47-100
Sexual well-being	51 ± 23	36 - 91
Satisfaction with breast	68 ± 19	44 -100
Satisfaction with outcome	72 ± 21	46 -100
Satisfaction with information	68 ± 22	36 - 100
Surgeon	87 ± 15	58 - 100
Medical Staff	96 ± 9	70 - 100
Office Staff	94 ± 12	84 - 100

The postoperative complication profile is illustrated in *Figure 1*, which provides an important clinical context for interpreting patient satisfaction and quality-of-life outcomes following implant-based breast reconstruction. The most frequently reported postoperative complication was superficial surgical site infection (13.3%), followed by rippling (10.0%), while capsular contracture (6.6%) and seroma (6.6%) occurred at lower but clinically meaningful rates. Less frequent complications included infected implant (3.3%) and chronic pain (3.3%). Although the overall distribution suggests that most complications were relatively limited in frequency, their clinical implications should not be underestimated. Superficial surgical site infection may affect early wound recovery, prolong antibiotic use, increase follow-up visits, and create anxiety among patients who are already adjusting to the physical and psychological consequences of breast cancer surgery. Similarly, implant rippling, although not necessarily life-threatening, can have a substantial effect on body image and aesthetic satisfaction because it directly influences the visible and tactile quality of the reconstructed breast. Capsular contracture and seroma are also important because they may affect implant position, breast contour, pain, symmetry, and long-term reconstructive stability. The relatively low incidence of infected implant and chronic pain is encouraging, as these

complications are often more strongly associated with implant loss, revision surgery, and poorer patient-reported outcomes. Overall, *Figure 1* indicates that the complication burden in this cohort was present but not excessive, with most adverse events occurring at low to moderate frequencies. This pattern suggests that implant-based reconstruction was generally feasible and clinically acceptable in the study population. However, the presence of even minor complications remains important because postoperative satisfaction is shaped not only by surgical success, but also by the patient's perception of comfort, breast appearance, recovery experience, and confidence in long-term outcomes. Therefore, the findings highlight the need for careful wound surveillance, early infection management, preoperative counselling on aesthetic risks such as rippling, and structured follow-up to identify complications before they progress into more serious reconstructive problems.

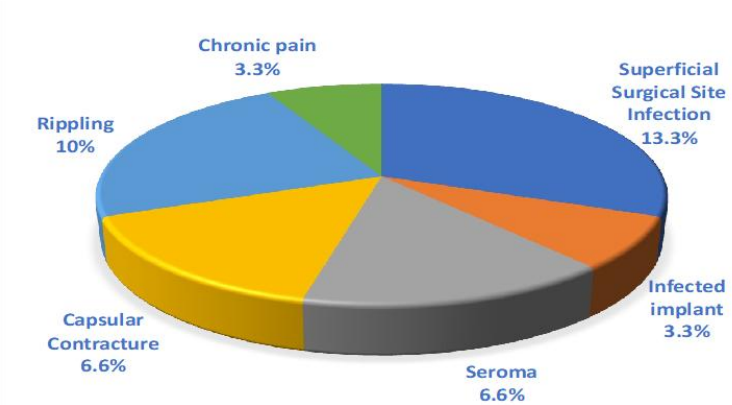

Figure 1. *Satisfaction score.*

Patient satisfaction with implant-related aesthetic outcomes is presented in *Figure 2*, which evaluates satisfaction with rippling, shape, and feel of the breast implant. The figure demonstrates that a substantial proportion of patients reported favourable satisfaction levels across all three domains, with the combined categories of very satisfied and somewhat satisfied representing the dominant response pattern. Satisfaction with shape and feel appeared particularly strong, with a high percentage of patients reporting that they were very satisfied, suggesting that the reconstructed breast contour and tactile perception were generally acceptable from the patient's perspective. This is clinically meaningful because breast reconstruction should not be evaluated solely through objective surgical outcomes; rather, the patient's subjective perception of shape, softness, naturalness, and comfort is central to the success of reconstruction. Satisfaction with rippling was also generally positive, although the figure suggests a slightly greater spread of responses compared with shape and feel. This aligns with the complication pattern shown in *Figure 1*, where rippling was reported in 10.0% of cases. Even when rippling occurs in a minority of patients, it may influence satisfaction because it can be visible through the skin, particularly in patients with thinner soft-tissue coverage or after mastectomy. The presence of small proportions of patients who were somewhat dissatisfied or very dissatisfied indicates that implant reconstruction outcomes are not uniform and that patient expectations may vary. Some dissatisfaction may reflect concerns about asymmetry, firmness, altered sensation, implant visibility, scarring, or differences between the reconstructed and contralateral breast. Importantly,

the favourable satisfaction pattern in *Figure 2* suggests that most patients perceived implant-based reconstruction as beneficial in restoring breast form and improving body image after mastectomy. However, the results also support the need for individualized preoperative counselling, particularly regarding realistic expectations of implant appearance and feel. Patients should be informed that while reconstruction can restore breast contour, it may not fully reproduce the sensation, softness, or natural movement of the original breast. Thus, *Figure 2* reinforces the importance of combining technical surgical success with patient-centred counselling and aesthetic expectation management.

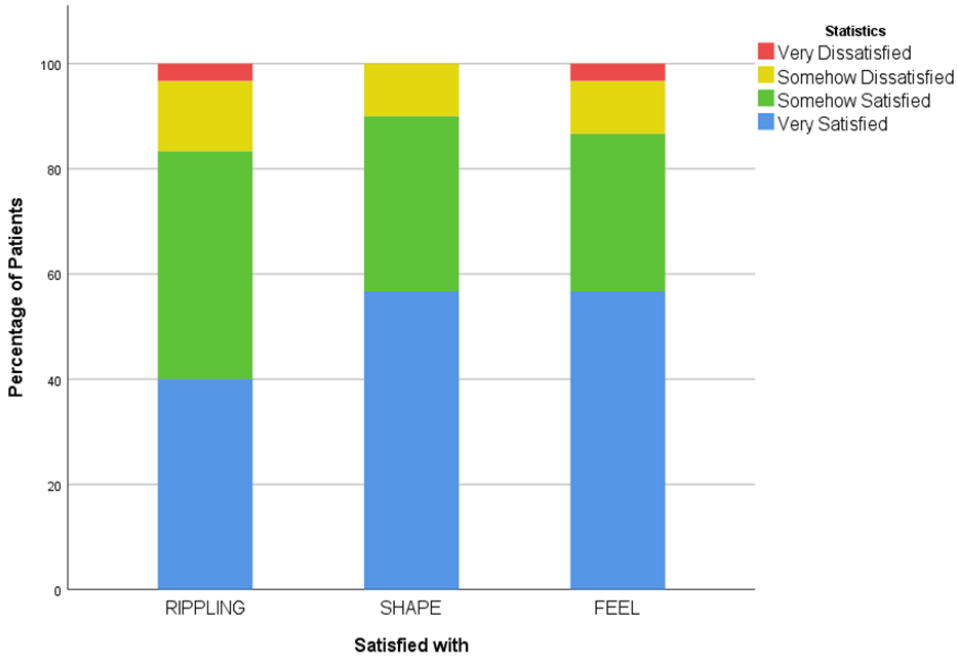

Figure 2. *Post Operative satisfaction with the breast Implant.*

The impact of radiotherapy on postoperative quality of life is shown in *Figure 3*, which compares patients who received radiotherapy with those who did not across three key domains: satisfaction with outcome, psychosocial well-being, and physical well-being. Patients without radiotherapy reported slightly higher scores for satisfaction with outcome compared with those who received radiotherapy, with mean scores of 73.9 and 71.9, respectively. A similar pattern was observed for psychosocial well-being, where the no-radiotherapy group recorded a higher mean score (78.8) than the radiotherapy group (76.7). These differences, although modest, suggest that radiotherapy may have some influence on perceived reconstruction outcomes and psychosocial recovery. This is clinically plausible because radiotherapy can affect skin quality, tissue elasticity, wound healing, breast softness, and implant-related comfort, all of which may influence how patients perceive the final reconstructive result. However, an interesting finding was observed in physical well-being, where the radiotherapy group scored slightly higher (77.3) compared with the no-radiotherapy group (75.3). This finding suggests that radiotherapy did not necessarily translate into poorer physical well-being in this cohort and may reflect effective postoperative management, patient adaptation, or differences in baseline clinical characteristics between groups. It may also indicate that physical recovery is influenced by multiple factors beyond radiotherapy alone,

including age, general health, implant volume, mastectomy type, timing of reconstruction, pain control, and rehabilitation support. Overall, *Figure 3* demonstrates that quality-of-life outcomes remained relatively favourable in both groups, with mean scores generally above 70 across the assessed domains. The findings suggest that implant-based reconstruction can achieve acceptable postoperative outcomes even among patients exposed to radiotherapy. Nevertheless, the slightly lower scores in satisfaction with outcome and psychosocial well-being among radiotherapy patients highlight the importance of enhanced counselling and long-term survivorship care for this subgroup. Patients receiving radiotherapy may benefit from closer monitoring for implant-related changes, more detailed discussion of aesthetic risks, and additional psychosocial support to address concerns related to body image, femininity, and confidence after cancer treatment.

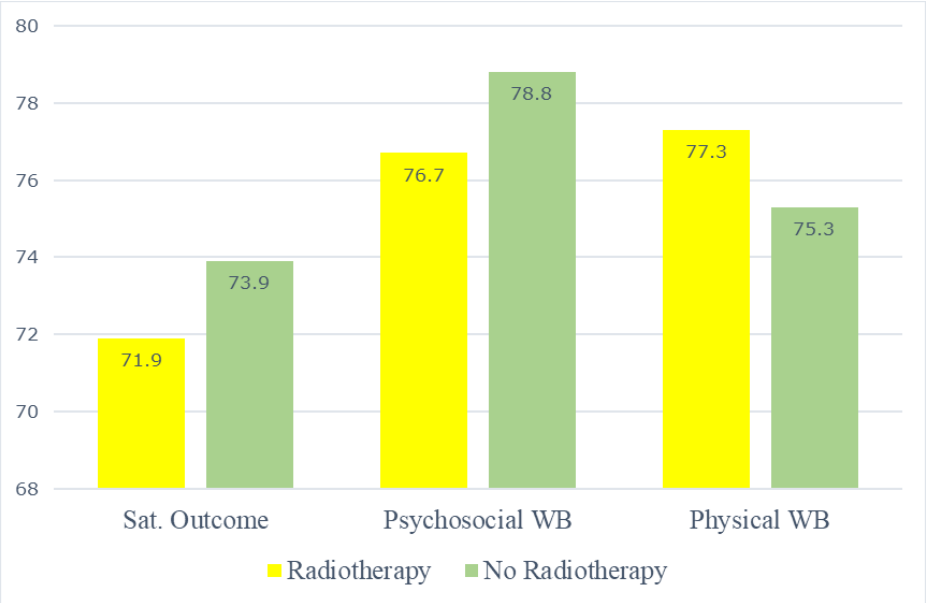

Figure 3. *Quality of life after implant surgery, comparing two groups of patients.*

The present findings provide clinically meaningful insight into implant-based breast reconstruction outcomes among a relatively young Malaysian breast cancer cohort. The mean age of participants was 40.0 years, indicating that many women were undergoing breast cancer treatment and reconstruction during an active stage of personal, family, occupational, and social life. This is particularly important in the Malaysian context, where breast cancer remains a major public health concern and survivorship outcomes have become increasingly relevant as cancer detection, treatment access, and survival improve (MOH 2018; Yip et al., 2006). Most participants were married, medically healthy, and either employed or managing household responsibilities, suggesting that reconstruction outcomes extend beyond physical restoration and are closely linked to broader quality-of-life domains. For married women, reconstruction may influence body image, spousal intimacy, sexual confidence, emotional recovery, and perceived femininity. For working women and homemakers, breast reconstruction may also affect return to routine activities, self-presentation, social interaction, and confidence in resuming normal roles after mastectomy. These findings support the importance of viewing implant-based reconstruction not merely as a surgical intervention, but as part of a comprehensive survivorship pathway. The use of patient-reported outcome

measures is therefore highly relevant because clinical success alone does not fully reflect the lived experience of women following breast cancer surgery. The BREAST-Q is especially useful in this regard because it captures satisfaction with breast appearance, psychosocial well-being, sexual well-being, satisfaction with outcome, and satisfaction with healthcare professionals from the patient's own perspective (Pusic et al., 2009; 2008). The generally favourable levels of satisfaction and psychosocial well-being suggest that implant-based reconstruction contributed positively to emotional adjustment and restoration of self-image. However, the variability in marital status, education, employment, medical background, treatment exposure, and reconstruction timing indicates that postoperative experience is not uniform across patients. Instead, satisfaction is shaped by the interaction between clinical factors, individual expectations, cultural values, family support, oncological treatment burden, and the quality of communication between patients and healthcare providers.

The clinical profile of the reconstruction procedures further demonstrates the complexity of implant-based breast reconstruction in this cohort. Most patients received textured implants, while a smaller proportion received smooth implants. Historically, breast implant technology has undergone major development in relation to implant shell design, filler materials, surface characteristics, safety considerations, and aesthetic performance (Perry and Frame, 2020). Textured implants were introduced partly to improve implant positioning and reduce the risk of capsular contracture in selected reconstructive and aesthetic settings (Spear et al., 2000). However, implant surface morphology has become a more carefully debated issue because texture may influence bacterial adhesion, biofilm formation, inflammatory response, capsular contracture, and implant-related complications (Jones et al., 2018). In the present findings, the high use of textured implants should therefore be interpreted with clinical caution. On one hand, the favourable satisfaction scores and generally positive patient perception of implant shape, feel, and outcome suggest that textured implants may have produced acceptable reconstructive results in most patients. On the other hand, the literature indicates that implant outcomes cannot be attributed to surface type alone, as they are also influenced by incision choice, implant placement, surgical technique, patient characteristics, radiotherapy exposure, bacterial contamination, and postoperative wound care (Namnoum et al., 2013; Henriksen et al., 2005). The observed postoperative complications, particularly superficial surgical site infection, rippling, capsular contracture, seroma, infected implant, and chronic pain, reinforce the need to interpret reconstruction success through both aesthetic and safety perspectives. Although these complications occurred at relatively low to moderate frequencies, their clinical implications remain important. Even minor complications can affect anxiety, comfort, body image, confidence, and long-term satisfaction. Infection is especially significant because implant reconstruction involves prosthetic material, and bacterial contamination may contribute not only to acute infection but also to biofilm formation and later capsular contracture (Jones et al., 2018; Pittet et al., 2005). These findings support the importance of meticulous perioperative sterility, careful implant handling, antibiotic stewardship, structured postoperative surveillance, and early intervention for wound-related problems.

The complication pattern in this study is also important because adverse events after breast reconstruction may influence both objective surgical outcomes and patient-reported quality of life. Superficial surgical site infection was the most common complication. Although this may be less severe than deep implant infection, it remains

highly relevant because early wound problems can delay recovery, increase clinic visits, prolong antibiotic use, cause emotional distress, and potentially threaten implant preservation. Breast implant infection has long been recognized as a significant complication because the presence of prosthetic material creates a favourable environment for bacterial colonization, biofilm formation, and treatment difficulty in more severe cases (Pittet et al., 2005). The relatively low occurrence of infected implant is encouraging, as deep infection can require more aggressive management, including intravenous antibiotics, surgical washout, implant exchange, or implant removal. Late implant infection, although uncommon, has also been documented and reinforces the need for long-term clinical vigilance after reconstruction (Ablaza and LaTrenta, 1998). Capsular contracture is another clinically important complication because it can cause firmness, distortion, breast asymmetry, discomfort, and dissatisfaction with the reconstructed breast. Previous studies have identified multiple risk factors for capsular contracture, including implant characteristics, bacterial contamination, surgical technique, inflammatory response, and radiotherapy exposure (Jones et al., 2018; Pittet et al., 2005). Similarly, seroma and rippling should not be dismissed as minor technical outcomes. Seroma may affect wound healing and increase infection risk, while rippling may influence visible breast contour, tactile naturalness, and patient confidence, particularly among women with thinner mastectomy flaps or limited soft-tissue coverage. Chronic pain was reported less frequently, but its clinical importance is substantial because pain after breast surgery may affect sleep, mobility, daily activities, sexuality, emotional well-being, and long-term quality of life (Wallace et al., 1996). Neuropathic causes, including intercostal neuroma, have also been described after aesthetic and reconstructive breast implant surgery (Nguyen et al., 2012). Therefore, complication evaluation should go beyond incidence alone. The true impact of postoperative complications lies in how they affect comfort, body image, sexual confidence, psychosocial recovery, and willingness to continue follow-up care.

The patient-reported outcome findings indicate that implant-based reconstruction produced generally favourable results, particularly in relation to satisfaction with healthcare providers, satisfaction with outcome, and psychosocial well-being. The highest satisfaction scores were recorded for medical staff, office staff, and surgeons, suggesting that patients perceived the care environment positively. This is highly relevant because breast reconstruction is not a single operative event but a prolonged care journey involving cancer diagnosis, mastectomy, reconstruction decision-making, chemotherapy or radiotherapy, postoperative healing, surveillance, and survivorship support. High satisfaction with healthcare providers may reflect effective communication, patient reassurance, technical confidence, empathy, accessibility, and continuity of care. These aspects are increasingly recognized as essential indicators of healthcare quality in breast reconstruction, particularly because patient satisfaction is influenced not only by the final breast appearance but also by the process through which care is delivered (Pusic et al., 2009; 2008). However, the relatively lower sexual well-being score requires careful and deeper interpretation. Although satisfaction with outcome and psychosocial well-being were favourable, sexual well-being remained the weakest domain. This pattern is consistent with previous studies showing that sexuality may remain vulnerable after mastectomy and reconstruction despite acceptable aesthetic outcomes (Shiraishi et al., 2023; Wei et al., 2016; Gahm et al., 2010). Several factors may explain this, including altered breast sensation, visible scars, fear of partner response, reduced self-confidence, treatment-related menopausal symptoms, anxiety,

pain, and changes in perceived femininity. Cultural context may also play an important role. In many Asian settings, sexual concerns may be less openly discussed during clinical consultation, leading to under-recognition of sexual distress. Studies on sexual functioning and survey responses suggest that cultural background, communication norms, and personal comfort can influence how women disclose sexual health concerns (Kim and Fredriksen-Goldsen, 2013; Morton and Gorzalka, 2013). Therefore, lower sexual well-being should not be interpreted simply as dissatisfaction with surgery. Rather, it reflects an under-addressed survivorship domain that requires structured counselling, sensitive communication, partner-inclusive support where appropriate, and long-term psychosocial care.

Radiotherapy exposure remains one of the most important clinical considerations in interpreting implant-based breast reconstruction outcomes. A substantial proportion of patients in this cohort received radiotherapy, making its relationship with postoperative satisfaction and quality of life particularly relevant. Radiotherapy is widely recognized to affect implant reconstruction by reducing tissue elasticity, altering skin quality, increasing fibrosis, affecting breast softness, and contributing to capsular contracture and aesthetic compromise (Nava et al., 2011; Behranwala et al., 2006). Previous studies have also reported that radiotherapy may be associated with higher rates of capsular contracture, reoperation, lower satisfaction, and poorer long-term aesthetic outcomes, although the degree of risk varies according to treatment timing, surgical technique, patient selection, implant placement, and follow-up duration (Nelson et al., 2022; Hvilsom et al., 2012). In the present findings, patients who did not receive radiotherapy showed slightly higher satisfaction with outcome and psychosocial well-being compared with those who received radiotherapy. Although the observed differences were modest, they are clinically plausible and consistent with the broader literature indicating that radiation may negatively influence perceived reconstructive outcomes in some patients (Albornoz et al., 2014; Jeevan et al., 2014). Interestingly, physical well-being appeared slightly higher among patients who received radiotherapy. This finding should be interpreted cautiously because the sample size was small and the analysis was descriptive. It may reflect differences in baseline characteristics, patient adaptation, timing of reconstruction, rehabilitation support, postoperative counselling, or individual variation in symptom reporting. National audit data have emphasized that breast reconstruction outcomes are influenced by multiple interacting factors, including patient characteristics, oncological treatment, timing of reconstruction, surgical approach, and institutional practice (Jeevan et al., 2014; 2011). Overall, the findings suggest that implant-based reconstruction can achieve acceptable outcomes even among radiotherapy-exposed patients, but this subgroup requires careful counselling regarding the risk of firmness, asymmetry, contracture, revision surgery, and long-term changes in breast appearance. Future care should therefore integrate surgical planning, oncological coordination, complication prevention, sexual health assessment, and psychosocial support into a comprehensive survivorship model.

Conclusion

Implant-based breast reconstruction in this study demonstrated a favourable postoperative profile, with relatively low complication rates and generally high levels of patient satisfaction with surgical outcome, healthcare delivery, and overall quality of life among patients in North Borneo, Malaysia. The findings suggest that implant-based

reconstruction is a clinically acceptable and patient-centred reconstructive option following mastectomy, particularly when performed with careful surgical planning, appropriate patient selection, and structured postoperative follow-up. Although complications such as superficial surgical site infection, rippling, seroma, capsular contracture, infected implant, and chronic pain were observed, their occurrence was relatively limited and did not appear to substantially compromise overall satisfaction among most patients. This indicates that implant-based reconstruction can provide meaningful physical and psychosocial benefits, including restoration of breast contour, improvement in body image, and enhancement of confidence after breast cancer surgery. The high satisfaction scores related to surgeons, medical staff, and office staff further emphasize that successful breast reconstruction is not determined solely by technical surgical outcomes, but also by the quality of communication, counselling, emotional support, continuity of care, and patient trust throughout the treatment pathway. These findings are especially important in the Malaysian and North Borneo context, where survivorship care is increasingly relevant as more women undergo treatment for breast cancer and seek restoration of physical appearance, femininity, and normality after mastectomy. Nevertheless, the lower score in sexual well-being highlights an important area that requires greater attention. While implant-based reconstruction may improve body image and satisfaction with appearance, it may not fully restore sexual confidence, intimacy, or breast-related sensation. Therefore, breast reconstruction services should incorporate holistic survivorship care that includes preoperative expectation management, psychological support, sexual health counselling, partner-sensitive communication where appropriate, and long-term monitoring of implant-related outcomes.

Current evidence from this study also supports the value of the BREAST-Q as an effective patient-reported outcome measure for evaluating satisfaction and quality of life among patients undergoing implant-based breast reconstruction. The questionnaire provides a comprehensive assessment that extends beyond traditional clinical indicators by capturing the patient's own perception of psychosocial well-being, sexual well-being, satisfaction with breast appearance, satisfaction with outcome, satisfaction with information, and satisfaction with healthcare professionals. This is important because the success of breast reconstruction should not be judged only by complication rates, surgical symmetry, or implant survival, but also by how patients feel, function, adapt, and reintegrate into their personal, social, and intimate lives after cancer treatment. The use of BREAST-Q in routine clinical practice may therefore strengthen patient-centred evaluation, improve shared decision-making, identify unmet survivorship needs, and guide quality improvement in reconstructive breast surgery. Future studies should expand the use of this questionnaire to patients undergoing other reconstructive techniques, including autologous flap reconstruction, latissimus dorsi flap reconstruction, tissue expander-based reconstruction, hybrid reconstruction, and delayed versus immediate reconstructive approaches. Comparative assessment across different techniques would allow clinicians to identify which procedures provide the highest satisfaction, best quality of life, lowest complication burden, and most acceptable long-term outcomes within the local population. Larger multicentre studies with longer follow-up are also recommended to evaluate the influence of radiotherapy, chemotherapy, implant type, mastectomy technique, reconstruction timing, and patient demographic factors on long-term satisfaction and quality of life. Overall, this study contributes important local evidence showing that implant-based breast reconstruction is

associated with positive patient-reported outcomes in North Borneo, Malaysia, while also reinforcing the need for broader, standardized, and comparative use of BREAST-Q to improve reconstructive decision-making and survivorship care.

Acknowledgement

This research is self-funded.

Conflict of interest

The authors confirm that there is no conflict of interest involve with any parties in this research study.

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