International Surgery Journal
Bandyopadhyay A et al. Int Surg J. 2019 Dec;6(12):4354-4359
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: http://dx.doi.org/10.18203/2349-2902.isj20195393

Original Research Article

The modifications in surgical technique and its impact on short term morbidity in modified radical mastectomy: a tertiary care hospital experience

Arnab Bandyopadhyay[1]*, Rajnish Talwar[2], Amol Patel[3], Pradeep Jaiswal[4]

[1]Department of Oncosurgery, Command Hospital (Eastern Command), Alipore Road, Kolkata, India
[2]Department of Oncosurgery, Army Hospital (Rand R), New Delhi, India
[3]Department of Medical Oncology, Army Hospital (Rand R), New Delhi, India
[4]Department of Oncosurgery, Command Hospital (AF), Bengaluru, India

Received: 09 September 2019
Revised: 20 November 2019
Accepted: 21 November 2019

***Correspondence:**
Dr. Arnab Bandyopadhyay,
E-mail: dr_arnabbanerjee@rediffmail.com

ABSTRACT

Background: Necrosis of flap margins, postoperative pain and shoulder dysfunction are amongst the main concerns of the breast surgeon performing modified radical mastectomy (MRM). This pilot study is aimed to evaluate the effects of these procedural modifications and whether should it be included as a standard practice.
Methods: A total of 150 MRM patients are evaluated in this single arm cohort study in a tertiary care centre over a time period of 2 years (2014-2016). The following modifications are adopted in the usual procedure of the MRM: double skin incision and elective excision of the skin margins, injecting long acting local anesthetic agent (bupivacaine) preoperatively around the nerve pedicles in axilla and postoperative positioning of arm in hyper abduction and early resumption of Shoulder exercises
Results: Flap margin necrosis has reduced considerably (2.6%) in comparison to historical data (15%). Pain relief was significantly less on first post-operative day (mean VAS score 2.93) which encouraged early shoulder mobilisation. Flap necrosis was more in T4 tumours (75% vs 25%) which was significant with a p value of .004. Similarly flap necrosis at 48hrs was more with the patients who received neoadjuvant chemotherapy (NACT) with a p value of 0.047. Higher nodal burden was significantly correlated with flap necrosis with a p value of .002.
Conclusions: This pilot study provides preliminary evidence of the positive effects of the proposed modifications on minimising morbidity following MRM further convincing evidence by way of multi-centric randomized control trials, will be required to validate the conclusions of this study.

Keywords: Flap margin necrosis, Morbidity, Modified radical mastectomy, Pain, Restriction of shoulder movement

INTRODUCTION

Breast cancer is the commonest cause of malignancy in Indian female as per Globocan data 2018.[1] Breast cancer is the commonest cancer in Indian women overall.[2,3] The surgical treatment of breast cancer has evolved considerably, with a trend towards more conservative approach. Although the safety and adequacy of breast-conserving surgery (BCS) for the treatment of early breast cancer has been proven in randomized controlled trials with long-term follow-up, western data show persistent high rates of mastectomy and wide geographic variation in surgical treatment for early breast.[4] Contrary to usual belief, more patient involvement in surgical

decision making was associated with a greater likelihood of choosing mastectomy.4 However, in an article by Teh et al, showed, when the surgeon does not recommend either procedure, that is, the patient has been given both BCS and mastectomy as possible options, about half will choose mastectomy over BCS.[5] In the present era of minimalistic conservative approach, modified radical mastectomy (MRM) has got its own place as one of the most commonly performed surgery for breast cancer. Immediate post-operative pain, shoulder dysfunction and flap necrosis are the main causes of short term morbidity and thereby chief concerns of the breast surgeon. An integrated approach to addressing these common complications of MRM is of significant clinical relevance. The objective of this study was to critically evaluate outcomes of modifications in standard surgical technique of MRM adopted at tertiary care center, and compare them, with those described in the literature; with special emphasis on short term morbidity. At this study author tried to find out whether these modifications in the surgical technique of MRM performed at this center, results in reduction of post-operative short term surgical morbidity favorably and should it be included as a standard practice.

METHODS

This was a prospective single arm cohort study conducted at Army Hospital(R&R), New Delhi during te period from March 2014 to March 2016.

Selection criteria

All consecutive patients reporting to the Malignant Disease Treatment Center with breast cancer were enrolled with age ≥18 till 75 years, and were evaluated and staged as per standard guidelines.[6] All patients undergoing MRM are included in the study. Patients with early breast cancer underwent upfront surgery whereas those reporting with locally advanced breast cancer (LABC) underwent surgery after planned neoadjuvant chemotherapy. Patients undergoing primary implant reconstruction or autologous reconstruction following MRM are excluded from the study. Institutional ethical committee clearance was taken.

MRM procedure is modified with following measures:

Double incision and elective removal of skin margins before closure

A standard Stewart incision is placed with the following modifications. While marking the standard transverse or sometimes obliquely placed elliptical incision another incision is marked (i.e. draw another ellipse about a cm within the previous one (Figure 1, 2).

After at the end of the surgery one cm of skin margin along the previously marked outer ellipse is cut by a sharp scissor before closure of skin flaps.

Figure 1: Marking of double incision.

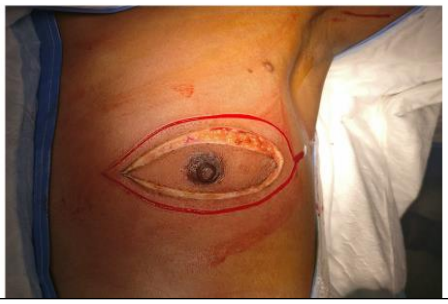

Figure 2: Placement of double elliptical incision over left breast.

Postoperative hyperabduction and early exercise

Arm of the operated side is positioned in hyper abducted position (Figure 3) before extubation while the patient is still under the effect of anaesthesia and patient is encouraged for early shoulder mobilisation as soon as she comes out from the effect of general anaesthesia by performing abduction, flexion and extension exercises which are explained during pre-operative counselling.

Figure 3: Immediate postop hyperabduction of arm.

Infiltration of nerve pedicles with bupivacaine solution (0.5%, 10 ml)

After the conclusion of mastectomy the thin fascial layers around three nerves (Thoracodorsal, Long thoracic,

Medial pectoral) are infiltrated with plain bupivacaine solution (3-4 ml/each pedicle) (Figure 4).

Figure 4: Per-operative infiltration of nerve pedicle.

The outcome measures of these modifications are assessed by analysing:

Mastectomy flap necrosis

The flap margins are evaluated daily for presence of flap necrosis by the surgeons and evaluated till 5th post-operative day to rule out any necrosis. A validated scoring system described by the Mayo Clinic called the skin ischemia and necrosis score is used to assess the severity of mastectomy skin flap necrosis.[7] Superficial necrosis/ discoloration of skin managed conservatively. Deep necrosis if any present is managed by excision of involved area and primary suturing of the flap margins.

Shoulder mobility

Range of motion is assessed by surgeons, measured with plastic goniometer and was scored as equal to or decreased relative to the non-operated side on 24 hrs, 48 hrs, and 7th post-operative day and at follow up visit on 3 months. Shoulder ROM (flexion, abduction and external rotation) were measured preoperatively at 24 hrs, 48 hrs, 7 days and 3 months post operatively. Restriction of shoulder mobility is diagnosed if there is >10 degrees decrease in ROM (flexion/abduction/external rotation) and recorded as Restricted or Not restricted (NR) by combining and comparing pre and post-operative measurements.

Post-operative pain

Post-operative pain is evaluated by Wong Baker Faces pain rating scale and managed accordingly by non-narcotic analgesics (inj paracetamol 1000 mg IV/tab paracetamol 650 mg).[8] Author choose Wong Becker Faces pain scale over other numeric pain scale because author found its easy reproducibility with all the patient from the different educational background.

Patients were discharged on second post operated day if there was no complication. Average length of stay was 5±2 days for patients with skin flap margin necrosis.

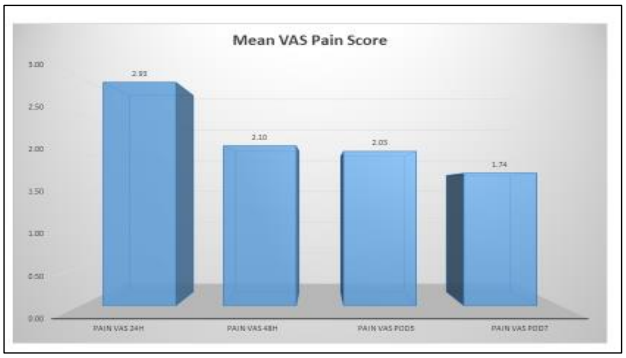

Figure 5: Mean pain VAS score (Wong Becker's Faces pain rating scale).

Statistical analysis

STATA 13 version (STATACORP, USA) was used to analyse data and association between variables was analysed by Chi square method. Where ever available Fisher exact test was done.

RESULTS

A total of 150 patients, were included in our study over a time period of 2 years (month 2014-2016). Baseline demographic characteristics are given in (Table 1).

Table 1: Patient demographics.

Factors	N (%)
Gender	
Male	2 (1))
Female	148 (99)
Age (in years)	
Average age	54.4
<40	13 (8.7)
41-60	94 (62.7)
61-70	30 (20)
>70	13 (8.7)
Average BMI (kg/m^2)	29.53
Clinical T size	
T1	16 (10.7)
T2	78 (52)
T3	25 (16.7)
T4b	28 (18.7)
Tx	3 (2)
Clinical nodal status	
N0	59 (39.3)
N1	65 (43.3)
N2	22 (14.7)
N3	4 (2.7)
Smoking	0%
Skin involvement	28 (18.7)
Timing of surgery	
Primary	106 (70.7)
NACT	44 (29.3)

Flap discoloration noted in four patients (2.6%) in our series. Among them two patients had superficial necrosis (skin score depth B and surface area 2) and managed conservatively with satisfactory healing and cosmesis. One patient had partial thickness necrosis (skin score depth C and surface area 2) and managed conservatively. Another patient had full thickness necrosis (skin score depth D and surface area 2) which were managed with excision and primary suturing within the first post-operative week that resulted in satisfactory healing and acceptable cosmesis and also did not affect adjuvant therapy.

Mean postoperative pain score as per VAS (Wong Becker's Faces pain rating scale) was 2.93 (Figure 5); which author found adequate and post-operatively no patients needed narcotic analgesics. Pain relief was significantly less on first post-operative day which encouraged the patients for early shoulder mobilisation. All the patients started doing shoulder mobilisation exercises in immediate post-operative period and on examination no patient developed shoulder ROM restriction.

Outcome variables were analysed for association with baseline clinical characteristics (Table 2). Flap necrosis was more in T4 tumours (75% vs 25%) which was significant with a p value of 0.004. Similarly flap necrosis at 48 hrs was more with the patients who received neoadjuvant chemotherapy (NACT) with a p value of 0.047. Higher nodal burden was significantly correlated with flap necrosis with a p value of 0.002. Age did not show any correlation when it was analysed with a cut off of <60 or >60 yrs.

Table 2: Correlation of baseline variables with flap necrosis.

Baseline variable	Flap necrosis at 48 hours		P value	VAS score <3	VAS score ≥3	P value
Age (n=150)	Yes	No	0.869	5	102 (72.86%)	0.123
≤60	3	104 (71.23%)				
>60	1	42 (28.77%)		5	38 (27.14%)	
BMI(n=150)	Yes	No	0.501	9	79 (56.43%)	0.037
<30	3	85 (58.22%)				
≥30	1	61 (41.78%)		1	61 (43.57%)	
Tumor (n=147)*	Yes	No	0.004	2	110 (80.29%)	0.450
<T4	1	118 (82.5%)				
T4	3	25 (17.48%)		1	27 (19.71%)	
Nodal status (n=150)	Yes	No	0.002	9	15 (82.14%)	0.526
N1	1	123 (84.25%)				
≥N2	3	23 (15.75%)		1	25 (17.86%)	
Flap necrosis	Yes	No	0.047	8	97 (69.29%)	0.475
Primary (n=105)	1	104 (71.23%)				
NACT (n=45)	3	42 (28.77%)		2	43 (30.71%)	

DISCUSSION

Reduced ROM and muscle strength, pain and decreased degree of activities in daily living were reported most frequently in relation to MRM/ axillary lymph node dissection. There has been much debate about the best time to begin physical therapy or to begin increasing motion. Lotze et al compared early and delayed physical therapy groups after mastectomy.[9] Wound complications including infection and small areas of skin breakdown occurred more frequently in the early group. No significant differences in the percent of patients achieving functional ROM could be identified between these two groups. In contrast, a study by Pollard et al. demonstrated improved abduction scores in patients who had earlier motion after operation.[10] Wingate et al and another study from University of South Korea suggested that early rehabilitation by ROM exercises from the first post-operative day was very effective for post mastectomy patients.[11,12] Post MRM flaps are insensate, but pain following axillary manipulation mimics a condition like frozen shoulder and post op pain limits mobility of shoulder and thereby increases morbidity. Studies described the rate of shoulder morbidity due to pain is around 16%.[13] This necessitates the consideration of immediate pain relief following surgery to facilitate the early mobilisation. Despite various strategies like use of NSAIDS, opioids, peripheral nerve blocks, several studies have reported limited success in providing effective postoperative pain control. The technique of infiltration or irrigation of local anaesthetic is widely used as a part of multimodal analgesia in plastic reconstructive breast surgery, with remarkable effectiveness and without adverse effects.[14,15] Medline search showed scant literature regarding the use of infiltration/irrigation of local anaesthetics following the MRM. The techniques like paravertebral block, brachial plexus block by infraclavicular approach have also been

tried for postoperative analgesia following mastectomy.[16,17] However, these techniques are laborious and technically challenging. The technique of bupivacaine infiltration of the nerve pedicles described in this study, is technically simple, and doesn't increase operating time. In this study, it is showed that this simple procedure like intraoperative infiltration along with immediate postoperative hyperabduction can minimise the post-operative pain considerably (Mean VAS score 2.93), lowers down the need for post-operative analgesics, and thereby help in early shoulder mobilisation. The mobilisation protocol followed at this study started at the immediate post-operative period when the patient is still under effects of anaesthesia and continued as a motivated, prior explained, active self-exercise program aimed primarily at preventing limitation of arm motion on the side of recent mastectomy. This protocol resulted no restriction of shoulder movement in the patients we followed in this study. A self-exercise program not only prevented shoulder movement restriction, but it was also extremely important in allowing the patient direct responsibility for improving her own physical appearance. By adopting the technique of intraoperative infiltration of nerve pedicles and early mobilisation of shoulder as well as a motivated, prior explained, active self ROM exercise program the shoulder dysfunction rate of this centre has decreased to nil.

One of the most commonly encountered complication of breast surgery is necrosis of skin flap margins (Fig D). In the literature, the rates of flap necrosis in MRM vary from 5% to 61%.[18] The National Mastectomy and Breast Reconstruction Audit Third Annual Report estimated flap necrosis rate approximately 5 per cent.[19] Surgical technique and patient risk factors may both influence skin flap viability. Patient risk factors for poor healing include the effects of smoking, previous scars, previous radiotherapy, diabetes, obesity and severe co-morbidities.[20,21] Some authors suggested that the use of diathermy rather than scalpel may increase the risk of skin flap necrosis. However, in a retrospective study of 151 skin sparing mastectomies there was no significant difference between diathermy and scalpel.[22] Despite this, dissection devices with a low risk of low thermal injury are being proposed in an attempt to minimize skin flap necrosis.[23] There are discrepancies in classification method for flap necrosis in the literature. The described treatment for full thickness flap necrosis is debridement along with re-suturing and, occasionally, application of split-thickness skin grafts. In the present study, the flap necrosis rate with the modification of elective excision of a cm of skin margin, adopted here in has been 2.6% (04 patients). Although the flap necrosis patients had an increased post-operative hospital stay in comparison to others (Avg 5±2 days vs 2 days), cosmetic outcomes were equally satisfactory and their adjuvant therapy were not delayed. Flap necrosis though best averted by careful fascial flap dissection in the avascular surgical plane between the subcutaneous fat and breast fat lobules, in this study it is dealt with rather prophylactically by a formal excision of about a centimetre of the skin margin at the time of skin closure. Although this procedure increased the mean operating time by 10±2 minutes it has neither increased operating time significantly nor increased the postoperative complication rate.

Although in our study author found positive correlation of flap necrosis with T4 tumours, higher nodal burden and NACT these findings needs to be validated in an RCT involving more number of patients.

CONCLUSION

Although seemingly a simple surgical procedure, MRM is known to be associated with many complications of which flap margin necrosis and post-operative shoulder dysfunction have been the chief concerns of the breast surgeons, since its inception. This is a novel pilot study carried out in a tertiary care centre where author showed by adopting simple techniques the above mentioned postoperative morbidities can be reduced to a great extent. Although this study provides preliminary evidence of the positive effects of the proposed modifications on minimising morbidity following MRM further convincing evidence by way of multicentric randomized control trials, involving larger number of patients, will be required to validate the conclusions of this study.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Globocan 2018. Available at: http://cancerindia.org.in/globocan-2018-india-factsheet. Accessed on 1 September 2018.
2. WHO. Breast cancer: prevention and control. Available at: http://www.who.int/cancer/detection/breastcancer/en/. Accessed on 1 September 2018.
3. Agarwal G, Ramakant P. Breast cancer care in India: the current scenario and the challenges for the future. Breast Care. 2008;3(1):21.
4. Katz SJ, Lantz PM, Janz NK, Fagerlin A, Schwartz K, Liu L, et al. Patient involvement in surgery treatment decisions for breast cancer. J Clini Oncol. 2005;23(24):5526-33.
5. Teh YC, Shaari NE, Taib NA, Ng CH, See MH, Tan GH, et al. Determinants of choice of surgery in Asian patients with early breast cancer in a middle income country. Asian Pac J Cancer Prev. 2014;15:3163-7.
6. NCCN guidelines: 2016-2017. Available at: https://www.nccn.org/about/news/ebulletin/ebulletindetail.aspx?ebulletinid=799. Accessed on 1 September 2016.

7. Lemaine V, Hoskin TL, Farley DR, Grant CS, Boughey JC, Torstenson TA, et al. Introducing the SKIN score: a validated scoring system to assess severity of mastectomy skin flap necrosis. Annals Surg Oncol. 2015;22(9):2925-32.
8. Lotze MT, Duncan MA, Gerber LH, Woltering EA, Rosenberg SA. Early versus delayed shoulder motion following axillary dissection: a randomized prospective study. Annals Surg. 1981;193(3):288.
9. Pollard K, Callum KG, Altman DG. Shoulder movement following mastectomy. Clin Oncol. 1976;2:343-9.
10. Wingate L, Croghan I, Natarajan N, Michalek AM, Jordan C. Rehabilitation of the mastectomy patient: a randomized, blind, prospective study. Archives Physical Med Rehab. 1989;70(1):21-4.
11. Na YM, Lee JS, Park JS, Kang SW, Lee HD, Koo JY. Early rehabilitation program in postmastectomy patients: a prospective clinical trial. Yonsei Med J. 1999;40(1):1-8.
12. Hladiuk M, Huchcroft S, Temple W, Schnurr BE. Arm function after axillary dissection for breast cancer: a pilot study to provide parameter estimates. J Surg Oncol. 1992;50(1):47-52.
13. Fayman M, Beeton A, Potgieter E, Becker PJ. Comparative analysis of bupivacaine and ropivacaine for infiltration analgesia for bilateral breast surgery. Aesthetic Plastic Surg. 2003;27(2):100-3.
14. Lu L, Fine NA. The efficacy of continuous local anesthetic infiltration in breast surgery: reduction mammaplasty and reconstruction. Plastic Reconstructive Surg. 2005;115(7):1927-34.
15. Coveney E, Weltz CR, Greengrass R, Iglehart JD, Leight GS, Steele SM, Lyerly HK. Use of paravertebral block anesthesia in the surgical management of breast cancer: experience in 156 cases. Annals Surg. 1998;227(4):496.
16. Bhuvaneswari V, Wig J, Mathew PJ, Singh G. Post-operative pain and analgesic requirements after paravertebral block for mastectomy: A randomized controlled trial of different concentrations of bupivacaine and fentanyl. Ind J Anaesthesia. 2012;56(1):34.
17. Zimmermann-Nielsen E, Dahl MB, Graversen HP. Effects of tobacco smoking on the incidence of flap necrosis after mastectomy. Ugeskrift For Laeger. 1997;159(33):4974-6.
18. Jeevan R, Cromwell D, Browne J, Van Der Meulen J, Pereira J, Caddy C. National mastectomy and breast reconstruction audit. NHS Inf Cent. 2011.
19. Paige KT, Bried JT, Jones G. A comparison of morbidity from bilateral, unipedicled and unilateral, unipedicled TRAM flap breast reconstructions. Plastic Reconstructive Surg. 1998;101(7):1819-27.
20. Padubidri AN, Yetman R, Browne E, Lucas A, Papay F, Larive B, Zins J. Complications of postmastectomy breast reconstructions in smokers, ex-smokers, and nonsmokers. Plastic Reconstructive Surg. 2001;107(2):342-9.
21. Davies K, Allan L, Roblin P, Ross D, Farhadi J. Factors affecting post-operative complications following skin sparing mastectomy with immediate breast reconstruction. Breast. 2011;20(1):21-5.
22. Fine RE, Vose JG. Traditional electrosurgery and a low thermal injury dissection device yield different outcomes following bilateral skin-sparing mastectomy: a case report. J Med Case Rep. 2011;5(1):212.

Cite this article as: Bandyopadhyay A, Rajnish Talwar R, Patel A, Jaiswal P. The modifications in surgical technique and its impact on short term morbidity in modified radical mastectomy: a tertiary care hospital experience. Int Surg J 2019;6:4354-9.