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Original Research Article

Autologous bone marrow therapy to operative site following modified radical mastectomy to prevent flap complications

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Abstract

Breast cancer is the most common malignancy and the major cause of cancer-related death with 23% of new cases and 14% of total deaths globally in female population around the world. Though breast-conserving surgery is more and more welcomed among female patients, Modified Radical Mastectomy (MRM) still plays an important role in the operation for breast cancer. Postoperative complications, such as seroma, wound infection, flap necrosis, hematoma, and prolonged drainage led to a delay of adjuvant treatments after the operation. In our study we have tried the autologous bone marrow therapy to operative site to prevent such complications. Two groups of patients were selected randomly and we did modified radical mastectomy for control group in 20 patients and in study group were given autologous bone marrow therapy to operative site after modified radical mastectomy in 20 patients and the patients were followed post operatively. The patients responded well and the post operative pain, seroma was less as compared to control group. Patients in study group had less marginal necrosis and no flap necrosis was seen as compared to control group. No local recurrence keloid or hypertrophic scar was seen in study group where as in control group we found one local recurrence and one hypertrophic scar. Thus this novel method of treatment helped the patients to recover early and decrease post operative morbidity significantly. Modified radical mastectomy is a hope for every patient of modified radical mastectomy but the patient really suffer a lot psychologically, financially and physically after it. In our study we have found autologous bone marrow therapy to operative site very effective in early postoperative recovery and helping such patients in all aspects.

Keywords: Autologous bone marrow therapy, Modified radical mastectomy, Carcinoma breast

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1. Introduction

The incidence of breast cancer is rising.[1] In our country where early diagnosis is not easily available many patients go into locally advanced stage or metastatic stage there by needing modified radical mastectomy rather than breast conservative surgery. The common immediate complications of modified radical mastectomy are wound pain, seroma , wound infection, flap necrosis, stiff shoulder , where as delayed complications are hypertrophic scar, keloid and local recurrence.[2,3,4] Many studies have been done all over the world to prevent these complications like the use of herbal medicines by the Chinese to prevent complications, delaying post operative physiotherapy for a week,[5,6] use of harmonic scalpel instead of electrocautery,[7,8] use of negative suction drain and compressive dressings etc.[8,9] None of the methods alone is sufficient to prevent such problems thus a combined approach is used. Autologous bone marrow therapy is a new concept which is based on the facts that bone marrow contains mesenchymal stem cells which stimulates the local stem cell, fibroblast and macrophages for their enhanced activity. They also liberate cytokines and growth factors which helps in rapid wound healing and preventing early flap complications like wound pain, flap and marginal necrosis and seroma formation.

In this prospective study from November 2013 to November 2016 we have done a prospective analysis in the study on the effect of autologous bone marrow therapy to breast bed , axillary bed and breast flaps to prevent flap complications.

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2. Objective

2.1. Primary objective

To study the effect of autologous bone marrow therapy to breast bed, axillary bed and breast flaps to prevent flap complications.

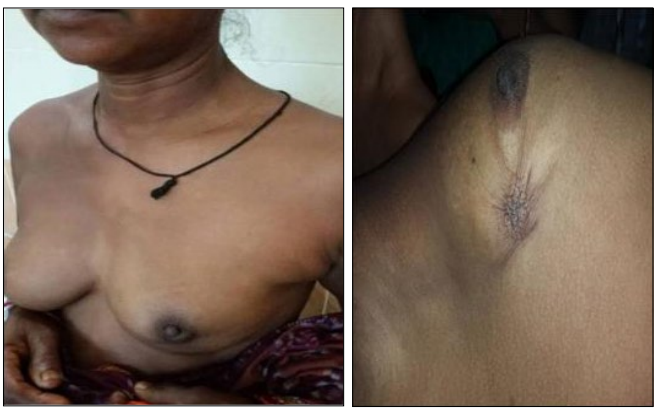
2.2. Secondary objective

To study the effect of autologous bone marrow therapy (cell therapy) to breast bed axillary bed and breast flap following modified radical mastectomy to prevent hypertrophic scar, keloid formation and local recurrance of cancer.

3. Materials and Methods

(Figure 1), (Figure 2), (Figure 3), (Figure 4), (Figure 5), (Figure 6), (Figure 7), (Figure 8), (Figure 9), (Figure 10), (Figure 11), (Figure 12)

1. Institutional ethics committee clearance and informed consent of the patients were undertaken before the study.
2. Total forty patients with T1-3 N0-1 M0 breast cancer patients under this study underwent modified radical surgery at VSS Institute of Medical Sciences and Research, Burla, Odisha, India in one surgical unit and performed by a single surgeon during 2013-16.
3. 20 patients were kept in study group and rest 20 in control group.
4. Auchincloss type modified radical mastectomy was performed in all patients.
5. In the study group, on table bone marrow was aspirated from the sternum of the patients and kept aside after priming with heparin.
6. Skin flaps were raised as per standard procedure, mastectomy and axillary clearance and hemostasis was obtained in all.
7. Bone marrow was infiltrated to under surfaces of breast flaps and brest bed and to axilary bed.
8. Skin flaps closed with a suction drain.
9. Pressure garment and suction drains were used routinely in study and control group.



(a) (b)

Figure 1: (a) Showing preoperative and (b) postoperative picture of patient

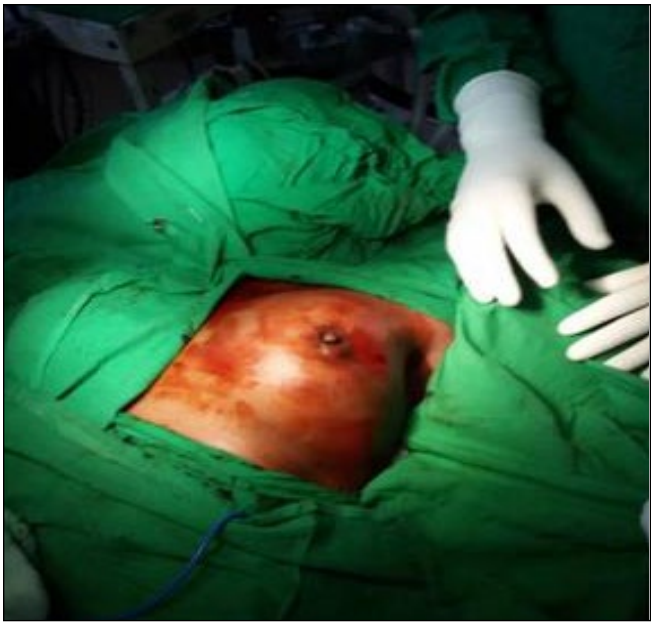


Figure 2: Intraoperative picture of patient

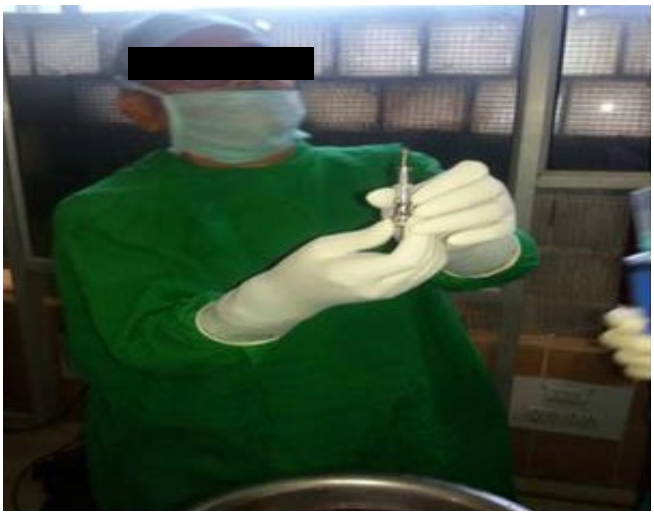


Figure 3: Showing bone marrow aspiration needle

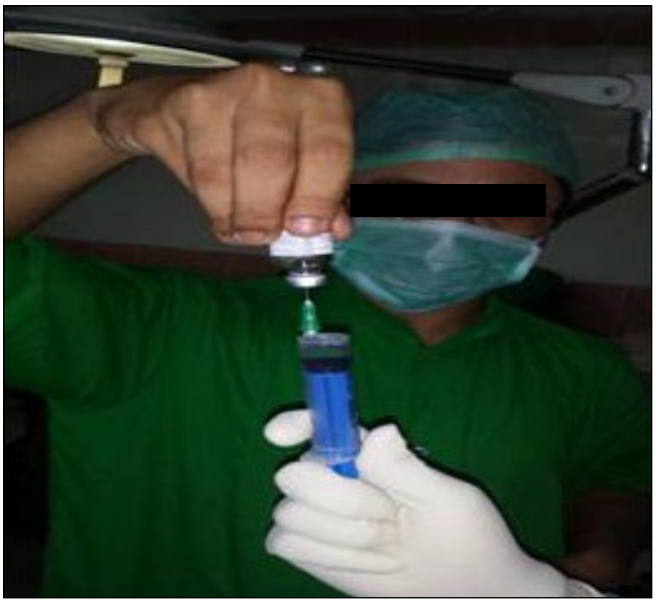


Figure 4: Showing priming of syringe with heparin

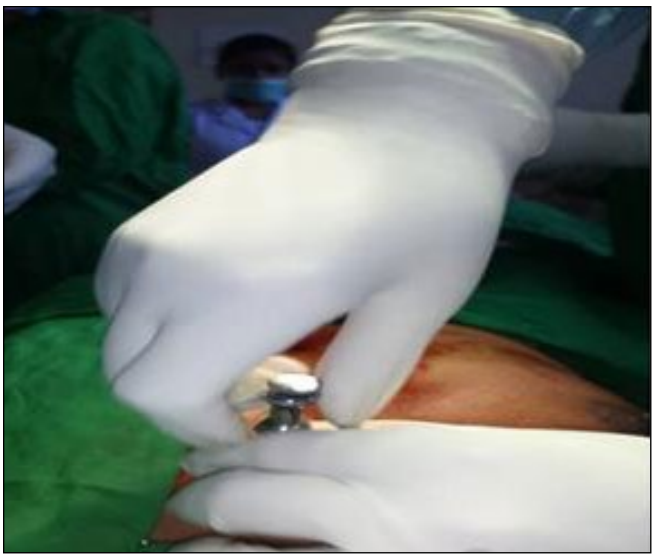


Figure 5: Showing bone marrow aspiration form sternum

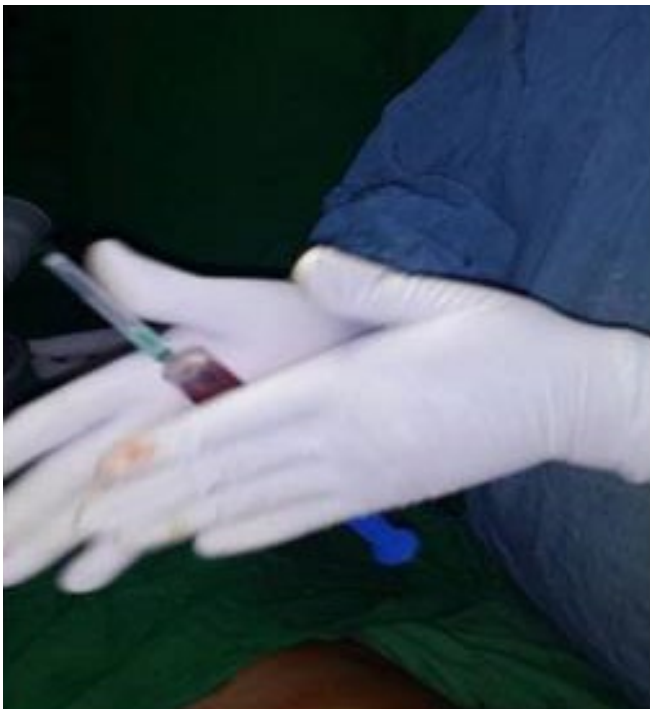
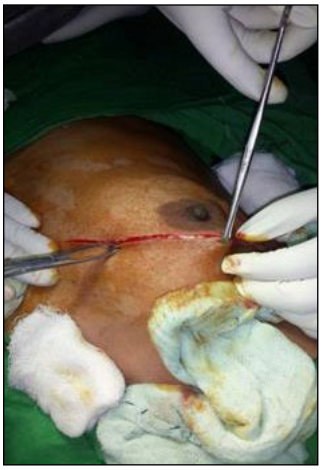


Figure 6: Showing marrow priming



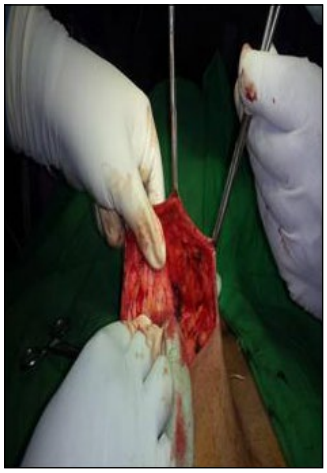


Figure 7: Showing flaps raised

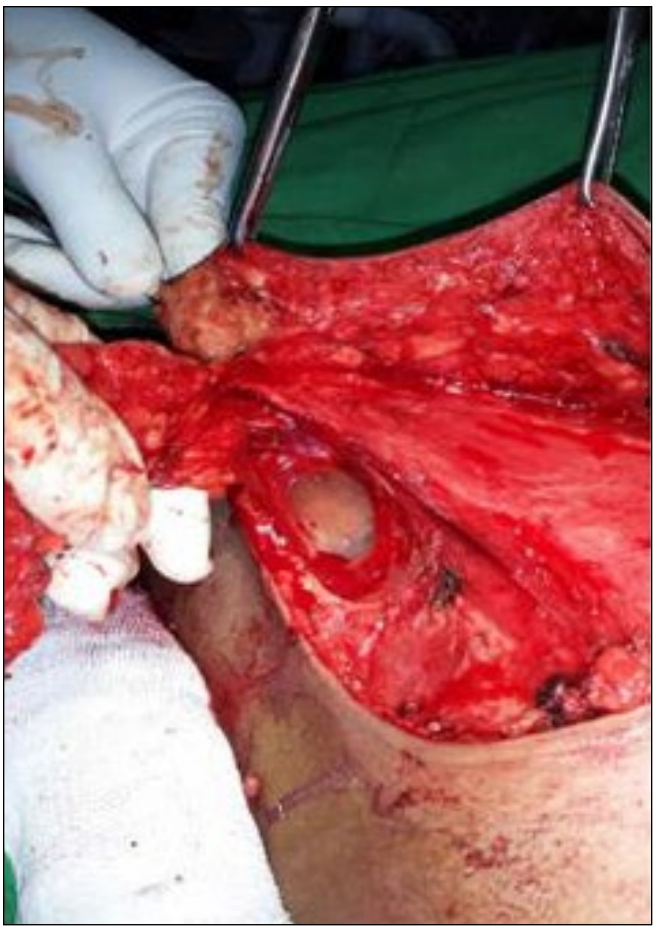


Figure 8: Showing axillary dissection

Figure 9: Showing excised breast specimen along with axillary tail containing lymph nodes

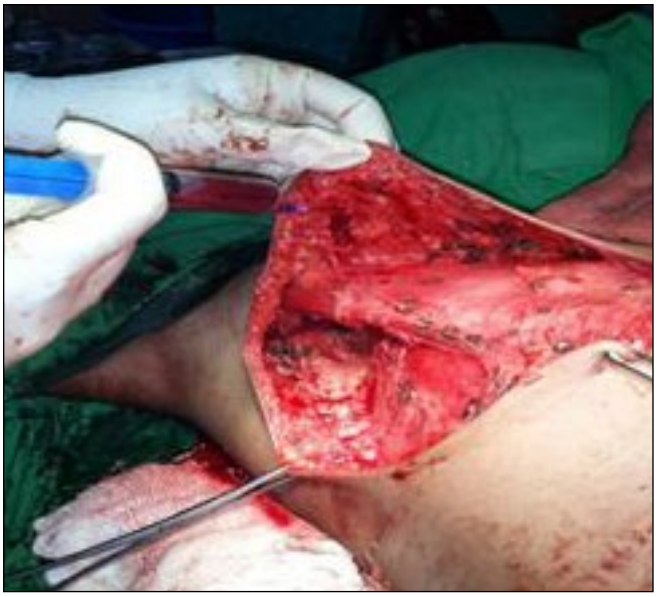


Figure 10: Showing Bone marrow infiltration to operative site

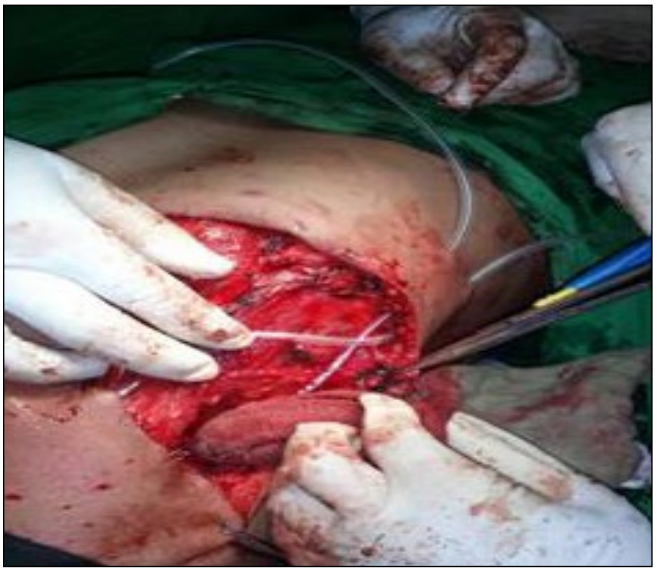


Figure 11: Showing drain placement

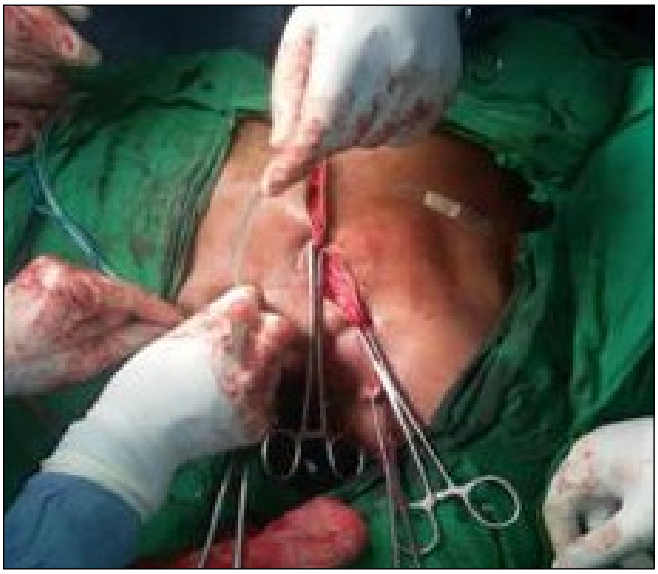


Figure 12: Showing flap closure

4. Results (Table 1), (Table 2), (Table 3)

1. In 20 patients of control group, flap associated complications like flap necrosis in 2 patients , marginal necrosis in 4 patients and seroma collection in 9 patients were observed. One patient required skin grafting for flap necrosis. All patients were discharged with full recovery.
2. Flap necrosis < 3cm (in 1 patients of control group) were allowed to heal with secondary intention where as larger defects in 1 patient was treated with skin grafting.
3. No major flap complications were observed in study group. Only marginal necrosis was observed in 2 patients (out of 20) which healed within 1 week post operatively without any intervention.
4. Patients under study group experienced less post operative pain as compared to control group. Shoulder stiffness was observed in 2 patients in study group where as in control group it was observed in 8 patients out of 20 patients in each group.
5. Local recurrence after modified radical mastectomy was seen in only one patient in control group.

Table 1: Showing post operative pain , seroma collection and flap complications seen in respective post operative day of control group

Post op days	Post op pain	Seroma collection	Flap complications
1	severe	130 ml	absent
3	mild	100 ml	marginal 2, flap 1
5	mild	70 ml	marginal 2 + 2 flap 1 + 1
7	mild	50 ml	marginal 2 + 2 flap 1 + 1
10	mild	30 ml	marginal 2 + 2 flap 1 + 1

Table 2: Showing post operative pain , seroma collection and flap complications seen in respective post operative day of study group

Post op days	Post op pain	Seroma collection	Flap complications
1	mild	100 ml	absent
3	mild	50 ml	absent
5	nil	30 ml	marginal 2 flap-nil
7	nil	10 ml	marginal 2 flap-nil
10	nil	10 ml	marginal 2 flap-nil

Table 3: Showing comparison between study and control group with respect to general well being, seroma collection after drain removal, shoulder stiffness and local recurrence

	Study group	Control group
General well being	good	moderate
Seromacollection	0/20	9/20
Shoulderstiffness	2/20	8/20
Local recurrence	0/20	1/20

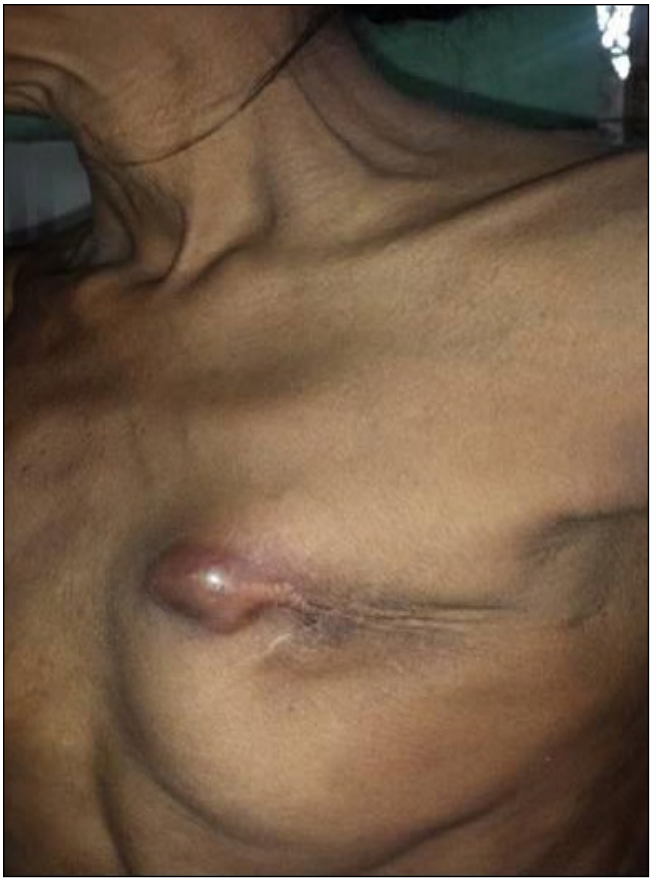


Figure 13: Showing local recurrence of a patient after modified radical mastectomy in control group

5. Discussion

In our study the post operative pain was experienced very less as compared to control group may be due to the anti-inflammatory activites of mesenchymal stem cells. The seroma formation also is less as compared to study group which may be due to fibrosis of lymphatics responsible for it. Marginal necrosis is less as compared to control group may be due to increased neovascularisation. Keloid and hypertrophic scar is not seen due to the effects of mesenchymal stems cells on local macrophages and fibroblasts to liberates cytokines which enhanced proper wound healing. We have not seen any local recurrence and it need to be studied more to prove the anti tumour effects of mesenchymal stem cells. This study is purely clinical and we have only seen the effects, but the rationale behind them need to be studied and proved in molecular level. It has created hope to answer many problems and also has given rise to many new questions which needs to be solved in molecular level. **(Figure 13)**

6. Conclusion

To minimize the skin flap complications after modified radical mastectomy for breast cancer, lesser use of cautery, infiltration of autologous bone marrow, routine use of suction drains and application of pressure garments may be recommended.

7. Declaration of Patient Consent

Written informed consent was obtained from the patient for publication.

8. Source of Funding

None.

9. Conflict of Interest

None.

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