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RESEARCH ARTICLE

SUBDERMAL PLEXUS AS A GUIDE FOR SKIN FLAP THICKNESS IN MODIFIED RADICAL MASTECTOMY IN BREAST CANCER

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Abstract

Introduction: Breast cancer is the most common invasive cancer to affect women in the world and is the second highest cause of cancer death in women after lung cancer. Different surgical options are available for treating breast cancer but Modified Radical Mastectomy is still the most common surgery performed worldwide for breast cancer and has the lowest incidence of loco-regional recurrence.

Aim: The aim of this study to find out the role of sub-dermal plexus as a guide to achieve optimum skin flap thickness during modified radical mastectomy for breast cancer.

Materialsandmethods: This prospective study was conducted in the Department of Surgery and Pathology, Zoram Medical College Hospital, Falkawn, Mizoram. A total of 40 patients with Breast carcinoma for which Modified Radical Mastectomy were included in this study.

Results: All the patients were observed for skin flap necrosis. The overall incidence of Flap necrosis was 0% as observed on POD1, POD2, POD4 and POD6. Although after POD14, there were a total of 5 patients who had surgical site infection with wound gaping for whom debridement, dressings and secondary suturing were done.

Conclusion: we concluded that there is minimal chance of skin flap necrosis and minimal chance of leaving behind breast tissue using subdermal plexus of vein as a guide for optimum skin flap thickness in modified radical mastectomy in patients with breast cancer.

Introduction:-

Breast cancer is the most common invasive cancer to affect women in the world and is the second highest cause of cancer death in women after lung cancer. On an average, 1 in 8 women will be diagnosed with breast cancer in her lifetime. In the UK, approximately 21,500 women undergo mastectomy per year. Advances in diagnostic procedures and technologies have led to increase in the detection rates of breast cancer, resulting in the higher incidence of mastectomy worldwide which still continues to be the work horse in the management of breast cancer. [1] Breast cancer is more common in females than males. The etiology, diagnosis, and treatment of breast cancer in males is similar to that in females. Unlike breast cancer in female, breast cancer in male is rare. Although its frequency has increased in recent decades-particularly in the urban United States, Canada & the United Kingdom- breast cancer in male accounts for less than 1% of breast cancer. In India, breast carcinoma is superseded only by cancer of cervix as

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the leading cause of death due to cancer in women. In India and in other developing countries, up to 25-30% of patients present as Locally Advanced Breast Cancer (LABC). It is estimated that there are around 80,000 new breast cancer cases in India per year. The population-based cancer registry data from various parts of the country has revealed breast cancer as the commonest cancer among women in Delhi, Mumbai, Ahmadabad, Kolkata and Trivandrum. In the rest of the Indian registries, breast cancer is listed as the second leading cancer among women. The age standardized incidence rates vary from 9-32 per 2 100,000 women. An increasing trend in the incidence rates of breast cancer has been reported from various registries of National Cancer Registry Project[2,3]. Different surgical options are available for treating breast cancer but Modified Radical Mastectomy is still the most common surgery performed worldwide for breast cancer; MRM has the lowest incidence of loco-regional recurrence. In MRM, we remove the whole of the tumor containing organ and regional draining lymph nodes in the axilla. As an initial step of mastectomy, the overlying skin is elevated as flaps. After removing the organ containing tumor, the raw area over the chest is closed with the skin flaps. The challenge surgeons‟ face is regarding skin flap necrosis versus residual breast tissue. Too thin the flap more is the risk of necrosis and too thick a flap, more is the risk of residual breast tissue which can again lead to recurrence of breast cancer. Hence the thickness of the skin flap needs to be optimized[4]. The present study has been designed to validate that subdermal plexus is a safe oncological guide and landmark for surgeons for raising optimal skin flap thickness in MRM and hence decreasing the rates of skin flap necrosis and at the same time not leaving breast tissue on the flaps.

Aims And Objectives:-

The aim of this study to find out the role of sub-dermal plexus as a guide to achieve optimum skin flap thickness during modified radical mastectomy for breast cancer.The objective is to study the incidence of flap necrosis and seroma rates using sub-dermal plexus of veins as a guide to optimum flap thickness during mastectomy.

Materials And Methods:-

This prospective study was conducted in the Department of Surgery and Pathology, Zoram Medical College Hospital, Falkawn, Mizoram. Number of patients that were proposed to be included is minimum 30. [finally, 40 cases could be done and hence included in the study]. The minimum number of patients to be include were calculated using the formula: $N=4pq/L^2$, P=population proportion of positive characterQ=1-p, L=Allowable error. **Patient consent**: A total of 40 patients with breast cancer treated by Modified Radical Mastectomy were included in this study. Patients planned for modified radical mastectomy for breast cancer were approached and counselled. After explaining to them the detail procedure and information in vernacular language, patients were requested to sign a consent form and after taking their consent, they are included in the study.**Procedural Details**: After painting and draping the patient, the surgical incision is marked using sterile gentian violet dye. Incision is given by surgical blade No. 15, and further dissection is done by electrocautery in all the cases. First, the upper flap is raised, the thickness of the flap being dictated by the subdermal plexus of veins which is visualized throughout the flap raising. The lower flap is raised using the same technique throughout the procedure. After the specimen is resected out, silk sutures are used to orient the specimen - long silk thread used to mark the lateral border, short silk thread for the superior border and the specimen is immediately put in a container and fixed with 10% formalin solution After completion of MRM, 1cm x 1cm discs of subcutaneous tissue from under the skin flap were excised for HPE. These biopsies were taken from middle of each - upper outer, upper inner, lower outer and lower inner quadrants of the flap at fixed site of 3 cm from the cut margin of skin. Ten sections of the biopsy from each site were examined by hematoxylin& eosin (HE) stains. The results were analyzed for the presence or absence of breast tissue in the biopsy specimens. The patients were then followed up, and checked for skin flap necrosis (on Day 1, 2, 4 and 6) till the sutures are removed, and seroma formation. The drains were removed after the drain output is less than 30 ml in 24 hours and the patient would be discharged.**Results were assessed by**: The flap necrosis incidence was assessed on Days -1, 2, 4 and 6 and recorded using a digital camera and analyzed using software. The suction drains were removed after the drain output is less than 30 ml in 24 hours [Hospital stay]. Seroma formation rates were calculated based on the number of aspirations and the amount of fluid aspirated. **STATISTICAL METHODS**: The incidence of flap necrosis, hospital stay and seroma rates were assessed by using ANOVA.P value less than or equal to 0.05 were taken as significant**.**SPSS 21 version was used for analysis.

Results:-

A total of 40 patients with Breast carcinoma for which Modified Radical Mastectomy were included in this study and the patients were observed for skin flap necrosis and seroma formation rate.

Table 1:- Age Distribution.

Age group	Frequency	Percentage
<40	8	20%
40-50	17	42.5%
>50	15	37.5%
Total	40	100%

The study group consists of only female. The majority of them are not in reproductive age group, 40 to 50 years comprising of 42.5% of the study population while 37.5% of the population are above 50 years of age which are of the lesser aggressive nature of breast cancer while 20% of the study population are in the reproductive age group(<40 years) who are presumed to be the aggressive carcinoma but histopathologically all were intraductal carcinoma.

Table 2:- Menstrual History.

MENOPAUSAL STATUS	Frequency	Percentage
POST MP	19	47.50%
PRE MP	21	52.50%
Total	40	100.00%

We had near equivocal menopausal and pre-menopausal patients with 47.5% and 52.5% respectively as shown in table 2.

Table 3:- Skin Flap Necrosis.

POD1	Frequency	Percentage
0	40	100.00%
Total	40	100.00%

POD4	Frequency	Percentage
0	40	100.00%
Total	40	100.00%

POD2	Frequency	Percentage
0	40	100.00%
Total	40	100.00%

POD6	Frequency	Percentage
0	40	100.00%
Total	40	100.00%

As shown in Table 3, skin flap necrosis of the patients in post-operative periods is observed. A photograph of all the patients on their post-op day 1, 2, 4 and 6 were taken. The overall incidence of Flap necrosis was 0% as observed on POD1, POD2, POD 4 and POD6. Although after POD14, there were a total of 5 patients who had surgical site infection with wound gaping for whom debridement, dressings and secondary suturing were done.

Discussion:-

Mastectomy skin flap necrosis (MSFN) has a reported incidence of 5%-30% in the literature [5]. It is often a significant and underappreciated problem. MSFN is a common complication and may present as partial- or full-thickness necrosis [6]. Predictive patient risk factors include smoking, diabetes, obesity, radiotherapy, previous scars and severe medical co morbidity [7]. MSFN leads to a number of challenges, including wound management problems, delays to adjuvant therapy, esthetic compromise, implant extrusion, patient distress and financial loss [8]. Careful preoperative planning and meticulous surgical technique may reduce the incidence of MSFN. A number of intraoperative techniques are available to try and predict skin flaps at risk of MSFN [9]. MSFN may be managed operatively or nonoperatively. Early intervention may reduce the morbidity of MSFN in selected cases [10]. Topical nitroglycerine ointment may be beneficial in reducing MSFN following immediate reconstruction, but the evidence base is still limited [11].The overall incidence of flap necrosis was nil in our patients and digital recording of flap was

done on post operation day 1, 2, 4 & 6th day and we neither had wound dehiscence nor surgical site infection in any of the patients. Since co-morbid conditions of DM, HTN and Hypothyroidism were present in 10% of our cases but they were non-contributory in wound healing in our study.Robertson SA et al (2017) included predictive patient risk factor as smoking, DM, previous radiotherapy, previous scar and severe medical Co-morbidity adding to mastectomy flap necrosis but since our study compromised a small amount of 40 patients so may be a larger study population may reveal better Co-relation of Co-morbid condition adding to flap necrosis [12]. Robertson SA et al (2014) reported approximately 5% flap necrosis in his study. He concluded that the plane between subdermal fat & breast parenchyma is a reasonable guide for mastectomy flap thickness which may not always correspond to subcutaneous fascial layer[6]. Carlson et al (1997) reported 11.2% flap necrosis in his bigger study group of 435 patients although according to his study the flap thickness depended on body habits of the patient with 2-3mm in thin patients, 5-10mm flap in obese patients' skin. Since he described breast to be an appendage between two superficial fascia of anterior abdominal wall & this delicate layer can be demarcated during mastectomy by raising flap in relatively bloodless field including minimal breast parenchyma in the flap[7].Verheyden CN et al[8] reported 16.8% flap necrosis with 4-5 mm thick flap taken in large breast mastectomies with tissue expanders, in his study on 20 patients while Ruffo Freitas-Junior reported 2.11% flap necrosis in his study on 430 patients, while Roses et al reported 8.7% of flap necrosis in his study of 115 patients & Wu Hongying reported 6% of flap necrosis[9].The optimum skin flap still remains controversial in all studies but the author believed that skin flap developed necrosis if they are deprived of blood supply. On the other side a thicker flap with an assured blood supply to flap may harbor residual breast tissue and result in recurrence of lesion. Hence optimizing the dual goal of risk of recurrence and thickness flap avoiding flap necrosis, all care was taken to visualize subdermal plexus of sappy and to raise the flap with these plexuses as guide. The vascular supply to the skin in the flap is via the perforating vessels which extend superficially to supply the skin. This angiosome concept of subdermal plexus forms a three-dimensional network of vascular supply to skin as well as all tissue layers.Hence, raising the skin flap just between the subdermal plexus preserves the vessels of the skin flap and in none of the patients we encountered flap necrosis as many studies have shown that flap necrosis adds to significant morbidity with delay in adjuvant therapy, increase hospital stay & cost to the patient, and the hospital which was coincidentally non-contributing in our study.

Conclusion:-

We postulate that using the subdermal plexus of veins as a guide for deciding the optimum skin flap thickness irrespective of the patient's body habitus or other factors, the chances of the patient developing skin flap necrosis is minimum and to add to that, the chance of leaving breast tissue behind in the skin flap is minimum, thus theoretically preventing or minimizing the chance of local recurrence. However, long term follow-up of the patients is needed to further comment on local recurrence. As seen in this study, none of the patients had permanent skin flap necrosis and all the four quadrant biopsy reports did not reveal any residual tissue left on the flaps. The surgical team sharing this data has been practicing this technique now as a routine and it may safely be recommended as one correct way of achieving an optimum flap thickness while sticking to the oncological principles. This is an easy to practice, reproducible, simple to teach and learn, surgeon proof technique to achieve the objective. Hence, using subdermal plexus of veins as a guide for optimum skin flap thickness in modified radical mastectomy in patients with breast cancer, we conclude that there is minimal chance of skin flap necrosis and minimal chance of leaving breast tissue behind in the skin flap.

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