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Breast Lipomodelling Outcome Following Conservative Breast Cancer Surgery and Reconstructive Surgery in a District Hospital

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Abstract

Lipomodelling has been increasingly used recently for the correction of defects and asymmetry following oncologic breast cancer treatment [1]. Current evidence on the efficacy of breast reconstruction using lipomodelling after breast cancer treatment is inadequate and the evidence raises no major safety concerns [2].

We have audited our outcome results against the NICE guidelines criteria for both safety and efficacy.Data was collected retrospectively of all the lipomodelling cases performed in Northumbria Healthcare NHS Foundation Trust between 04/2011-04/2013.

A total of 36 patients were included in the study, the average amount of fat injected was 113.91mls per session, Cytori technique gave the least complications rate 11% vs Coleman and body jet techniques 44% and 45% respectively.

We met the NICE guidelines criteria in; number of sessions for each patient, the duration of hospital stay andwe documented the amount of fat harvested and injected in each patient.

We didn't fulfil the guidelines in: volume change; as no definite tool was used other than clinical assessment; 80% were very good and good aesthetic outcome compared to NICE's 87%, while aesthetic outcome was absent in 8% compared to NICE's 2.7%. Regarding the safety, we met the NICE's guidelines in local recurrence rates <1%, and local infection rate<1%, as well as pneumothorax and fat embolism (0%). However; we had a high liponecrosis rate 13% vs 3%, and liponecrotic cysts (8.33% vs 7%), these were more frequent with Body jet technique.

Conclusion: Lipomodellingis a safe procedure following breast cancer surgery which can be carried out at District general hospitals levels with comparable outcomes.

Keywords: Lipomodelling; Breast cancer; Conservative surgery; Safety; Efficacy

Introduction

Lipomodelling is the process of relocating autologous fat to change the shape, volume, consistency and profile of tissues, with the aim of reconstructing, rejuvenating and regenerating body features [3].

Historically, fat auto-transplantation has been extensively used in breast surgery. Initially described by Czerny in 1895, it was used for breast augmentation throughout the 20th century. Methods often consisted of free fat and dermofat autografts, involving en-bloc harvesting and placement by open surgery. Complication rates were high, including infection, necrosis and fat resorption. In the 1950s, a long-term investigation of the fate of free fat grafts found over 50% graft resorption at 1 year [4-6].

In the 1980s, with the development and maturation of liposuction, interest in free fat grafting was reinvigorated. Liporemodelling provided a means of performing autologous fat transplant in a more systematic method with more predictable results. Its success depends on careful harvesting, refining and grafting of the fat. As techniques have improved, lipomodelling has become more widely applied in reconstructive breast surgery; including post breast cancer surgery, treating congenital and acquired breast deformities, and lately for cosmetic augmentation [7].

In oncoplastic breast surgery, patients' expectations of a good aesthetic outcome continue to rise. Patients who may have previously undergone mastectomy are now often treated with breast-

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conserving surgery and adjuvant radiotherapy, leading to a range of breast defects which are potentially amenable to correction by liporemodelling. Both of these factors have led to an increase in the popularity of liporemodelling, particularly in the correction of defects and asymmetry following oncologic breast cancer treatment [8].

Current evidence on the efficacy of breast reconstruction using lipomodelling after breast cancer treatment is adequate and the evidence raises no major safety concerns [2]. There are, however, few controlled studies of the effectiveness and oncological safety of the technique and its longer-term aesthetic outcomes [9].

The primary aim of this audit was to compare the efficacy and safety of liporemodelling in our unit against the standards set forth in guidelines published by the National Institute of Clinical Excellence.

The key efficacy outcomes recommended by NICE include volume change, aesthetic assessment of breast shape, quality of life and body image assessments.

Currently there is an era of development of devices being introduced which aim to concentrate adipose stem cells in the tissue that is being used for lipomodelling, further information about the outcomes of this and other adaptations of the technique of lipomodelling is desirable for guiding their future use in clinical management [10-12].

Methods

Data was collected retrospectively over a 2-year period from our 3 District General Hospitals of Northumbria healthcare NHS trust 2014 to 2016 inclusive. A total of 36 patients were included in the study.

All patients who had lipomodelling performed following oncoplastic breast cancer surgery were included. Patients who had lipomodelling for any reason other than correction of deformities post breast surgery were excluded.

Our primary aim was to compare our safety and efficacy outcome of lipomodelling against the NICE guidance.

Lipomodelling techniques

The technique adopted by the team differed mainly in the fat harvesting stage. All of Coleman, Cytori and Body Jet techniques were adopted in our study.

The first step in lipomodelling is identification of the donor site. Fat has been harvested from a few sites. We mainly adopted the abdomen as the primary site for the harvest of fat.

Before the fat is aspirated, the tissue is infused with tumescent solution consisting of local anaesthesia and adrenaline for analgesia and haemostasis using the standard technique of using the "Klein's solution" which contains 1cc of epinephrine (1:500,000) diluted in 500cc of 0.001% lactate ringer solution (LRS). The 50cc of Mepivacaine can be added in the solution if the procedure is planned under local anaesthesia. It is injected through a small bore 4mm blunt cannula that attached to a 60-cc syringe. The estimate volume of solution is 1cc for each $1cm^3$ of target fat harvest volume. The surgeon should wait at least 15 minutes before starting fat harvesting [13].

The fat is then harvested using one of the following techniques, The Coleman technique were started with and used in 13(36%) patients, the Body jet technique was adopted in 15(41%) patients and the Cytori technique was used in 6(16%) patients.

Once processed, the fat can be placed into the graft site. Whilst there is no standardized fat placement technique, the Coleman technique is the most widely used. In this technique, fat is injected using a blunt Coleman infiltration cannula attached to a syringe while withdrawing the cannula

This study examines the number of needed sessions, duration of hospital stay, volume of fat harvested and injected using each technique, as well as the complication rates of each technique

Number of sessions and inpatient length of stay

NICE guidance recommends that patients typically undergo a total of 2-4 sessions of liporemodelling. This study examines the number of sessions required for each patient to achieve optimal results and also examines the individual length of inpatient stay of each patient undergoing the procedure.

Examining efficacy

NICE guidance recommends the use of MRI, photographs and clinical assessment in the assessment of efficacy of liporemodelling. It states that the volume change should be good to very good in 87% and moderately good in 14 %. This study relied mainly on clinical assessment of volume change, aesthetic outcome and asymmetry.

Examining safety

Experimental studies have shown that adipocytes can stimulate breast cancer cells through the 'tumour stroma interaction 'to induce cancer re-appearance by fuelling dormant tumour cancer cells in the tumour bed. However, many studies showed the safety of Liporemodelling [14-16]. NICE demonstrated that 96% have to be cancer free and 98% with no distant malignancy.

This study examines the safety of individual techniques by determination of their complication rates in the population studied, and compares the findings to those quoted in the NICE guidance.

Replace all this with the guide lines you are comparing against.

Results

Liporemodelling techniques

Of the 36 patients studied, 8 underwent the Cytori technique (22.22%). 15 underwent the Bodyjet Technique (41.6%); 13 underwent the Coleman Technique (36.18%)

The average amount of fat injected per session over all techniques was 113.91mls. Using individual techniques, the average amount of fat injected per session was as follows:

- Bodyjet technique : 296.28mls
- Cytori technique : 185.5mls
- Coleman technique : 154.7mls

The Cytori technique gave the best volume of harvested fat.

Number of sessions and length of inpatient stay

A total of 21 patients required only a single session of liporemodelling. 3 patients required 2 sessions. 5 patients required 3 sessions. 7 patients required 4 sessions.

The mean number of sessions required was 3, which is in keeping with that suggested by the NICE guidance.

In total, 9 patients had the procedure completed as a day case. 20 patients were admitted for 1 night. 4 patients were admitted for 2

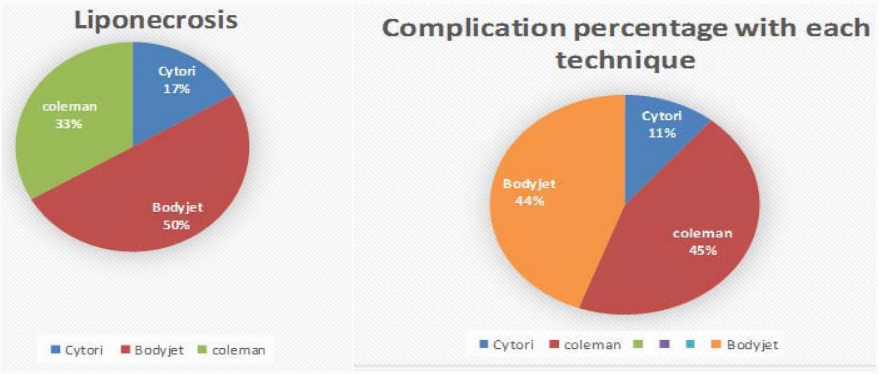

Figure 1:

nights. 1 patient was admitted for 3 nights. The average length of stay therefore was 1 night.

Examining efficacy

On clinical assessment of volume change, 43% had a 'very good' outcome, 43% had a 'good' outcome, 14% had a 'moderate outcome', and 0% had no change.

On review of all patients, 8.3% had breast asymmetry, with symmetry achieved in 91.7% using clinical assessment and including the patient's opinions as well.

Regarding efficacy, we met the standards set by NICE guidelines for the following criteria:

- Number of sessions for each patient (average 2-4)
- The duration of hospital stay (average 1-2 days).
- Documentation of the amount of fat harvested and injected in each patient.

However, we did not meet the standards for the following criteria:

- Assessing volume change; no definite tool was used other than clinical assessment; 86% were very good and good compared to NICE's 87%.
- Correction of asymmetry, with reports of asymmetry at 8% compared to 2.7% in the guidance.

Examining safety

The documented complications in this population included liponcrosis, liponecrotic cyst formation and abdominal wall (donor site) bruises. No patients in the study suffered local infection, fat embolism or pneumothorax. At the time of study, no patients had suffered local or metastatic recurrence of their breast cancer.

Complication rates were noted to be lowest with the Cytori technique (11%) and highest with the Coleman technique (45%). The Bodyjet technique rate was also significantly higher than Cytori (44%).

The Cytori technique was associated with a lower rate of liponcrosis comparing to the other two techniques (Figure 1).

We met the NICE's guidelines in local recurrence rate of <1% and local infection rate <1%, as well as the absence of pneumothorax and fat embolism (0%). However; we had a high rate of liponecrosis (13% vs 3%) and liponecrotic cysts (8.33% vs 7%). The incidence of these complications in this study was highest when the Bodyjet technique was employed.

Conclusion

Liporemodelling following breast cancer surgery is a safe procedure that can be performed as a day case. It appears to have acceptable efficacy in the correction of deformities without compromising oncological outcomes.

In our study both the number of sessions required to achieve the desired outcome, and the mean duration of hospital stay were comparable with NICE recommendations. We also achieved low rates of complications.

In comparison of the three techniques used, the Cytori technique provided the best fat harvest and was associated with the lowest rate of complications. The most frequent complication was liponecrosis, and this was observed more frequently with the use of the Bodyjet technique.

This audit demonstrates that the prevalence of breast asymmetry for patients undergoing liporemodelling in our unit is higher than the standards set by NICE, which is an issue that should be addressed.

Recommendations

- A more appropriate measure of aesthetic success would be to use a validated patient questionnaire, which we plan to perform in the second cycle, prospectively.
- Magnetic Resonance Imaging could be considered as a means of assessing volume change objectively, although this is unlikely to be cost-effective.
- More research is required to accurately delineate the aetiological factors giving rise to high rates of liponecrosis and liponecrotic cyst formation following liporemodelling.
- This audit should be repeated in our unit to monitor and improve outcomes.

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