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REVIEW

Efficacy, safety and complications of autologous fat grafting to healthy breast tissue: A systematic review



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Received 20 April 2013; accepted 24 November 2013

KEYWORDS

Lipotransfer;
Volume gain;
Cosmetic;
Oncological risk;
Breast augmentation;
Breast
reconstruction;
Systematic review;
PRISMA

Summary *Background:* Fat grafting for primary breast augmentation is growing in popularity due to its autologous properties and its side benefit of removing unwanted fat from other areas, although volume gain is unpredictable and patient safety remains unclear.

Objective: The aim of this study was to provide an evidence-based overview of autologous fat grafting to healthy breast tissue with focus on volume gain, safety and complications.

Design: A systematic review was performed in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines.

Data sources: The MEDLINE, Cochrane Library and EMBASE databases were searched for clinical studies on autologous fat grafting to healthy breast tissue within the last 30 years.

Data extraction: Clinical articles were evaluated for indication, pre- and postoperative work-up, surgical technique, volume gain (efficacy), complications, radiographic changes and oncological safety. The level of evidence was assessed according to the Oxford Centre for Evidence-based Medicine 2011.

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Results: A total of 36 articles involving 1453 patients with a mean follow-up period of 16.3 months (1–156 months) were included. No randomised controlled studies were found. Six percent of the patients undergoing fat grafting to healthy breast tissue experienced major complications requiring a surgical intervention or hospitalisation. Two patients with breast cancer (0.1%) after fat grafting for cosmetic purposes were reported. Average breast volume gain ranged from 55% to 82% relative to the grafted fat volume.

Conclusions: The prevalence of complications and re-operations in fat grafting to healthy breast tissue compared favourably to implant-based breast augmentation. Although no increased incidence of breast cancer was found, long-term breast cancer screening and the implementation of publicly accessible registries are critically important to proving the safety of fat grafting.

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As fat grafting is becoming increasingly popular, silicone implants may be supplemented or perhaps even completely replaced by fat.^{1–5} Using unwanted fat from other parts of the body to enhance the shape and volume of the breast results in a win–win situation for the patient. While the complications of fat grafting to healthy breast tissue do not seem to be a primary concern, the safety in terms of malignant transformation and efficacy in terms of volume maintenance remain unclear.

Fat has many properties that render it an ideal filler: it is autologous, soft, frequently abundant and easily collected, but it is not inert. Fat has been recognised as a metabolically active tissue consisting of a heterogeneous cell population secreting cytokines, hormones and growth factors.⁶ Thus, injection of fat in proximity to mammary gland tissue may change the microenvironment by the addition of multipotent cells and stimulating factors. To date, no assurance can be given to the patients that fat grafting does neither induce new cancer cells nor stimulate dormant cancer cells.

In contrast to breast augmentation with implants, where the benefit in terms of volume gain is obvious and (aside from some tissue thinning over time) relatively stable, data demonstrating long-term maintenance of the enhanced breast volume after fat grafting are scarce. In addition, the techniques of fat harvesting, processing or transplantation are not uniformly applied. Rosing et al. have published a comprehensive overview of autologous fat grafting for primary breast augmentation focussing on the technique, its radiological impact and its complications.⁷ Other review articles have analysed the applicability and safety of autologous fat in breast surgery including post-cancer breast reconstruction.^{8–12} The aim of the present review was to give an overview of autologous fat grafting to healthy breast tissue with emphasis on the efficacy (volume gain), safety and complications.

Methods

Search

The systematic review was performed in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines (Figure 1).¹³ The literature review was conducted using the U.S. National

Library of Medicine (MEDLINE), Cochrane Library and EMBASE databases by two independent reviewers using the keywords 'fat grafting' OR 'fat transplantation' OR 'lipotransfer' OR 'lipostructuring' OR 'lipomodelling' OR 'lipofilling' AND 'breast'. The reference list of the searched articles was further reviewed for potentially relevant articles.

Eligibility criteria

The inclusion criteria consisted of any trial, case series or case report involving patients undergoing autologous fat grafting to healthy glandular tissue of the breast with the fat harvested by liposuction and without any previous oncologic history published (publication date) within the last 30 years (from 1 January 1982 to 31 December 2012) (i.e., macromastia, micromastia, asymmetry and ptosis of the breast, as well as congenital deformities (tuberous breast and Poland syndrome)).

Articles were excluded if they contained data from review articles without original data or if fat grafting to the breast was performed for reconstructive purposes in breast cancer patients. Duplicated articles or articles using a duplicate patient sample were not considered. Articles with insufficient numerical data were excluded.

Study selection

Citations found through the literature database search and reference screening were title- and/or abstract-reviewed for eligibility. The full text was retrieved for evaluation of final inclusion in the systematic review.

Data collection process

Data extracted from articles included authors, date of publication, number of patients, indication, pre- and postoperative work-up, surgical technique, volume gain (efficacy), complications, radiographic changes and oncologic safety. The extracted data were listed separately by two independent reviewers (RDL and LAHT). Discrepancies in data extraction were reviewed by all reviewers and discussed until consensus was accomplished.

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