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Antibiotic prophylaxis in breast reduction surgery: A systematic review and meta-analysis

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Summary *Objective:* To determine the effectiveness and harm of using antibiotic prophylaxis versus placebo or no intervention in patients undergoing breast reduction surgery to prevent surgical site infection.
Materials and methods: A search strategy was conducted in the MEDLINE, CENTRAL, EMBASE, and LILACS databases. Searches were also conducted in other databases and unpublished literature. Clinical trials were included without language restrictions. The risk of bias was evaluated with the Cochrane Collaboration's tool. An analysis of fixed effects was conducted. The primary outcome was surgical site infection. The secondary outcomes were delayed wound healing and adverse effects. The measure of the effect was the risk difference (RD) with a 95% confidence interval (CI). The planned interventions were antibiotic prophylaxis versus placebo/no intervention.
Results: Five articles were included in the qualitative and quantitative analysis. A total of 584 patients were included from the five studies. A low risk of bias was shown for most of the study items. The overall RD for surgical site infection was −0.08 (95% CI −0.14—−0.03), favoring antibiotic prophylaxis compared with placebo.
Conclusion: Antibiotic prophylaxis lowers the incidence of surgical site infection in breast reduction surgery compared with placebo or no intervention.

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Introduction

Breast hypertrophy causes important physical[1,2] and psychosocial discomfort[2–4]; consequently, breast reduction surgery (BRS) has become a very commonly performed operation,[5] being the seventh most common procedure in reconstructive surgery and the tenth most performed cosmetic surgical procedure in the United States (US).[6] However, there is no consensus for using antibiotic prophylaxis (ABP) for this procedure.[7,8]

Surgical site infection (SSI) is a risk in every surgical procedure, but according to the US Centers for Disease Control and Prevention (CDC), wounds classified as *"clean wounds"*[9] have such a low incidence of infection (<3.4%)[10] that ABP is not recommended.[9,11] Breast surgery is a *"clean surgery"* by definition; however, studies that are more specific on this topic have shown a higher infection rate, ranging from 4% to 26%.[5,7,12–16] These results have led some authors to consider the breast as a "clean-contaminated" surgical site[17] for which ABP is recommended; however, this is not an internationally accepted concept.

In the guidelines developed jointly by the American Society of Health-System Pharmacists, the Infectious Diseases Society of America, the Surgical Infection Society, and the Society for Healthcare Epidemiology of America, ABP is recommended in plastic surgery in the presence of certain risk factors in addition to general risk factors (implant use, skin radiation, and procedures below the waist).[18] Therefore, theoretically ABP is not required in BRS. In other guidelines developed by the American Society of Plastic Surgeons (ASPS), this practice is a level C recommendation,[19] leaving the flexibility to use or not use antibiotics to the preference of the surgeon and the patient.[20] In the United Kingdom (UK), the recommendations are that ABP should not be used in BRS because of the lack of data from aesthetic plastic surgery guidelines.[21]

The aim of this systematic review (SR) was to determine the effectiveness and harm of ABP versus placebo or no intervention in patients undergoing BRS to prevent SSI.

Materials and methods

We performed this review according to the recommendations of the Cochrane Collaboration and following the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) Statement. The PROSPERO registration number is CRD42017056073.

Inclusion criteria: We included clinical trials that had at least 1 week of follow-up. All women who underwent BRS were included. The planned interventions were ABP versus placebo/no intervention. ABP had to be administered before surgery, during surgery, or, at the most, a few hours after the procedure, as defined by the CDC.[9] We excluded studies with extended postoperative antibiotic administration. There were no restrictions on the antibiotic or dose used. The primary outcome was the incidence of SSI, and the secondary outcomes were side effects and delayed wound healing. All articles related to breast cancer and breast cancer surgery were excluded.

Information sources

A search strategy was designed for clinical trials published in MEDLINE (Ovid), CENTRAL (Cochrane Library), LILACS, and EMBASE databases from January 1970 to December 2016. The search strategy was specific for each database and included a combination of medical headings and free text terms for BRS and antibiotic use. A specific search was performed with indexed terms and free writing for sources of conference abstracts, clinical trials in progress (www.clinicaltrials.gov), literature published in non-indexed journals, and other sources of gray literature. A generic search strategy was designed for Google Scholar, HTA, and DARE. No language restrictions were used, and the publication status of the articles was not considered.

Study selection and data collection

We reviewed the title and abstract of each reference. Then, we scanned the full text of relevant studies, applied pre-specified inclusion and exclusion criteria, and extracted the data. Disagreements were resolved by consensus. Relevant data were collected in duplicate by using a standardized data extraction sheet that contained the following information: author names, year of publication, title, country, participant characteristics, definition of infection, intervention (antibiotic and its dose), number of patients included, loss to follow-up, timing, outcomes, association measures, and funding source.

Risk of bias

The risk of bias assessment for each study was made using the Cochrane Collaboration tool, which includes the following: sequence generation, allocation concealment, blinding, incomplete outcome data, selective reporting, and other biases. We judged the possible risk of bias from extracted information, rating it as "high risk," "low risk," or "unclear risk." We computed a graphic representation of potential bias using Review Manager 5.3 (RevMan® 5.3).

Data analysis/Synthesis of results

The statistical analysis was performed using RevMan® 5.3. For categorical outcomes, we reported risk differences (RDs) with the corresponding 95% confidence intervals, and we pooled the information with a fixed-effect meta-analysis (MA) according to the heterogeneity expected. Heterogeneity was evaluated using the I^2 test. An I^2 value greater than or equal to 50% could represent heterogeneity according to Higgins et al.[22] We reported the results in forest plots of the estimated effects of the included studies with a 95% confidence interval (95% CI).

We did not perform publication bias assessment or sensitivity analysis because of the number of included studies.

Results

A total of 2103 records were found with the designed search strategies, and after duplicates were removed, there were