
Effect of Noninfectious Wound Complications after Mastectomy on Subsequent Surgical Procedures and Early Implant Loss



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- BACKGROUND:** Noninfectious wound complications (NIWCs) after mastectomy are not routinely tracked and data are generally limited to single-center studies. Our objective was to determine the rates of NIWCs among women undergoing mastectomy and assess the impact of immediate reconstruction (IR).
- STUDY DESIGN:** We established a retrospective cohort using commercial claims data of women aged 18 to 64 years with procedure codes for mastectomy from January 2004 through December 2011. Noninfectious wound complications within 180 days after operation were identified by ICD-9-CM diagnosis codes and rates were compared among mastectomy with and without autologous flap and/or implant IR.
- RESULTS:** There were 18,696 procedures (10,836 [58%] with IR) among 18,085 women identified. The overall NIWC rate was 9.2% (1,714 of 18,696); 56% required surgical treatment. The NIWC rates were 5.8% (455 of 7,860) after mastectomy only, 10.3% (843 of 8,217) after mastectomy plus implant, 17.4% (337 of 1,942) after mastectomy plus flap, and 11.7% (79 of 677) after mastectomy plus flap and implant ($p < 0.001$). Rates of individual NIWCs varied by specific complication and procedure type, ranging from 0.5% for fat necrosis after mastectomy only, to 7.2% for dehiscence after mastectomy plus flap. The percentage of NIWCs resulting in surgical wound care varied from 50% (210 of 416) for mastectomy plus flap, to 60% (507 of 843) for mastectomy plus implant. Early implant removal within 60 days occurred after 6.2% of mastectomy plus implant; 66% of the early implant removals were due to NIWCs and/or surgical site infection.
- CONCLUSIONS:** The rate of NIWC was approximately 2-fold higher after mastectomy with IR than after mastectomy only. Noninfectious wound complications were associated with additional surgical treatment, particularly in women with implant reconstruction, and with early implant loss. (*J Am Coll Surg* 2016;222:844–852. © 2016 by the American College of Surgeons. Published by Elsevier Inc. All rights reserved.)
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Wound complications after breast surgical procedures, including surgical site infections (SSIs) and noninfectious wound complications (NIWCs), result in increased

morbidity as well as increased health care use and costs.¹ Wound complications can lead to worse outcomes after breast reconstruction, including loss of implant or flap

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Abbreviations and Acronyms

BCS	= breast-conserving surgery
IR	= immediate reconstruction
NIWC	= noninfectious wound complication
SSI	= surgical site infection

and poor cosmetic results,²⁻⁴ which often require additional surgical procedures. Complications of breast reconstruction can result in large numbers of affected women, as >26,000 breast-reconstruction procedures were performed at the time of mastectomy during US inpatient hospitalizations in 2012, according to the Healthcare Cost and Utilization Project National Inpatient Sample.⁵ This number does not include subsequent reconstruction or procedures performed in ambulatory settings; therefore, the total number of breast reconstruction procedures performed annually in the United States is much larger.

Surgical site infections after breast procedures and health care facility SSI rates are tracked nationally at >14,500 facilities through the National Healthcare Safety Network.^{6,7} Additionally, about 400 hospitals (most in the United States) participate in the American College of Surgeons NSQIP, collecting data on process variables and 30-day complications, including SSIs.⁸ The NSQIP collects NIWCs, including wound dehiscence and return to the operating room, although the reason for reoperation is not specified. For breast reconstruction operations, loss of the flap or implant is also captured as a 30-day complication.⁹

Other than reports of wound dehiscence rates using the NSQIP database,^{10,11} reports of NIWC rates after breast procedures are generally limited to publications describing complications from a single surgeon or a large university-affiliated hospital. Currently available literature on breast surgery complications is problematic because many publications report only one summary measure for complications after a variety of different breast reconstruction procedures (eg report one combined rate for immediate and delayed implant and autologous reconstructions), and do not compare complication rates after mastectomy with breast reconstruction to complication rates after mastectomy only. In addition, different definitions of noninfectious complications are often used with various follow-up periods, which make it difficult to compare rates from various centers.

To provide more comprehensive data concerning the rates of NIWCs, including hematoma, fat necrosis, necrosis, and wound dehiscence after mastectomy with and without immediate breast reconstruction, we identified wound complications in a large, geographically diverse

cohort of women undergoing mastectomy and assessed differences in outcomes based on the type of immediate breast reconstruction performed.

METHODS**Data source**

We conducted a retrospective cohort study using the HealthCore Integrated Research Database, including individuals from 12 Anthem-affiliated plans (California, Connecticut, Georgia, Indiana, Kentucky, Maine, Missouri, excluding 30 counties in the Kansas City area, Nevada, New Hampshire, New York, Ohio, Virginia, excluding the northern suburbs of Washington, DC). Data include all fully adjudicated claims submitted from providers, facilities, and outpatient pharmacies linked to health plan enrollment information. Fully insured women with enrollment in a fee-for-service plan with medical coverage of hospital and physician services were eligible for inclusion in the study. We excluded women coded for end-stage renal disease, organ transplantation, or HIV-positive status due to unique risk factors for infection. Medical claims were restricted to paid claims.

The database contained up to 5 ICD-9-CM diagnosis codes per claim from 2004 to 2008 and up to 12 diagnosis codes per claim from 2009 to 2011. Inpatient hospitals included up to 5 ICD-9-CM procedure codes per claim (8 in 2009–2011), and provider and ambulatory facility claims used CPT-4 codes.

To obtain hospital-level information, we matched the operative facility to the American Hospital Association Annual Survey of Hospitals (Health Forum, LLC) using National Provider Identifier codes, where available. Otherwise, matching to the American Hospital Association data was performed using facility name and address fields.

Identification of mastectomy and immediate breast reconstruction

We identified mastectomy operations among women aged 18 to 64 years from January 1, 2004 to December 31, 2011 using ICD-9-CM and/or CPT-4 procedure codes from inpatient and outpatient facilities and provider claims (see [Appendix](#); available online). We classified the mastectomy as unilateral or bilateral based on the ICD-9-CM procedure and CPT-4 codes, billed units, and CPT-4 modifier codes assigned by the provider and facility.¹² Operations in members whose enrollment ended on the day of mastectomy were excluded because no follow-up was available. When CPT-4 or ICD-9-CM procedure codes for breast-conserving surgery

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