



Mammographic and Ultrasonographic Findings of Oxidized Regenerated Cellulose in Breast Cancer Surgery: A 5-Year Experience

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Abstract

Our study describes imaging findings in patients who underwent breast-conserving surgery followed by oxidized regenerated cellulose implantation. When applied to the surgical residual cavity, oxidized regenerated cellulose reduced the risk of local hemorrhage and postoperative infections, but can lead to alterations in surgical scar. Thus, knowledge of radiological findings might allow avoidance of misdiagnosis of tumor recurrence or unnecessary diagnostic examinations.

Background: The purpose of this study was to describe the ultrasonographic (US) and mammographic (MX) findings in patients who underwent breast-conserving surgery followed by oxidized regenerated cellulose (ORC) implantation in the surgical cavity and their size variations in follow-up. **Materials and Methods:** We retrospectively reviewed 417 MX and 743 US images performed between January 2009 and January 2014 for 262 women who underwent breast-conserving surgery. All patients underwent US, only 203 women underwent MX examination. **Results:** In 170 of 262 patients, US examinations showed abnormal findings. Three main US patterns were identified: (1) complex masses: well-encapsulated ipoechoic lesions with circumscribed margins with internal hyperechoic nodules (56%); (2) hypoanechoic lesions without internal hyperechoic nodules (24%); and (3) completely anechoic collections (20%). Moreover, Doppler ultrasound examination was performed on all of the patients. In 95 of 203 patients, MX examinations showed abnormalities. Four main MX patterns were identified: (1) round or oval opacity with circumscribed margins (58%); (2) round or oval opacity with indistinct or ill-defined margins (17%); (3) irregular opacity with indistinct or spiculated margins (9%); and (4) architectural distortion or focal asymmetry (15%). Most of the lesions showed a decrease in size at US and MX follow-up examination and the decrease was statistically significant ($P < .01$). **Conclusion:** When applied to the surgical residual cavity, ORC aids to control local hemorrhage and reduce the risk of postoperative infections, but can lead to alterations in surgical scar. Thus, knowledge of the radiological findings might allow avoidance of misdiagnosis of tumor recurrence or unnecessary diagnostic examinations.

Clinical Breast Cancer, Vol. 15, No. 5, e249-56 © 2015 Elsevier Inc. All rights reserved.

Keywords: Absorbable implants, Breast-conserving surgery, Mammography, Post-surgical imaging, Ultrasonography

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Submitted: Jan 13, 2015; Accepted: Mar 18, 2015; Epub: Mar 24, 2015

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Introduction

Conservative breast surgery followed by postoperative radiation therapy has become the gold standard treatment for early-stage breast cancer.¹

A further aim of conservative breast surgery is to ensure complete removal of breast cancer, and to preserve the shape and appearance of the mammary glands and their natural symmetry, with the same survival rate compared with mastectomy.²⁻⁴

Oxidized Regenerated Cellulose in Breast Cancer Surgery

Recently some surgeons have focused their attention on oncoplastic procedures, which combine principles of surgical oncology with those of reconstructive surgery, allowing a more radical local tumor excision, which potentially reduces margin involvement and local recurrence, and allows the achievement of an acceptable cosmetic result.⁵⁻⁷

Usually, breast reshaping absorbs the volume loss and decreases the risk of a localized defect, although there are zones that are at a higher risk of deformity and cosmetic failure.⁸⁻¹⁰

At our institution, over the past 5 years, surgeons started to use oxidized regenerated cellulose (ORC; Tabotamp fibrillar, Johnson & Johnson; Ethicon, New Brunswick, NJ) which is a sterile absorbable material, used originally in intra-abdominal or retroperitoneal surgical procedures, to obtain local hemostasis.¹¹⁻¹³ It was first proposed as a filling material for volume defects after breast surgery in 2003.¹⁴

The technique in use by breast surgeons for placement of oxidized cellulose at our institution follows a standard pattern (Figure 1).

When applied in the surgical cavity, ORC swells into a gelatinous brown-black mass, which allows local control of bleeding, reduction of risk of postoperative infections, thus combining the oncological radicality with the esthetic results; in contrast, this procedure could induce changes in radiological appearance of the surgical scar.¹³⁻¹⁵

There are few works about postoperative imaging of ORC in the literature.¹⁶⁻¹⁸

Because of the increasing use of oncoplastic procedures, and in particular ORC implants in conservative treatment of breast cancer, the aim of our study was to describe early ultrasonographic (US) and mammographic (MX) findings due to the presence of ORC after breast surgery, and their variation in follow-up imaging, to avoid misdiagnosis of recurrence and additional or unnecessary diagnostic procedures, such as MRI or biopsies.¹⁹⁻²¹

Materials and Methods

Subjects

We retrospectively reviewed MX and US examinations performed between January 2009 and January 2014 in 262 patients who underwent breast-conserving surgery with ORC implantation in the surgical cavity at our institution.

All patients underwent their first postoperative US examination approximately 6 months after surgery and were then examined with follow-up US examinations every 6 months.

Only 203 patients also had postoperative mammograms approximately 1 year after surgery and were then examined with follow-up MX examinations every year.

In this way, a total of 743 US and 417 MX images were reviewed.

The follow-up period ranged from 5 years to 6 months, depending on the date of surgery.

The study protocol was approved by our institutional ethics committee.

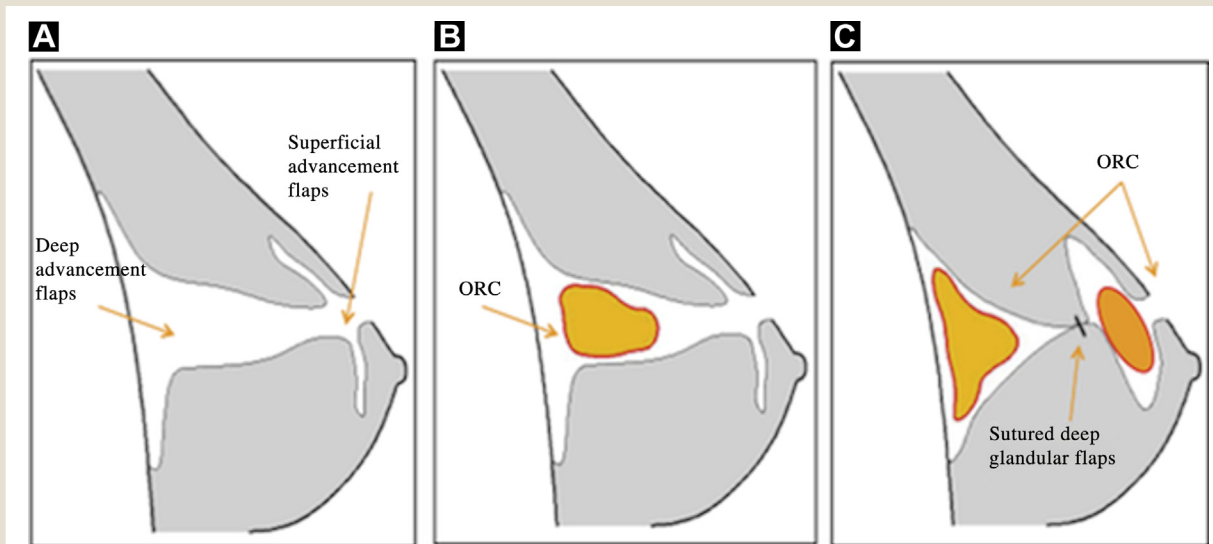
Informed consent, including potential risks and benefits of the procedure, was obtained from all patients. Although the recall and data analysis were done retrospectively, the patient database was assembled prospectively.

Ultrasonographic and MX Imaging

Ultrasound imaging and color/power Doppler was performed with an Antares echograph (Siemens Healthcare, Erlangen, Germany) or with an Aplio 500 echograph (Toshiba Medical Systems Corporation, Otawara-shi, Tochigi-ken, Japan), both equipped with a 5-13 MHz linear transducer.

Mammographic images were obtained using a Senographe DS mammograph (GE Medical Systems, Milwaukee, WI) and a

Figure 1 After Complete Tumor Excision, Adequate Reshaping of the Gland Is Performed by Dissecting the Residual Breast Parenchyma From the Pectoralis Major Fascia and Then From the Superficial Subcutaneous Tissue. Using This Dissection, 2 Opponent Superficial Advancement Flaps (ie, Skin, Subcutis) and 2 Opponent Deep Advancement Flaps (ie, Breast Parenchyma) Are Obtained (A). After Careful Control of the Hemostasis, 5 Separate Layers of Oxidized Regenerated Cellulose (ORC) Fibrillar Are Placed in the Residual Cavity, Topping the Pectoralis Major Muscle (B) and 2 Additional Separate Layers of ORC Are Then Placed on the Surface of the Approximated Glandular Flaps (C)



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