Immediate Breast Reconstruction After Mastectomy Increases Wound Complications

However, Initiation of Adjuvant Chemotherapy Is Not Delayed

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Background: Immediate breast reconstruction is being increasingly used after mastectomy, although it may increase the incidence of wound complications. The indications for chemotherapy in breast cancer are expanding and wound complications following mastectomy may delay the initiation of adjuvant chemotherapy.

Hypothesis: Immediate breast reconstruction after mastectomy for breast cancer does not lead to an increased incidence of wound complications nor delay the initiation of systemic chemotherapy.

Design and Setting: Retrospective medical record review at a tertiary care center.

Patients: One hundred twenty-eight women treated with a mastectomy for breast cancer over an 8-year period (January 1, 1995, through December 31, 2002).

Main Outcome Measures: Surgical site complications (infectious and noninfectious) and time to initiation of postoperative chemotherapy.

Results: One hundred forty-eight mastectomy procedures in 128 women with breast cancer were evaluated. We analyzed 4 subgroups according to whether or not immediate breast reconstruction was part of the surgical procedure (76 or 72 procedures, respectively) and whether or not postoperative adjuvant chemotherapy was administered (81 or 47 patients, respectively). There was an increased incidence of wound complications in patients who underwent immediate breast reconstruction compared with those who did not (6/72 [8.3%] vs 17/76 [22.3%]; P=.02). However, these complications did not delay initiation of postoperative chemotherapy.

Conclusions: Although we observed an increased incidence of wound complications when immediate breast reconstruction was combined with mastectomy, there was no delay in the initiation of adjuvant therapy. Immediate breast reconstruction should remain an important treatment option even when postoperative chemotherapy is anticipated.

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questioned given concerns about potential delays in the initiation of chemotherapy secondary to increased operative morbidity of IBR.\textsuperscript{17,18} Therefore, we performed a retrospective medical record review to determine whether the incidence of wound complications was higher when IBR was combined with mastectomy; furthermore, we also determined whether these wound complications delayed the initiation of postoperative adjuvant chemotherapy.

## METHODS

We identified all women who underwent mastectomy for breast cancer during an 8-year period (January 1, 1995, through December 31, 2002) following approval by the University of California, Davis Medical Center’s institutional review board. Patients were excluded if the breast reconstruction included a skin graft or if the follow-up was insufficient to determine whether a postoperative wound complication developed in the patient or if the patient received postoperative adjuvant chemotherapy. In addition, patients who were receiving chemotherapy for other malignancies when their breast cancer was diagnosed were also excluded from this study. Medical records were retrospectively reviewed for age at diagnosis, date of diagnosis, tobacco use, comorbid conditions (ie, diabetes mellitus or connective tissue disease), stage of disease, histologic features, procedure performed, surgical site complications, use of adjuvant therapy, date of last follow-up, and survival. The decision to administer postoperative adjuvant chemotherapy and the specific regimen and duration was at the discretion of the treating oncologist based on cancer-related factors as well as the patient’s wishes.

The option of IBR was provided to all patients who opted for a mastectomy as part of their treatment for their breast cancer. The risks and benefits of breast reconstruction were discussed preoperatively by a plastic surgeon (T.R.S., T.P.W., or E.J.S.) if requested by the patient. Immediate breast reconstruction was performed by a plastic surgeon (P.D.S., V.P.K., J.E.G., or R.J.B.) after completion of the mastectomy by a surgical oncologist. Methods of IBR include the use of tissue expanders with ultimate conversion to longer-lasting implants, or autologous tissue techniques (either a latissimus dorsi musculocutaneous flap or a transverse rectus abdominis musculocutaneous flap) at the agreement of the plastic surgeon and the patient. Patients electing either immediate implantation or tissue expander reconstruction had the wound and implant irrigated with antibiotic-containing solution at the time of submuscular-subpectoral placement. All patients had closed-suction drains in place until the output was less than 30 mL/d and perioperative antibiotic therapy was continued until the drains were removed. Tissue expansion typically started in the third postoperative week unless there were wound healing issues. Expansion was completed over a several-week period followed by a 6- to 8-week tissue relaxation phase before substitution of the expander with a longer-lasting implant. The expansion process was ceased in the face of unanticipated radiotherapy but was rarely halted during the administration of chemotherapy.

Surgical site complications were defined as any complication requiring intravenous or oral antibiotics, readmission to the hospital, debridement, reoperation, or delayed chemotherapy. A delay in chemotherapy was identified if a patient was scheduled to begin chemotherapy, but it could not be initiated as scheduled owing to a surgical site complication. Complications were divided into major and minor complications. Major complications were those that required reoperation, readmission, or a delay of chemotherapy.

Mean and standard deviation were calculated for continuous variables. Statistical analysis was performed using the Fisher exact $t$ test, paired $t$ test, and analysis of variance wherever appropriate. $P<.05$ was considered statistically significant.

## RESULTS

One hundred twenty-eight women were identified who met our inclusion criteria, of whom 62 (48%) underwent IBR. The group who underwent IBR was significantly younger than the group who had had only mastectomy but did not have any difference in ongoing tobacco use or presence of comorbid conditions (Table 1). The distribution of the stage of disease was not significantly different between groups except in those with stage III disease, in which fewer women underwent IBR (6/62 [10%]) vs 23/66 [35%]; $P = .007$) (Table 1). Of the 128 women, 20 (16%) underwent contralateral prophylactic mastectomy; those women who opted for IBR had a higher utilization rate of prophylactic mastectomy (14/62 [23%]) than those who did not have an IBR (6/62 [10%]; $P = .04$). The administration of postoperative adjuvant chemotherapy was 63% (81/128) and was not correlated with the use of IBR (Table 1).

The overall incidence of wound complications following the 148 mastectomies (128 therapeutic mastectomies, 20 prophylactic mastectomies) in 128 women was 15.5% (23/148) (Table 2). There was an increased inci-

<table>
<thead>
<tr>
<th>Table 1. Patient Demographics*</th>
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</thead>
<tbody>
<tr>
<td><strong>Variable</strong></td>
</tr>
<tr>
<td>Age, mean (SD), y</td>
</tr>
<tr>
<td>Tobacco use</td>
</tr>
<tr>
<td>Comorbid conditions</td>
</tr>
<tr>
<td>Prophylactic contralateral mastectomy, No. (%) of patients</td>
</tr>
<tr>
<td>Those receiving chemotherapy, No. (%) of patients</td>
</tr>
<tr>
<td>Cancer stage</td>
</tr>
<tr>
<td>0</td>
</tr>
<tr>
<td>I</td>
</tr>
<tr>
<td>II</td>
</tr>
<tr>
<td>III</td>
</tr>
<tr>
<td>IV</td>
</tr>
<tr>
<td>Wound complications, No. (%) of patients</td>
</tr>
<tr>
<td>Follow-up, mean (SD), mo</td>
</tr>
</tbody>
</table>

*Data are given as the number of patients unless otherwise indicated. Abbreviations: IBR, immediate breast reconstruction; NA, not applicable.

\textsuperscript{*}
dence of wound complications in patients who underwent IBR compared with those who did not (6/72 [8.3%] vs 17/76 [22.3%]; \textit{P} = .02). The wound complications included reoperations for hematoma, readmissions for cellulitis infections requiring intravenous antibiotic therapy with or without operative incision and drainage, wound infections requiring oral antibiotics, eschars ranging in severity from minor debridements to those requiring debridement in the operating room, and poor wound healing. Only 1 patient in the IBR group required removal of a tissue expander secondary to infection at 50 days (2% loss).

The methods of IBR were 3 distinct types: (1) immediate placement of a tissue expander with delayed conversion to a permanent implant, (2) a transverse rectus abdominis musclecutaneous flap, or (3) a latissimus dorsi musclecutaneous flap. Most patients (38/62 [61%]) opted for IBR by tissue expander/implant placement. The tissue expander/implant placement group had a significantly lower incidence of surgical site complications than the other 2 methods using autologous tissue (\textit{P} = .02) (Table 3).

Despite the increased incidence of wound complications in women undergoing IBR, there was not a delay to initiation of adjuvant chemotherapy in those women for whom postoperative adjuvant chemotherapy was recommended. The mean time to the initiation of adjuvant chemotherapy from the time of mastectomy was 1.5 months for those women who did not undergo IBR and 1.7 months in women who underwent IBR (\textit{P} = .43) despite the observation of a significantly greater incidence of surgical site complications in the latter group (5% vs 24%; \textit{P} = .02) (Table 4). Of the 81 women who received postoperative adjuvant chemotherapy, there were 4 (5%) in whom the initiation of chemotherapy was delayed secondary to wound complications; 2 underwent mastectomy with IBR; and 2 had mastectomies alone. Of the 2 patients who had mastectomy alone, cellulitis developed in one while the other had poor wound healing of her breast incision. Of the 2 patients in the IBR group who had a delay in the initiation of postoperative adjuvant chemotherapy, one developed cellulitis and a small area of skin breakdown of her transverse rectus abdominis musclecutaneous flap and the other had an open wound in her latissimus dorsi flap secondary to a surgical site infection.

The administration of postoperative chemotherapy was not correlated with the use of IBR; 20 (43%) of 47 women who did not receive postoperative chemotherapy had IBR while 42 (52%) of 81 women who received postoperative chemotherapy had IBR. Although it would not be anticipated, the postoperative use of adjuvant chemotherapy was unrelated to operative morbidity. Of the 81 patients who received chemotherapy, 12 (15%) had surgical site complications while of the 47 patients who did not receive chemotherapy, 9 (19%; \textit{P} = .52) had surgical site complications. As those patients who undergo IBR with tissue expanders may have prolonged risk of surgical site complications owing to the ongoing expansion that occurs during the administration of chemotherapy, we examined the incidence of surgical site complications that occur during the administration of postoperative adjuvant chemotherapy. Of the 76 mastectomies that were reconstructed, 2 (3%) developed delayed surgical site complications during chemotherapy of the 72 mastectomies that were not reconstructed, 2 (3%; \textit{P} = .96) also developed complications during chemotherapy.

**Table 2. Complications**

<table>
<thead>
<tr>
<th></th>
<th>Mastectomy Group (n = 66)</th>
<th>Mastectomy and IBR Group (n = 62)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operative site complications</td>
<td>6</td>
<td>17</td>
</tr>
<tr>
<td>Major/minor complications</td>
<td>4/2</td>
<td>11/6</td>
</tr>
<tr>
<td>Infection</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>Hematoma</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Wound eschar</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Poor wound healing</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Tissue expander removal</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

**Abbreviations:** IBR, immediate breast reconstruction; NA, not applicable.

**Table 3. Type of Immediate Breast Reconstruction in 62 Women According to the Total Number of Surgical Procedures**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Autologous Tissue</th>
<th>Tissue Expander Group (n = 38)</th>
<th>TRAM Group (n = 18)</th>
<th>Latissimus Dorsí Group (n = 6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, mean (SD), y</td>
<td>49.7 (8.8)</td>
<td>48.0 (5.9)</td>
<td>46.1 (4.3)</td>
<td></td>
</tr>
<tr>
<td>Axillary prophylactic mastectomy, No. of patients</td>
<td>14</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>No. (%) of mastectomies</td>
<td>52 (68)</td>
<td>18 (24)</td>
<td>6 (8)</td>
<td></td>
</tr>
<tr>
<td>Surgical site complications, No. (%) of patients</td>
<td>6 (11.5)†</td>
<td>6 (33)</td>
<td>5 (83)</td>
<td></td>
</tr>
</tbody>
</table>

\*\textit{P} = .02 vs autologous tissue reconstruction.

**Table 4. Adjuvant Chemotherapy**

<table>
<thead>
<tr>
<th></th>
<th>Mastectomy Group (n = 39)</th>
<th>Mastectomy and IBR Group (n = 42)</th>
<th>\textit{P} Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, mean (SD), y</td>
<td>54.3 (12.1)</td>
<td>47.0 (7.8)</td>
<td>NA</td>
</tr>
<tr>
<td>Time to initiation of adjuvant chemotherapy, mean (SD), mo</td>
<td>1.54 (0.71)</td>
<td>1.70 (0.98)</td>
<td>.41</td>
</tr>
<tr>
<td>Surgical site complications, No. (%)</td>
<td>2 (5)</td>
<td>10 (24)</td>
<td>.02</td>
</tr>
<tr>
<td>Major</td>
<td>2</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Minor</td>
<td>0</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Delay in initiation of adjuvant chemotherapy</td>
<td>2</td>
<td>2</td>
<td>.94</td>
</tr>
</tbody>
</table>

**Abbreviations:** IBR, immediate breast reconstruction; NA, not applicable.

**Comment**

Immediate breast reconstruction is being increasingly offered to women following mastectomy and may have several benefits including the lessening of the psychological consequences of mastectomy as well as potential technical benefits compared with delayed breast reconstruction. However, some women may be dissuaded from choosing immediate reconstruction due to their or their surgeon’s concern of the increased incidence of wound complications.
IRB if postoperative adjuvant chemotherapy is anticipated because of concerns over delay in the initiation of chemotherapy secondary to potentially higher rates of operative complications. We found that IRB is associated with an increased rate of surgical site complications compared with mastectomy without reconstruction. The morbidity of IRB has been reported to range from 15% to 52%, although the incremental increase that IRB adds to mastectomy alone for breast cancer has not been clearly defined.10,12 Vinton et al7 compared wound complications between 305 patients undergoing mastectomy alone and 90 patients undergoing mastectomy and IRB. Mastectomy alone was associated with a higher incidence of complications (46% vs 31%), in particular more seromas occurred. In a series of more than 400 patients, O’Brien et al7 observed a similar incidence of complications after mastectomy with (31%) or without IRB (28%). The high rates of complications reported in these studies included seroma formation, which we specifically did not include.

As increasing numbers of patients are receiving adjuvant chemotherapy, there has been some concern that IRB has the potential to lead to a delay in the initiation of postoperative therapy.20,22 Following a mastectomy with or without IRB, approximately 5% of patients had a surgical site complication that delayed the initiation of postoperative adjuvant chemotherapy. The use of IRB does not influence the incidence of delaying the initiation of chemotherapy. Little is known of the effect of surgical site complications related to IRB and the delay of chemotherapy. Lin et al14 noted that 8.1% of patients who underwent mastectomy and IRB had prolonged convalescence longer than 6 weeks secondary to wound complications requiring an average additional recovery time of 3 weeks. The only study that has specifically examined the time to initiation of chemotherapy as related to the use of IRB noted that patients who had IRB initiated chemotherapy sooner than those who did not undergo IRB (41 vs 53 days).21 However, it is unclear whether these groups were comparable for age, stage of disease, or incidence of operative morbidity.

There has been conflicting evidence as to whether chemotherapy may cause increased complications in women who have already undergone IRB, especially with tissue expanders. Initial reports of women who underwent IRB with tissue expanders found no increase in delayed surgical site complications during the administration of chemotherapy.19,20 However, inflation of the tissue expanders was not routinely performed on these patients during the period they were receiving chemotherapy, and the studies did not include control groups. In a more recent study, Vandeweyer et al18 prospectively evaluated a cohort of patients who underwent IRB with tissue expander placement. Those patients who received chemotherapy had a significantly higher incidence of complications that ultimately required implant removal.18 In our study, we did not find an increased incidence of delayed surgical site complications during the administration of postoperative chemotherapy when IRB was used.

**CONCLUSIONS**

While IRB may increase the incidence of surgical site complications, postoperative adjuvant chemotherapy is infrequently delayed. Furthermore, there is no increase in the risk of delayed surgical site complications during the course of postoperative adjuvant chemotherapy when IRB is combined with mastectomy. Therefore, the anticipated administration of postoperative adjuvant chemotherapy should not deter the use of IRB performed in conjunction with a mastectomy for breast cancer.

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**REFERENCES**