Conservative Axillary Surgery in Breast Cancer Patients Undergoing Mastectomy: Long-Term Results

Michael S Cowher, MD, Stephen R Grobmyer, MD, FACS, Joanne Lyons, BSN, Colin O'Rourke, MS, Deborah Baynes, PA-C, Joseph P Crowe, MD, FACS

BACKGROUND: Recently, the American College of Surgeons Oncology Group Z0011 trial demonstrated that axillary lymph node dissection (ALND) could be safely avoided in selected breast cancer patients with limited nodal disease and having breast conservation therapy. However, for node positive (N+) mastectomy patients, full ALND remains the standard of care. Hypothesizing that omission of complete ALND is safe in many N+ breast cancer patients, a hybrid procedure called conservative axillary regional excision (CARE) was developed, consisting of removal of sentinel nodes and other palpable nodes (without intraoperative frozen section or reoperation for N+).

STUDY DESIGN: A retrospective review of patients undergoing mastectomy with CARE between 2002 and 2010 was performed. Data collected included demographics; staging; number of lymph nodes removed; adjuvant, antihormonal, and radiation therapies; recurrence; lymphedema; and survival data. Recurrence-free survival was estimated using the Kaplan-Meier method and compared using Cox proportional hazards.

RESULTS: Five hundred and eighty-seven patients underwent mastectomy with CARE. Mean follow-up was 5.1 years. A median of 8 nodes were removed. There were 7 patients with local recurrence, of which 3 were axillary recurrences. Lymphedema developed in 20 (3.4%) patients, 75% of which had neoadjuvant chemotherapy. Lymphedema development was associated with the number of lymph nodes removed (p = 0.05) and radiation therapy (p = 0.004).

CONCLUSIONS: Conservative axillary regional excision is an excellent model for understanding the role of limited axillary surgery in mastectomy patients. The locoregional recurrence rate among N1 patients having CARE is low (3.4%). Conservative axillary regional excision is also associated with low rates of lymphedema. These data support the use of limited ALND in selected N+ mastectomy patients. (J Am Coll Surg 2014;218:819–826. © 2014 by the American College of Surgeons)

The last 50 years have witnessed a steady decrease in the extent of radical surgical procedures for breast cancer. 1 Axillary lymph node dissection (ALND) was performed as a routine part of breast cancer surgery through the late 1990s, as it was believed to provide necessary staging information and long-term regional control, and was considered essential for guiding decisions about the use of adjuvant therapies (reviewed in Rao and colleagues3). Axillary lymph node dissection for breast cancer typically results in removal of 17 to 24 lymph nodes.1–6 However, ALND has been associated with substantial rates of lymphedema, ranging from 12% to 28%, depending on the lymphedema definition criteria.7 The greatest risk period for lymphedema development is in the first 24 months after ALND.7 Concerns about the morbidity of ALND have therefore prompted efforts to reduce the extent of axillary lymph node surgery.

Axillary SLNB has been widely accepted as a less radical axillary staging procedure for patients with clinically node-negative (N−) invasive breast cancer.8 The National Surgical Adjuvant Breast and Bowel Project 32 randomized trial demonstrated that ALND can be safely omitted in patients without evidence of metastatic disease involving sentinel lymph nodes (SLNs).9 Sentinel

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From the Division of Surgical Oncology and Breast Services, Department of General Surgery, Cleveland Clinic, Cleveland, OH.

Correspondence address: Michael S Cowher, MD, Division of Surgical Oncology and Breast Services, Department of General Surgery, Cleveland Clinic, 9500 Euclid Ave, A81, Cleveland, OH 44195. email: cowherm@ccf.org

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lymph node biopsy has since also been demonstrated to be safe and accurate in patients undergoing neoadjuvant therapy for breast cancer.\textsuperscript{10,11}

Recently, the American College of Surgeons Oncology Group’s Z0011 clinical trial has suggested that completion ALND can be safely avoided in selected patients having breast conservation surgery with low-volume axillary disease confined to 1 or 2 SLNs that are treated with adjuvant medical therapy and whole breast radiation therapy.\textsuperscript{1} In addition, data from Z0011 demonstrated that completion ALND in patients with involvement of 1 or 2 SLNs did not substantially affect overall or disease-free survival of patients. It has been postulated that the use of modern adjuvant medical and radiation therapy effectively controls otherwise occult axillary disease in SLN-positive breast cancer patients in whom ALND is omitted. The results of this trial have prompted many to adopt the omission of complete ALND in selected patients undergoing lumpectomy for breast cancer with 1 or 2 positive axillary SLNs.\textsuperscript{12,13}

Patients undergoing mastectomy for breast cancer were not included in the American College of Surgeons Oncology Group’s Z0011 trial and complete ALND remains standard practice for patients having mastectomy and metastasis involving any axillary lymph nodes.\textsuperscript{14} Modern data on the omission of complete ALND in patients having mastectomy with low-volume axillary node disease are limited.\textsuperscript{15-17} Milgrom and colleagues\textsuperscript{15} demonstrated low rates of locoregional recurrence (LR) for SLN-positive mastectomy patients in whom completion axillary node dissection was omitted. However, most patients (91%) in this series had only micrometastatic disease or immunohistochemical-only positive disease in SLNs. Crawford and colleagues reported low rates of LR in SLN-positive mastectomy patients in whom ALND was omitted.\textsuperscript{16} It is noteworthy in this series that many patients (47%) had micrometastatic disease in SLNs and a mean of 7 axillary nodes were removed in these patients who had SLNB and no ALND. Spiguel and colleagues\textsuperscript{18} reported no axillary failures among SLN-positive mastectomy patients in whom completion ALND was omitted. Similar to Milgrom and colleagues and Crawford and colleagues, this series also had a high proportion (67%) of patients with micrometastatic disease.

Hypothesizing that omission of complete ALND is safe in many node-positive (N\textsuperscript{+}) breast cancer patients, in 2002 a single surgeon (JPC) at our institution developed a hybrid procedure called conservative axillary regional excision (CARE). Conservative axillary regional excision is the excision of SLN(s) with additional axillary dissection limited to include only excision of other adjacent or palpable nodes, including additional nodes in the same anatomic region. The consistent practice of CARE in mastectomy patients for an extended period of time reported here provides a unique model to study the impact of limited axillary dissection on outcomes in mastectomy patients with axillary nodal metastasis.

METHODS

Conservative axillary regional excision procedure

Conservative axillary regional excision uses methylene blue dye injected into the breast at the time of operation, followed by several minutes of breast massage. The dye is diluted to ½ strength and approximately 5 mL is injected in 2 sites in a subareolar location. A standard incision is made at the inferior axillary hairline in patients having skin sparing or nipple sparing mastectomy or CARE can be performed through the lateral aspect of a standard mastectomy incision. After the clavipectoral fascia is incised, the nodal packet is mobilized below and above the intercostobrachial nerves. Care is taken to identify the course of any blue lymphatics that enter the area to guide the extent of dissection of the nodal packet. During dissection, individual lymph nodes (LNs) are not separated from the surrounding fat but are used to define the boundaries of the nodal packet (Fig. 1A, B). This packet is then excised en bloc, including any blue and palpable LN (Fig. 1C). Only for additional grossly abnormal palpable LN or obvious blue dye tracking would the dissection be carried cephalad to the level of the axillary vein. The thoracodorsal neurovascular bundle and the long thoracic nerve are not routinely dissected during the CARE procedure. Intraoperative frozen section of the sentinel node(s) is not performed. Patients found to have LN involvement on final pathology are not taken back to the operating room for completion axillary node dissection. The technique of CARE procedure was the same in patients who received and did not receive neoadjuvant chemotherapy. Pathologic analysis of axillary LN was performed using standard techniques and did not change after the initiation of CARE.

Conservative axillary regional excision technically differs from full ALND in few ways. A traditional ALND is anatomically based and removes all tissue between the anterolateral latissimus dorsi muscle and the chest wall.
medially and proceeds superiorly to the axillary vein, including level I and II ± level III LNs. In addition, with traditional ALND, all of the fat and axillary tissue are removed completely, clearing the inferior border of the axillary vein and all of the tissue around the thoracodorsal bundle and long thoracic nerve. With CARE (Fig. 1), all blue nodes and any attached nodes were identified and excised, and also any clinically concerning (palpable and firm) LNs. Typically, this would include only level I and possibly select level II nodes. Intercostobrachial nerves are preserved in most instances (Fig. 1B, C). The CARE procedure differs from the “extended simple mastectomy” of McBride in that the axillary vein is not skeletonized.

**Study design**

After obtaining IRB approval, we performed a retrospective review of a single surgeon’s breast cancer patients (JPC) undergoing mastectomy with CARE between 2002 and 2010. The multidisciplinary treatment team individualized radiation and chemotherapy treatment decisions. Data collected from the electronic medical record and Cleveland Clinic tumor registry included demographics, age at diagnosis, clinical and pathologic staging, number of LNs removed, neoadjuvant or adjuvant chemotherapy, anti-hormonal therapy and radiation treatments, recurrence, and survival data. Locoregional recurrence was defined as chest wall or axillary recurrence. Records were also retrospectively reviewed for the development of postoperative lymphedema defined as an occupational therapist or surgeon’s note documenting a decreased function and/or quality of life due to arm swelling or pain. The presence of lymphedema was modeled as a function of the number of LNs removed using a logistic regression model. Recurrence-free survival was estimated using the Kaplan-Meier method and compared using Cox proportional hazards.

Estimates of odds and odds ratios were reported with 95% confidence intervals. Analyses were done using R software (version 3.0.1, Vienna, Austria). A significance level of 5% was used for all testing.

**RESULTS**

Five hundred and eighty-seven patients underwent mastectomy with CARE beginning in 2002 (Table 1, Fig. 2). Mean follow-up was 5.1 years. A median of 8 LNs were removed (range 1 to 27 LNs). The number of LNs removed and the treatment of patients by N stage are shown in Table 1.

One hundred and fifty-two (25.9%) patients in this series had adjuvant radiation therapy (Table 1). Two hundred and eighty-nine (49.2%) patients had neoadjuvant or adjuvant medical therapy (Table 1). Neoadjuvant therapy was given in 112 patients (19.1%) of patients. There was a slightly higher median number of LNs removed comparing those who did (n = 10) and did not receive neoadjuvant chemotherapy (n = 7) (p < 0.001). A limited number of patients (n = 19, 24% of N1) had micrometastatic (0.2–2.0 mm) disease.

There were 7 patients in this series who had LR: 3 axillary recurrences (ARs) and 4 chest wall recurrences (Table 2).

<table>
<thead>
<tr>
<th>Stage</th>
<th>Median no. of nodes</th>
<th>Radiation, %</th>
<th>Chemotherapy or hormone therapy, %</th>
<th>5-Year recurrence-free survival, % (range)</th>
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<tr>
<td>N0</td>
<td>379</td>
<td>12.9</td>
<td>62.0</td>
<td>93.1 (90.2–96.1)</td>
</tr>
<tr>
<td>N1 (1–3 LN+)</td>
<td>144</td>
<td>36.8</td>
<td>97.2</td>
<td>83.9 (77.5–90.9)</td>
</tr>
<tr>
<td>N2 (4–9 LN+)</td>
<td>53</td>
<td>77.4</td>
<td>96.2</td>
<td>64.9 (52.8–79.9)</td>
</tr>
<tr>
<td>N3 (10+ LN+)</td>
<td>11</td>
<td>81.8</td>
<td>100</td>
<td>35.5 (16.4–75.9)</td>
</tr>
</tbody>
</table>

**Figure 1.** Steps in conservative axillary regional excision (CARE). (A) After incision of clavipectoral fascia, dissection of the inferior packet of nodes with preservation of intercostobrachial nerves; (B) mobilization of the superior packet; and (C) completed CARE procedure.
The LR rate among N1 patients was 3.4% (Table 2). All 3 ARs were in N1 patients (2%) and ARs occurred at 1.3, 2.3, and 2.9 years. No patients with AR received radiation treatment or neoadjuvant chemotherapy. However, comparing N1 patients who received and did not receive radiation treatment, there was no significant difference in recurrence-free survival (hazard ratio $= 2.2; 95\%$ CI, 0.9–5.8) or overall survival (hazard ratio $= 1.8; 95\%$ CI, 0.8–4.4). Overall recurrence-free survival curves for patients receiving and not receiving neoadjuvant chemotherapy are show in Figure 3.

Of 587 patients, lymphedema developed in 20 (3.4%), 12 (75%) of which had neoadjuvant chemotherapy. There was an association between the number of nodes removed and development of lymphedema ($p = 0.05$). For every 8 nodes removed the risk of having lymphedema increased by a factor of 1.5. There was a significant association between having lymphedema and radiation ($p = 0.004$). Based on the logistic regression model, radiation therapy was associated with a relative risk of 3.3 for developing lymphedema compared with not having post-mastectomy radiation therapy.

**DISCUSSION**

In 1955, Dr George Crile Jr began omitting axillary dissection for clinical stage I breast cancer patients having mastectomy. His series of patients from Cleveland Clinic in which patients were treated with simple mastectomy without adjuvant radiation and medical therapy demonstrated low rates of axillary failure and survival similar to patients treated at that time with standard radical mastectomy.

Similar findings to those reported by Dr Crile were seen in randomized trials of ALND in early breast cancer. In the early 1970s, the National Surgical Adjuvant Breast and Bowel Project B-04 Study randomized clinically node-negative patients to radical mastectomy (including ALND), total mastectomy with radiation, or total mastectomy alone. Pathology specimens of clinically node-negative patients who had ALND showed an approximately 40% nodal metastasis rate, and for those patients in the arm without the ALND (whom it is assumed also had an approximately 40% N+ rate), there was no survival difference at 25 years of follow-up. The AR rate for clinically node-negative patients undergoing radical mastectomy was similar to patients undergoing mastectomy and radiotherapy (2%), and the AR rate for patients with total mastectomy alone was 15%, with a median time to AR of 12 months.

The currently reported series of mastectomy patients treated with CARE supports the concept that complete ALND can be safely avoided in N+ mastectomy patients who receive adjuvant medical therapy with or without radiation therapy. The LR rate is low among N1 mastectomy patients having CARE (3.4%). This is similar to other modern reports of LR in N+ mastectomy patients.
undergoing complete ALND with adjuvant medical therapy and selected use of post-mastectomy radiation therapy. The current series shows no statistically significant association between radiation therapy use and LR. These findings are likely related to the selection of a higher-risk subset of N1 patients for post-mastectomy radiation therapy, including young age and lymphovascular invasion.

Other authors have described limited axillary surgical procedures for breast cancer patients with low AR rates (0.2% to 7%), but in all cases the limited axillary surgery was combined with radiotherapy.

The current series provides new insight into conservative axillary surgery in patients with breast cancer with macrometastatic disease. The current series differs from other recently published series of conservative axillary surgery in that only a limited number of patients had micrometastatic disease (24% of N1 patients). Other modern series of N+ limited nodal resection, such as Milgrom and colleagues, Crawford and colleagues, and Spiguel and colleagues had much higher percentages of micrometastatic only or immunohistochemistry-positive nodal disease.

Neoadjuvant therapy is being increasingly used by many centers to assess response of breast cancer tumors to therapy and has been demonstrated to be associated with high rates of complete pathologic response, a surrogate for excellent survival. The management of the axilla in patients having had neoadjuvant chemotherapy has also been the subject of recent investigation and is evolving. The recently published American College of Surgeons Oncology Group’s Z1071 study demonstrated that SLNB is highly accurate, even in breast cancer patients who present with N1 disease. The current study adds to our understanding of axillary management of patients treated with neoadjuvant chemotherapy in that patients treated with CARE after neoadjuvant therapy have low rates of axillary failure.

Conservative axillary regional excision procedure involves removal of approximately 50% of the nodes traditionally removed during an axillary dissection and is associated with very low rates of lymphedema (3.4%). This result compares favorably with traditional reports of 20% to 40% lymphedema incidence in patients having ALND and is similar to reports of lymphedema in patients with modern axillary reverse mapping procedures.

Several limitations of our current study should be noted. This is a retrospective review of a single surgeon’s experience with mastectomy patients having the CARE procedure. Objective lymphedema data were not collected prospectively, making it difficult to directly compare morbidity of the CARE procedure with published rates of lymphedema in SLN alone or ALND patients. There was no standardized approach to the administration of adjuvant post-mastectomy radiotherapy.

CONCLUSIONS
This study demonstrates that complete ALND is not required in many N+ mastectomy patients. This is supported by the observed low rates of LR and lymphedema seen in mastectomy patients having the CARE procedure. In addition, for N1 mastectomy patients undergoing CARE, the addition of radiotherapy does not appear necessary on the basis of nodal positivity alone. Whether SLNB only is acceptable in selected mastectomy patients with low-volume axillary metastatic disease remains a subject of ongoing debate and investigation.

Author Contributions
Study conception and design: Cowher, Grobmyer, Baynes, Crowe
Acquisition of data: Cowher, Grobmyer, Lyons, O’Rourke, Baynes, Crowe
Analysis and interpretation of data: Cowher, Grobmyer, Lyons, O’Rourke, Crowe
Drafting of manuscript: Cowher, Grobmyer, O’Rourke, Crowe
Critical revision: Cowher, Grobmyer, Lyons, O’Rourke, Crowe

REFERENCES


Discussion

DR V SUZANNE KLIMBERG (Little Rock, AR): There are about 240,000 breast cancer cases per year and between 3 and 5 million existing cases of lymphedema in the US, making this one of the most significant postoperative problems in breast cancer. Many
women tell me that the lymphedema is worse than the mastectomy. Symptoms of lymphedema may present within days or up to 30 years later; although 80% present within 3 years of surgery, with the remainder at a rate of 1% per year. Volume displacement is the gold standard for measurement because subjective symptoms of pain or discomfort are often mistaken for lymphedema. Sentinel lymph node biopsy (SLNB) was developed in an effort to prevent the high morbidity seen with axillary lymph node dissection (ALND). However, lymphedema in SLNB groups ranges from 0% to 13% and in ALND groups, ranges from 13% to 77%, varying with how closely lymphedema is monitored, length of follow-up, questionably the number of positive lymph nodes, postoperative irradiation, body habitus, and the extent of surgery.

The widely varying lymphedema rates are indicative that the technique of ALND is variable in practice, yet the basic anatomic principles have not changed in decades. As a core trainer for the B32 study, I had an opportunity to go around the country and see how various institutions performed ALND. It is perhaps one of the most modified procedures, with some institutions leaving lymph nodes behind while others carefully dissected nodes and fat and left nerves, as you did, resulting in low rates of lymphedema. So surgeons don’t necessarily need to stop doing ALNDs for positive lymph nodes but instead, change the principles and technique of how to perform them. I applaud the foresight of Crowe and colleagues and their efforts to do just that. However, I had a hard time understanding exactly how conservative axillary regional excision (CARE) differs from SLNB. As defined by the National Surgical Adjuvant Breast and Bowel Project (NSABP) 32, a sentinel lymph node is one that is located by radioactive or blue dye and/or is palpable. What is the difference in your technique? I believe that Dr Crowe can achieve such good results, but can it be standardized and taught?

Osler said you see what you know. Our group hypothesized that we could decrease the rate of lymphedema for both SLNB and ALND using the technique of axillary reverse mapping (ARM), which allows us to identify lymphatics that are in the surgical field but primarily drain the upper extremity. By identifying and avoiding transection of these lymphatics, we are able to further minimize the morbidity of these procedures while not compromising our oncologic resection. Lymphatics can be as big as 6 mm; how could I have not seen them before? When lymph nodes are involved and need to be transected, reanastomosis decreases expected lymphedema with rates of 1% to 2% for SLN and ALND, respectively. Rather than blindly taking nodes, I urge surgeons to identify and take the breast nodes and leave the arm nodes behind. The CARE procedure gets good results, but again, can you teach the resident to do it?

Finally, what I don’t understand in general is that we work so hard to get all the disease out of the breast and get negative margins; why would we knowingly leave disease behind in the axilla in up to 25% of patients as in Z0011? People are always quoting the low regional recurrence rate in the axilla but I am not so worried about that as I am about the existing disease that can metastasize; some act like lymph nodes can’t metastasize. Yet genetic studies show that they can. How do you resolve your technique for staging in the face of the MA.20 data? Do you have any data on CARE followed by ALND and a false-negative rate? Did you analyze anything on the order of lymph node ratio?

**DR JOHN OLSON** (Baltimore, MD): In the last several decades, we have witnessed a transformation in breast cancer care from radical to less extensive surgery for this disease. The approach has paralleled improvements in systemic therapy and has been largely data driven due to carefully conducted clinical trials.

Still, in 2013, there is no more controversial an area than management of the axilla. Is removal of involved axillary nodes therapeutic? Not likely. Does it guide therapy? Yes, often.

The developmental sentinel node biopsy in the 1990s acknowledged this view and has replaced axillary node dissection for staging the axilla. This technique spared thousands of node-negative women from node dissection and has limited full axillary surgery to those who might benefit, mainly those women with positive nodes. But does that really help? The recent ACOSOG Z0011 trial demonstrated equivalent oncologic outcomes for sentinel node-positive patients who either have or do not have completion axillary node dissection in addition to breast irradiation and lumpectomy. This has raised questions about the role of axillary surgery in the disease even in the presence of metastatic lymph nodes.

Although the issue is arguably settled, there are still important gaps in the field because patients needing mastectomy were not eligible for participation in Z0011 and the findings were restricted to patients with limited sentinel node disease burden. Most authors believe—I stress “believe”—that the principles of Z0011 should apply to all patients, but this has not been proven.

This belief was the subject of the presentation by Dr Grobmyer and his colleagues from the Cleveland Clinic. This was an interesting presentation describing a single surgeon’s experience with limited lymph node dissection, including a sentinel node, for nearly 600 patients having mastectomy. The technique involved resection of a presumed sentinel node in a packet without standard anatomically based node dissection of levels 1 and 2. The inclusion of additional lymph nodes was based on judgment of node palpability and other intraoperative criteria. Lymphedema and local recurrence rates were low, and led them to conclude that this procedure works and does no harm. The challenge of the paper was how to generalize the results to everyday practice.

First, you state that the approach should be applied selectively. Your paper does not describe patient or tumor characteristics of the patients included in the study. What were the selection criteria for inclusion in this technique? Specifically, was this approach offered to young women and those with hormone receptor-negative tumors, those for whom locoregional control may be the most important?

Second, the reported lymphedema rate of 3.4% is laudable, but was it rigorously sought? The criteria defined in the paper—a patient sees a clinician who documents decreased range of motion and poor quality of life—is fraught with bias and is at risk for under-reporting.

Importantly, 65% of the patients in this series had node-negative disease yet had a median number of 7 lymph nodes removed. Most sentinel node biopsy series report 2 or fewer nodes removed. Is this a meaningful difference, and did you subject two-thirds of the women in your study to unnecessary axillary surgery?

Last, do you think this study is sufficiently powered to draw firm conclusions about clinical practice? And, specifically, based on your results today, do all of the breast surgeons at the Cleveland Clinic approach patients in this way?
DR MICHAEL COHWER (Cleveland, OH): I agree that lymphedema avoidance is the driving factor in minimizing lymph node surgery. And, depending on the method of determining lymphedema, the rates vary quite widely in the literature. Unfortunately, we did not measure volume displacement prospectively in our registry. So for this review, we were limited to chart documentation of significant pain, swelling, or quality of life.

We were very pleased to find that only 3.4% of patients had had such subjective problems documented in the past. This compares favorably with other published rates of patient-reported symptoms.

The main difference between CARE and sentinel lymph node biopsy is that we used blue dye to identify sentinel nodes to guide the boundaries of the excised packet, then included any palpable nodes within 1 to 1.5 cm around those blue nodes. This packet, excised en-bloc, preserved intercostobrachial nerves. Any palpably abnormal nodes higher up in the axilla were removed as well. Obviously, this was a judgment call. I’m sure there were 2- to 4-mm nodes that may or may not have been palpable, which were left behind. This technique, as described, results in a median of 8 nodes removed, somewhat different from the number of nodes removed in the sentinel node biopsy. In B-32, 80% of patients had fewer than 4 lymph nodes removed.

Regarding standardization in teaching, I had the privilege of being one of Dr Crowe’s fellows 4 years ago. And I do feel that it was easily taught. I use the technique myself in patients with positive sentinel nodes.

All breast surgeons at the Cleveland Clinic do perform a sentinel lymph node biopsy. We have used these data to reduce the extent of lymphadenectomy performed in those found to have a positive sentinel node.

The axillary reverse mapping technique could be a useful tool for patients in whom there is extensive axillary involvement requiring a complete dissection. It is our opinion, though, that the added complexity of mapping and reanastomosis is not necessary with most patients undergoing CARE.

Finally, regarding metastasis from residual axillary disease, the theoretic risk of distant metastasis from residual axillary disease has not been shown in the long-term data that are available. Complementing Dr Crile’s data presented in 1960, in NSABP B-04, patients in the untreated mastectomy arm had a presumed 40% untreated nodal metastasis rate and, at 25 years of follow-up, there was no survival difference in patients who did not have nodal surgery.

Regarding the selection criteria, to follow on Dr Olson’s question, this was a consecutive series of all of Dr Crowe’s mastectomy patients. There were no specific selection criteria.

No patients in this series presented today had a completion full axillary dissection, so, unfortunately, false-negative data are not available. Given the subjectivity in which palpable nodes are deemed abnormal and added to the CARE resection, I’m not sure that the lymph node ratio changes the take-home message, which is, in my opinion, that for node-positive mastectomy patients, a careful limited axillary dissection, including approximately 6 to 9 lymph nodes, including identified sentinel nodes, has a low rate of local recurrence and lymphedema, and that traditional full dissection is not required in many node-positive patients.