Axillary Web Syndrome after Sentinel Node Biopsy and Axillary Lymph Node Dissection during the Conservative Treatment of Early Breast Cancer

Seung Jae Huh • Jung-Hyun Yang • Won Park • Seok Jin Nam • Jeong Han Kim
Departments of Radiation Oncology, Surgery, Samsung Medical Center, Sungkyunkwan University School of Medicine, Seoul, Korea

Purpose: We wished to evaluate the prevalence and clinical features of axillary web syndrome (AWS) after sentinel node biopsy (SNB) and axillary lymph node dissection (ALND) during the conservative treatment of early breast cancer.

Methods: From March to November 2003, a total of 110 consecutive patients with clinical T1-T2 breast cancer underwent breast conserving surgery, with ALND being performed in 98 patients or SNB being performed in 12 patients. The diagnostic criterion for AWS was the presence of palpable and visible cords of tissue in the axilla upon maximal shoulder abduction. The extent of AWS was evaluated by inspection and by palpation of the axilla and the arm.

Results: Ten of 110 patients (9%) developed AWS. The AWS typically presented in the first several weeks after surgery and it resolved within 1 month of onset for all the patients. AWS was encountered for 3 patients (25%) among the patients who had SNB and for 7 patients (8%) among the ALND group, which is not statistically significant. Typically, the syndrome was self-limiting, and it resolved without any specific treatment.

Conclusion: AWS is a significant cause of morbidity in the early postoperative period for 9% of the patients after axillary surgery. A more limited axillary surgery might help reduce the incidence and severity of the AWS.


Key Words Breast cancer, Axillary pain, Axillary web syndrome, Axillary lymph node dissection, Postoperative morbidity

INTRODUCTION

Axillary web syndrome (AWS) is a self-limiting cause of morbidity in the early postoperative period after axillary surgery. The term AWS was first coined by Moskovitz et al.1 The diagnostic criterion for AWS is the presence of palpable and visible cords of tissue extending from the mid axilla down the ipsilateral arm. The proposed pathogenesis is lymphovenous injury, stasis and hypercoagulability as a consequence of superficial venous stasis, lymphatic disruption, and tissue injury caused by axillary clearance.2 AWS occurs in 6% to 42% of patients2 and AWS was associated with pain and limited shoulder abduction in 74% of the
patients.\textsuperscript{10} Axillary lymph node dissection (ALND) is a valuable staging procedure performed for breast cancer, and it controls therapeutic decision making as it predicts tumor recurrence risk and survival.\textsuperscript{10,19} Unfortunately, ALND also has significant operative complications including pain, numbness, swelling, weakness, and arm or shoulder stiffness.\textsuperscript{17,12} Lymphedema, the most dreaded long-term complication of ALND, occurs in 7% to 37% of patients,\textsuperscript{7,9} and because of the possibility of this malady, less traumatic staging procedures are now being used, the most notable of which is sentinel node biopsy (SNB) for the detection of early breast cancer metastasis. The technique of the SNB was developed to provide surgeons with the information they must have, and to avoid axillary dissection if the sentinel node is negative. AWS has been encountered less frequently in patients with SNB than in patients with ALND.\textsuperscript{23}

We have observed a self-limiting post-ALND and SNB AWS occurring in the patients with breast cancer. The aim of this study was to evaluate the prevalence and clinical features of AWS after SNB and ALND retrospectively.

**METHODS**

A total of 110 consecutive patients with clinical T1-T2 breast cancer underwent breast-conserving surgery with ALND in 98 patients and SNB in 12 patients from March to November 2003, at the Breast Surgery Unit of Samsung Medical Center, Seoul, Korea. For the ALND, a level I to II axillary clearance was performed. For the SNB, 2 – 4 hours before surgery, a lymphoscintigraphy was performed after the subdermal peritumoral injection of 37 MBq\textsuperscript{99m} Tc-tin colloid in a volume of 0.1 ml. A 6 ml volume of mixed solution, made by mixing 50 mg of isosulfan blue with 5 ml of pure water, was injected into the breast parenchyma surrounding the primary tumor site, and after 5 minutes, an incision was made over the axillary area. Sentinel nodes were searched for using a gamma probe and seeking the blue stained lymphatic vessels and nodes. All radioactive and blue nodes in the axilla were harvested and sent to the lab for frozen sectioning. After SNB, a careful palpation of the open axilla was performed, and all the enlarged or hard lymph nodes were removed for frozen sectioning and examination during the operation. The details of the surgical procedures were reported in an earlier publication by the authors.\textsuperscript{13,19} The final pathological reports on hematoxylin and eosin (H&E) staining of the sentinel lymph node and the non-sentinel axillary node specimens were compared. The diagnostic criterion for AWS was the presence of palpable and visible cords of tissue in the axilla during maximal shoulder abduction, with or without associated pain or shoulder range-of-motion limitation. By two surgeons, the extent of AWS was evaluated by close inspection and palpation of the axilla and the arm by monthly physical examination. Fishers exact test was used to compare the statistical results.

**RESULTS**

Ten of 110 patients (9%) developed AWS, and AWS presented in the early postoperative course of recovery after axillary dissection. Typically, the syndrome was self-limited and it resolved without any specific treatment. There was no case of the syndrome developing after more than 9 weeks postoperatively. The AWS typically present in the first several weeks after surgery and then it resolved within...
1 month of symptom onset in all patients (Table 1). All AWS patients had no constitutional symptoms. The characteristic of this syndrome is a visible and palpable web of axillary skin overlying pal- pable cords of tissue that are made taut and painful by shoulder abduction (Fig 1). The web is usually present in the axilla and extends into the medial ipsilateral arm, frequently down to the antecubital space and into the forearm, and occasionally to the base of the thumb. Typically, there are two or three taut, tender cords of tissue under the skin. AWS was encountered in 3 (25%) patients among the patients who had SNB, and in 7 patients (8%) gas among the ALND group, which is not statistically significant ($p = 0.0625$).

The authors do not perform the biopsy for this lesion. AWS occurred in 3 patients out of 12 patients after lumpectomy and SNB, and these patients had the characteristic findings of pain and an axillary web in the axilla and upper arm. None of these three patients developed cords down to the wrist, as we have observed in the severe cases after ALND.

**DISCUSSION**

AWS is a self-limited process that developed in 6% to 42% of the patients with breast cancer. The interruption of axillary lymphatics appears to play an important role in the development of the AWS. Moskowitz et al. has suggested that the axillary surgery, and not the breast procedure, was the etiologic factor. They have also reported that AWS developed in patients with matted axillary metastasis without any operation owing to the blockage of normal lymphatic flow through nodes replaced with tumor. The authors of this study have not found any cases of the AWS after isolated breast surgery in the absence of an axillary node dissection.

The AWS syndrome is analogous to an axillary variant of Mondor’s disease. Mondor’s disease is a superficial thrombophlebitis of thoraceopigastric veins that has been observed infrequently in patients after breast procedures from local trauma, as an idiopathic variant, and in patients with previously undiagnosed breast cancer. As in the AWS, symptoms of Mondor’s disease have been reported to resolve spontaneously 2 to 10 weeks after onset. In the current series, the AWS typically presents in the first several weeks after surgery and resolved within 1 month of onset in all patients. According to Moskowitz et al., 11 percent of AWS patients developed lymphedema. This is within a commonly accepted rate for lymphedema after breast cancer surgery, of 7% to 37% and this does not suggest a predisposition to lymphedema in AWS patients.

Moskowitz et al. have suggested the hypothesis that angiolymphatics contribute to the AWS on the basis of their anatomic and pathologic evidence. In their series, biopsies revealed dilated, thrombosed lymphatics or thrombosed superficial veins, or both. The discrete interruption of the axillary lymphatics in the performance of SLB may predispose the patient to lymphovenous outflow obstruction for at least a portion of the ipsilateral arm. Furthermore, anatomic studies of arm and breast lymphatics and more recent lymphatic mapping with lymphoscintigraphy have demonstrated that both arm and breast lymphatics do drain to the axilla. Thus, in some patients, a limited breast SLND may also disrupt important lymphatic drainage for the medial arm.

If the ALND procedure were causative, one
would expect a shorter or less invasive operation, such as SNB, to cause less superficial venous stasis, lymphatic disruption and tissue injury. Previous studies have indicated significantly less or even negligible postoperative pain, numbness, motion restriction or lymphedema after SNB compared with ALND. (8-20) According to Leidenius et al.,(29) AWS was encountered significantly less often after SNB only, and this was probably owing to the more limited surgical procedure in the axilla. They reported that AWS was encountered in 20% of patients with SNB and in 72% with AC. Because metastatic involvement of axillary nodes doesn’t seem to predispose patients to AWS or motion restriction, they believed that the noted differences between the groups were mainly due to the differences in the extent of axillary surgeries. To date, the AWS observed after SNB has been less severe and limited to the axilla and medial arm, without any extension to the wrist. Although the authors data demonstrated higher incidence of AWS in the patients with SNB than ALND, which is not statistically significant, we thought the number of cases were too small to make the conclusion as for AWS associated with the operative methods. In the current series, the AWS that occurred in 3 patients out of 12 patients after lumpectomy and SNB have had the characteristic findings of pain and an axillary web in the axilla and upper arm. None of these three patients developed cords down to the wrist, as we have observed in the severe cases after ALND.

CONCLUSION

In this study, AWS is a significant cause of morbidity in the early postoperative period for 9% of patients after axillary surgery. There is no specific treatment and the AWS appears to be self-limiting. It is possible that the more limited axillary surgery, with less disruption of the lymphatics and superficial tissues of the arm, might help reduce the incidence and severity of the AWS.

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