Importance of ultrasonography and magnetic resonance imaging in the axillary evaluation in patients with breast cancer.

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Aims and objectives

The search for metastatic disease in the axillary lymph nodes is an important information to define staging, treatment and prognosis of breast cancer\(^1\). Axillary surgery with histological analysis is considered the gold standard method. However it still has a significant associated morbidity\(^1\).

Because of the increasing early breast cancer detection rate, a less aggressive method is needed to evaluate axillary lymph nodes since a significant number of patients will have negative axillary surgery.

Sentinel lymph node biopsy technique (SLNB) emerged as a major advance in the treatment of patients with clinically negative axillary lymph nodes, currently with less than 1\% of axillary recurrence in patients with negative result\(^2\).

Clinical examination and mammography have already proved to be inaccurate in the identification of axillary lymph node metastases. Several studies showed that other imaging techniques may contribute to this goal such as: ultrasonography alone or associated with color Doppler; needle core biopsy; computed tomography; positron emission tomography (PET / CT); magnetic resonance imaging (MRI) and elastography\(^2\).

Both sonography and magnetic resonance imaging (MRI) have an important role in staging axillary lymph nodes, among other things, because they are noninvasive methods. Ultrasonography in particular because it is cheaper, does not use non ionizing radiation and helps to guide invasive procedures such as fine needle aspiration (FNA) and needle core biopsy (NCB). In this study we compare the axillary imaging results (sonography and MRI) with BLS in patients with early stage breast cancer (T1/T2, N0, M0).

Our objective is to demonstrate the negative predictive value (NPV) of axillary ultrasonography and magnetic resonance imaging in patients with early breast cancer and compare with BLS findings.
**Methods and materials**

We retrospectively evaluated 305 patients who underwent breast surgery due to early breast cancer and who were submitted to SLNB in a quaternary hospital during the year 2017.

The inclusion criteria were:

- breast cancer diagnosis established;
- T1 - T2, N0, M0 lesions;
- sentinel lymph node biopsy result.
- axillary sonography and / or MRI findings at the time of diagnosis.

The pathological results of sentinel lymph node biopsy were compared with the axillary imaging findings.

Atypical lymph nodes criteria at imaging studies were:

- cortical thickness more than 3 mm;
- absence/obliteration of the fatty hilum.

Due to the retrospective design of the study, it was not necessary to use the informed consent form.

Data were tabulated and analyzed using the Microsoft Office Excel 2015 program.
Results

122 patients fulfilled the inclusion criteria.

Sixteen (13%) patients had imaging atypical lymph nodes. Six (37.5%) of these 16 patients had more than 2 metastatic lymph nodes; four (25%) had up to 2 metastatic lymph nodes and six (37.5%) had no metastatic disease.

Among the 106 patients with normal axillary lymph nodes imaging findings, 93 patients (87.7%) had no metastatic lymph nodes at SLNB and 13 (12.2%) had lymph node metastasis. Ten (9.4%) of these 106 patients had up to 2 metastatic lymph nodes and 3 patients (2.8%) had more than 2 metastatic lymph nodes.

Breast cancer is the most common malignant neoplasm in women in Western countries and its prognosis is directly associated with tumor staging at the time of diagnosis.\textsuperscript{3}

The assessment of axillary node involvement is the most important prognostic factor in relation to overall patient survival.\textsuperscript{4}

Historically, axillary lymph node dissection was the gold standard procedure to determine metastatic involvement, since this method has a diagnostic accuracy of almost 100%.\textsuperscript{4} However, axillary lymph node dissection is an invasive procedure, with a high morbidity rate, associated with complications such as seromas, lymphedema and nerve lesions. In addition, large clinical studies have reported that axillary dissection alone does not improve patient survival.\textsuperscript{4}

In patients with early breast cancer and clinically negative axillary lymph nodes, sentinel lymph node biopsy is already widely accepted as axillary treatment.\textsuperscript{5-6} However, discordance occurs when it comes to patients with early breast cancer and positive sentinel lymph node. The question is: is it necessary to remove only the sentinel lymph node or to remove the sentinel lymph node along with whole axillary dissection?

In 2010 the published study ACOSOG Z011 helped to answer this question. This study showed that there was no difference in locoregional recurrence in patients with up to 2 metastatic sentinel lymph nodes who were treated with whole axillary dissection compared to the group of patients who did not perform axillary dissection. The mean follow-up period was 6.3 years and regional recurrence after sentinel lymph node biopsy only was surprisingly low (0.9%). Axillary lymph node dissection did not significantly decrease regional recurrence or improved survival rate in patients with early breast cancer and low metastatic burden in axillary lymph nodes.
Axillary sonography is the best imaging modality to evaluate lymph nodes since it is a low cost exam, without ionizing radiation, easy to perform and what best depicts lymph node morphology\textsuperscript{7}.

It has been shown that in imaging studies the size of the lymph node cannot reliably help distinguish between normal and abnormal ones, but rather their morphological changes are the best indicator. Suspicious findings for metastatic lymph nodes include cortical thickening more than 3 mm, eccentric cortical thickening, round shape, irregular margins, loss/obliteration or displacement of the fatty hilum\textsuperscript{4}.

Magnetic resonance imaging is used for high risk patients screening, staging newly diagnosed breast cancer and for assessing chemotherapy response.

When it comes to axillary evaluation, the findings that indicate lymph node metastasis include cortical irregularity, cortical thickening, loss of fatty hilum and round shape, similar to ultrasound findings\textsuperscript{4}.

Our results showed that among patients with negative axillary imaging, 87.7\% had negative lymph nodes at SLNB and 9.4 \% had up to 2 metastatic lymph nodes. Only 2.8 \% had more than 3 metastatic lymph node. Therefore according to ACOSOG Z011 criteria, only 2 \% of these patients would need a whole axillary surgery. In other words, when the axillary imaging study is negative there is a high probability that we are dealing with a patient with low burden axillary metastatic disease or no metastatic disease at all.

When the imaging studies depicted atypical axillary lymph nodes, 37.5\% of these patients had relevant metastatic involvement (more than two sentinel lymph nodes), 37.5\% had non metastatic lymph nodes, and 25\% had up to two metastatic lymph nodes.

In a more recent study, Kim et al showed that patients with early breast cancer and no atypical axillary lymph nodes in imaging study, 97.7\% did not have axillary lymph node metastasis, whereas only 2.3\% had metastatic lymph nodes at histology\textsuperscript{8}. These findings are similar to our study results, corroborating the idea that a negative axillary ultrasonography (US) or magnetic resonance imaging (MRI) may play an important role even in sparing these patients in performing axillary SLNB.

In conclusion, our study results showed a high NPV when imaging studies (sonography or MRI) did not depicted atypical axillary lymph nodes. 97.2\% of these patients had low burden axillary disease or no disease at all. These findings may help managing patients with early breast cancer and clinically negative axilla even sparing them to be submitted to SLNB.
Fig. 1

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Fig. 2

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Fig. 3
Conclusion

In conclusion, our study results showed a high NPV when imaging studies (sonography or MRI) did not depict atypical axillary lymph nodes. 97.2% of these patients had low burden axillary disease or no disease at all. These findings may help managing patients with early breast cancer and clinically negative axilla even sparing them to be submitted to SLNB.
References


