Axillary dissection

Axillary dissection is a surgical procedure that incises the axilla, usually in order to identify, examine, or take out lymph nodes.

Patients with early breast cancer undergoing primary surgery, who have a low axillary nodal burden, can safely forego axillary node clearance (ANC). However, routine use of axillary ultrasound (AUS) leads to 43% of patients in this group having ANC unnecessarily, following a positive AUS. The intersection of machine learning with medicine can provide innovative ways to understand specific risks within large patient data sets, but this has not yet been trialed in the arena of axillary node management in breast cancer.

Objective: The objective of this study was to assess if machine learning techniques could be used to improve the preoperative identification of patients with a low and high axillary metastatic burden.

Methods: A single-center retrospective analysis was performed on patients with breast cancer who had a preoperative AUS, and the specificity and sensitivity of AUS were calculated. Standard statistical methods and machine learning methods, including artificial neural network, naive Bayes, support vector machine, and random forest, were applied to the data to see if they could improve the accuracy of preoperative AUS to better discern high and low axillary burden.

Results: The study included 459 patients; 142 (31%) had a positive AUS; among this group, 88 (62%) had 2 or fewer macrometastatic nodes at ANC. Logistic regression outperformed AUS (specificity 0.950 vs 0.809). Of all the methods, the artificial neural network had the highest accuracy (0.919). Interestingly, AUS had the highest sensitivity of all methods (0.777), underlining its utility in this setting.

They demonstrated that machine learning improves the identification of the important subgroup of patients with no palpable axillary disease, positive ultrasound, and more than 2 metastatically involved nodes. A negative ultrasound in patients with no palpable lymphadenopathy is highly indicative of low axillary burden, and it is unclear whether sentinel node biopsy adds value in this situation. Further studies with larger patient numbers focusing on specific breast cancer subgroups are required to refine these techniques in this setting ¹⁾.

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Jozsa F, Baker R, Kelly P, Ahmed M, Douek M. The Use of Machine Learning to Reduce Overtreatment of the Axilla in Breast Cancer: Retrospective Cohort Study. JMIR Perioper Med. 2022 Nov 15;5(1):e34600. doi: 10.2196/34600. PMID: 36378516.

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