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Real-time indocyanine green (ICG) fluorescence imaging technique for the detection of SLNs in early-stage breast cancer

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Background: The sentinel lymph nodes status of breast cancer is used to predict the status of the remaining axillary lymph nodes accurately and sentinel lymph node biopsy (SLNB) provide staging information and to determine the need for axillary lymph node dissection in breast cancer patients. The purpose of this study was to evaluate the utility of a color charge-coupled device (CCD) camera system for the intraoperative detection of SLNs and to determine its clinical efficacy and sensitivity in patients with operable breast cancer.

Methods: The intraoperative detection of SLNs was performed using the conventional Indigo Carmine dye (indigotindisulfonate sodium) technique combined with a new Indocyanine green (ICG) imaging system (HyperEye Medical System: HEMS, MIZUHO IKAKOGYO, Japan) to map SLNs, in which the lymphatic vessels and SLNs were visualized transcutaneously with illuminating ICG fluorescence. One intradermal injection of 3.5ml indigo carmine (blue dye) mixed with 0.5ml indocyanine green (ICG) was performed via the subareolar plexus followed by 5 minutes breast massage for dilating breast lymphatics. After an inferior axillary incision, the search of SLN was guided by HEMs for lighting stained lymphatic channels leading to blue-stained LNs.

Results: Between January 2012 and May 2013, SLNs were successfully identified in all 168 patients (detection rate: 100%). By histopathology, the sensitivity was 93.8% for the detection of the metastatic involvement of SLNs (15 of 16 nodal-positive patients). Immunohistology revealed one false-negative case among 16 patients (6.3%). After a median follow-up of 30.5 months, none of the patients presented with axillary recurrence.

Conclusion: These results suggest that the HEMS imaging system is a feasible and effective method for the detection of SLNs in breast cancer. Furthermore, the HEMS device permitted the transcutaneous visualization of lymphatic vessels under light conditions, thus facilitating the identification and detection of SLNs without affecting the surgical procedure, together with a high sensitivity and specificity.

Biography

Uhi Toh has completed his MD and PhD from Kurume University School of Medicine. He is currently working as the Associate Professor of Department of Surgery and the Director of Breast Surgery of Kurume University Hospital. He has published more than 50 papers in reputed journals.

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