HISTOLOGICAL CONFIRMATION OF SENTINEL NODE STATUS USING FERROMAGNETIC TRACER

Sentinel node biopsy is a routine component of treatment planning in breast carcinoma. Various techniques for sentinel node localisation are in use, including visible dye, radio-isotopes and, more recently, ferromagnetic nanoparticle tracers. Visible dyes and radio-isotopes may signal sentinel node status during the procedure or macroscopic dissection of the node, but are not identifiable on histological sections. We report on the use of ferromagnetic tracer localisation of sentinel nodes and histological confirmation of sentinel node status through tracer concentration in the sinus macrophages that produces a haemosiderin-like pigment that is visible on routine histological sections.

Results: Twenty three consecutive sentinel node biopsies sent to the reporting laboratory were positive in 30% (7/23) for nodal metastasis (total of 50 individual nodes examined). 85% (6/7) of node positive cases were positive in the designated sentinel node, and of the positive sentinel nodes 5/6 (83%) had visible tracer pigment on histology. Overall, 78% of designated sentinel nodes (18/23) were positive for tracer on histological assessment; in the 5 tracer-negative sentinel nodes additional nodes were present in three cases and no additional nodes were positive for tracer detection on histology. One case had metastatic disease in a non-sentinel node and no tracer in this node despite tracer present in the sentinel node, representing a non-sentinel metastatic deposit.

Materials and Methods: Ferromagnetic tracer (SentiMag®) was used for ipsilateral sentinel node localisation in 23 cases of upfront sentinel node biopsy in patients with confirmed diagnosis of breast carcinoma. The tracer was injected into the breast at anaesthetic induction. Highest tracer reading nodes were marked by the surgeon and nodes were dissected at <2mm intervals for histological examination. A semi-quantitative scoring system was employed for tracer quantitation: 1+, isolated macrophages with cytoplasmic tracer uptake in node; 2+, confluent sheets of macrophages with tracer uptake in part of lymph node; 3+, confluent sheets of macrophages with tracer uptake in whole of node. Detection of metastatic disease was by routine microscopy and cytokeratin staining where required.

Conclusion: Sentinel node localisation with ferromagnetic particles provides histological confirmation of sentinel node status in a high proportion of cases and correlates with intraoperative designation of sentinel node status using probe readings. Longer interval between tracer injection and biopsy may increase the number of cases visible on histology and intensity of pigment accumulation. One case in this study showed metastasis in a non-sentinel node; histologically visible tracer may provide a model system for the understanding of drainage dynamics and metastatic site in sentinel node biopsy.