



Value of the Breast MRI in the Prone Position and 3D Printing for Locating the Breast Cancer during Surgery

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Editorial

Usually, patients received the breast MRI examinations in the prone position. However, they actually lie in a supine position during surgery. It is unclear whether the images of the breast MRI obtained in the prone position could be used to precisely locate the lesions during surgery, when patients are lying in a supine position. To address the question, we used the 3D Recon modeling software to extract the MRI images of breast cancer patients. The borders of the tumor were extracted based on the contrast of the pixel grey scale of the tumor vs. the surrounding normal tissue. We reconstructed a 3D model which mimics the entire lesions with smoothed edges. A set of coordinates with axis X and Y were set up, with nipple as the reference point. We shadowed the coordinates onto the biggest coronal section of the tumor, and marked two points: A and B. The locations of point A and B were represented by the distance between the points and the axis X and Y. Marked the points A and B on the surface of the 3D model, and filled and smoothed the 3D model. We used the Free Form Modeling Plus to print the designed 3D model with a thickness of 1 mm, using the nylon powder output from an EOS P110 printer. When the patient was lying in a supine position during surgery, we marked the point A and B on the skin of the patient based on the previously recorded location of the two points. The contour of the tumor was drawn on the skin, with the guidance of the 3D-printed model. For breast conserving surgery, we remove the breast tumor along the outer margin of the 3D-printed model. The cutting was vertically to the posterior space of breast. The macroscopic lumpectomy margin was evaluated by visual inspection. The margin of the tumor cavity was evaluated as we previously reported [1]. We used the 3D printed model to guide our BCS in five patients. All of the patients got negative margin. These results suggested that images of the breast MRI obtained in the prone position could be used to accurately locate the lesions during surgery, when the patients were lying in a supine position. Our data suggested that we could use the preoperative MRI data with patients in the prone position, to pinpoint the precise location of the tumor that relative to the nipple, so as to guide the surgery when the patient was in supine position.

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