

A QA Phantom for Ultrasound Guided Prostate Seed Implants

In ultrasound (US) guided transperineal prostate implants, the accuracy of needle placement depends on the agreement between the physical grid on the template-probe assembly and the software grid on the ultrasound display. A QA phantom is designed to quantify the agreement between the physical and software grid.

The phantom is made of an acrylic hollow block with a front and a back plate 8 cm apart. These two plates have the same grid of holes as the template plus two additional columns of 7 holes. Each of the holes in one column on the front plate is joined to the corresponding holes in the opposition column on the back plate by suture thread, hence forming 7 sets of crosses. When the phantom, mounted on the template, is scanned in water, the suture thread appears as two columns of dots on the US image showing the physical grid location.

A B&K template-stepper assembly is examined with the phantom for the discrepancy between the physical and the software grid. The discrepancy is found mainly in the lateral direction with a magnitude of 1.6 and 2.5 mm for the average and maximum deviation respectively. As there is no translational adjustment provided by the manufacturer, a rotational adjustment is made to minimize the deviation down to 1.0 (average) and 1.9 mm (maximum). Finally, the template-stepper assembly is reassembled to make a translational correction, reducing the discrepancy to 0.5 (average) and 1.1 mm (maximum).