

EP 11.11 Low-cost Gelatin Phantom for Ultrasound-Guided Core-Needle Biopsy Training

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Introduction

Ultrasound-guided core-needle biopsy is widely used in gynecologic oncology, particularly in patients with advanced, unresectable or recurrent disease, where histological confirmation supports treatment planning and molecular characterization.

Objective

To describe a training approach for ultrasound-guided core-needle biopsy in gynecologic oncology using a low-cost gelatin phantom, illustrated by a step-by-step instructional video simulating transvaginal/transrectal and transabdominal approaches according to ISUOG–ESGO technical recommendations.

Phantom preparation

The phantom was prepared with 150 g of food-grade gelatin dissolved in 1 L of hot water (15% w/v). Target lesions were embedded during the semi-solid phase, before refrigeration until complete solidification (Table1)

Biopsy simulation

Simulations were performed by an expert operator using a high-frequency endocavitary probe with a dedicated needle guide and an 18-gauge automatic biopsy gun (transvaginal/transrectal approach), and a high-frequency linear probe with a freehand 14-gauge semiautomatic tru-cut device (transabdominal approach), following ISUOG–ESGO recommendations (Figures 1, Video 1).

Results

All simulated biopsies were successfully completed. Both approaches allowed stable probe positioning and continuous in-plane needle visualization, with consistent sampling of the targets and adequate echogenic contrast and tactile resistance for repeated practice.

Conclusion

A low-cost gelatin phantom provides a practical and reproducible platform for training in ultrasound-guided core-needle biopsy in gynecologic oncology.



Figure 1. Simulated biopsy on the gelatin phantom: transvaginal/transrectal approach (top) and freehand transabdominal approach (bottom).

Step	Description
Ingredients	150 g food gelatin; 1 L hot water; food coloring (optional); pitted olives; fluid-filled condoms to simulate bowel loops.
Heat water	Heat water using a microwave (2-3 min intervals) or stovetop until near-boiling.
Dissolve gelatin	Add 150 g gelatin to hot water and stir until fully dissolved.
Add food coloring	Add 5 mL food coloring to increase opacity.
Semi-solid stage	Allow mixture to thicken; insert olives/condoms during semi-solid phase to prevent sinking.
Refrigeration	Refrigerate for ≥4 hours until fully solidified.
Adjustment	If needed, reheat briefly (10-second microwave intervals) to reposition targets.

Table 1. Phantom preparation protocol.