



Ultrasound mirror-image artifacts during transversus abdominis plane blockade

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The transversus abdominis plane (TAP) block is increasingly used to provide postoperative analgesia for open and laparoscopic abdominal surgeries. Ultrasound guidance to identify the different intermuscular planes of the abdominal wall can increase the success rate of the procedure. When anesthesiologists carry out this procedure, the most critical step is identifying the muscle layers of anterolateral abdominal wall. The desired target region of needle insertion and local anesthetic for TAP block is the plane between the transversal abdominis and internal oblique muscles. Nevertheless, this procedure may be hampered by imaging artifacts that inaccurately reproduce the anatomical structures.

A subcostal TAP block was performed in a 60-year-old female for postoperative analgesia using a 13–6 MHz linear probe (Edge; Sonosite, Bothell, WA, USA) after

laparoscopic radical hysterectomy in the postanesthesia care unit. The subcutaneous area (SC), external oblique (EO), internal oblique (IO), and transversus abdominis (TA) muscles were seen as mirror images (TA', IO', EO', and SC') below the transversalis fascia (Figure, panel A). Mirror-image artifacts partly disappeared (SC' and partial EO') when compressing the probe and the intra-abdominal contents were detectable (Figure, panel B).

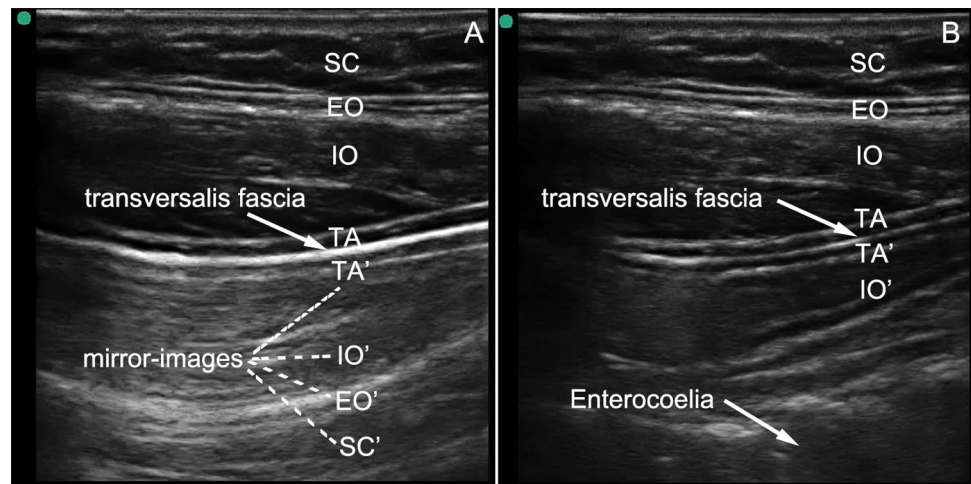
The mirror-image artifact is a reverberation artifact that arises when the ultrasound beam reflects off of a highly reflective interface, such as the diaphragm and pleura, and causes bending of the beam before returning to the transducer, which violates the key assumption that an echo returns to the transducer in a straight line after a single reflection. The interface between the transversalis fascia and artificial pneumoperitoneum acts as an acoustic mirror and duplicates abdominal muscles below the peritoneum in the patient. Anesthesiologists may change the scanning plane or the angle of the probe to expose this artifact in ambiguous cases. If not properly recognized, mirror-image artifacts can be mistaken for normal anatomic structures and can lead to harmful interventions.

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Figure A) The subcutaneous area (SC), external oblique (EO), internal oblique (IO), and transversus abdominis (TA) muscles appear as mirror images (TA', IO', EO', and SC') below the transversalis fascia during the TAP block; B) Mirror-image artifacts partly disappeared (SC' and partial EO') when compressing the probe.



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