



Injectate spread after superficial injection of thoracoabdominal nerves block through the perichondrial approach

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To the Editor,

It had been assumed that the thoracoabdominal nerves block through the perichondrial approach (TAPA) could anesthetize both the lateral cutaneous and anterior branches of the thoracoabdominal nerves.¹ Therefore, the TAPA or modified TAPA (M-TAPA) has been used in various abdominal surgeries.^{2–4} Nevertheless, we previously found in a volunteer study that TAPA/M-TAPA only anesthetized the anterior branches of the thoracoabdominal nerves. Additionally, the superficial injection (second injection) of TAPA, which is injected into the plane under the external oblique muscle at the anterior aspect of the 10th costal cartilage (I2-TAPA), had no anesthetic effect.⁵ Thus, we aimed to investigate why the I2-TAPA had no effect on the lateral cutaneous branches by administering a series of injections simulating I2-TAPA using water-based acrylic dye on four cadavers and assessing spread.

Ethical approval for this cadaveric study was provided by the Institutional Ethics Committee of Juntendo University Medical School (Tokyo, Japan; approval number: 20-304). To eliminate differences in the injectate spread due to differences in fixation method, we used four embalmed cadavers: two were embalmed in formalin, one in saturated salt solution, and one in Thiel solution. The I2-TAPA injections were performed by an experienced regional anesthesiologist (Y. O.). The cadavers were placed in the supine position. A 15–6-MHz linear probe (S-Nerve, Fujifilm Sonosite, Tokyo, Japan) was placed at the 10th costal margin and 20 mL of blue dye (primary cyan 15 mL in 100 mL water; Royal Talens, Apeldoorn, Netherlands) was injected into the plane under the external oblique muscle bilaterally. After performing the injections, the cadavers were dissected by an experienced anatomist (H. A.).

In total, eight I2-TAPA injections were performed. There was no difference in dye spread according to the fixation method. In six of the eight sites injected with blue dye, the dye did not reach the site where the lateral cutaneous branches penetrated the external oblique muscle (Figure A). In two sites injected in one cadaver, only the anterior branches of the lateral cutaneous branch of the seventh thoracic spinal nerve (T7) were faintly stained (Figure B).

The results obtained in this cadaveric injection study support the findings of our previous volunteer study.⁵ In all specimens, there was not enough spread of dye to stain all the lateral cutaneous branches. This is of great clinical importance as it shows that local anesthetic might not be sufficiently effective when administered into the plane under the external oblique muscle at the anterior aspect of the costal cartilage. We believe that the site where the lateral cutaneous branches are found is very narrow as is

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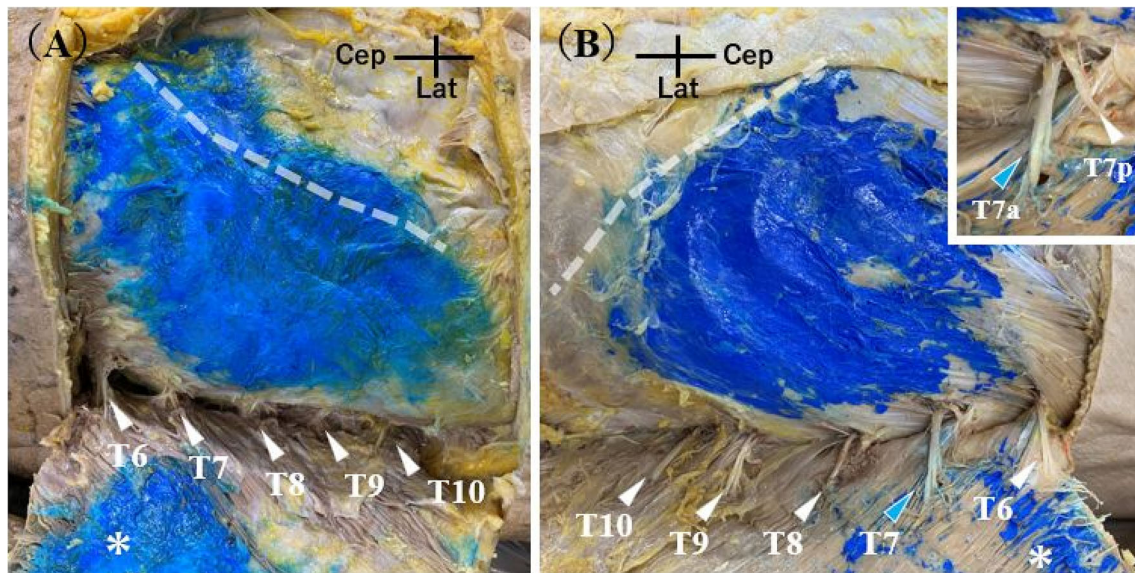


Figure Photographs showing cadaver dissection after I2-TAPA injection of 20 mL of blue dye. The external oblique muscle was cut longitudinally at the boundary between the muscle belly and the aponeurosis of external oblique muscle and then the muscle belly was flipped backward to identify the lateral cutaneous branches. (A) Cadaver 1 embalmed in formalin. Dye does not reach the lateral cutaneous branches. (B) Cadaver 2 embalmed in formalin.

close to the origin of the external oblique muscle, resulting in limited space for injectate to spread.

We previously reported novel costal and lateral external oblique muscle plane (EXOP) blocks that can anesthetize the lateral cutaneous branches of T7–T10 and T11–T12, respectively.⁵ These blocks involve local anesthetic injection into the plane superficial to the external oblique muscle at the 10th costal cartilage for costal EXOP block and at the lateral abdomen cephalad to the iliac crest and caudal to the costal margin for lateral EXOP block. The EXOP blocks efficiently anesthetize the lateral abdominal cutaneous branches as they run on the surface of the external oblique muscle, after penetrating the muscle. The analgesic effect of the abdominal wall can be enhanced by adding costal and/or lateral EXOP blocks to M-TAPA.

In conclusion, injectate spread after the superficial injection of TAPA may be localized and might not result in sufficient analgesic effect. Other regional analgesic techniques, such as EXOP blocks, should be additionally considered for the entire blockade of the lateral cutaneous branches of the thoracoabdominal nerves.

Disclosures None

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Only the anterior branch of the lateral cutaneous branch of T7 was faintly stained. The dotted lines show the costal arch. The asterisk shows the inverted external oblique muscle.

Cep = cephalad; Lat = lateral; T7a = anterior branch of the lateral cutaneous branch of the seventh thoracic spinal nerve (T7); T7p = posterior branch of the lateral cutaneous branch of T7

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