Cutaneous sensory block area after ultrasound-guided transversus abdominis plane block in volunteers

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Background
Although the ultrasound-guided transversus abdominis plane (TAP) block technique is well described, the detailed cutaneous sensory block area (CSBA) has to our knowledge not been reported. Important sensory block characteristics such as inter- and intra-individual variability are unknown.

The aim of this study was to map and determine inter- as well as intra-individual reliability in the CSBA after ultrasound-guided TAP blocks.

Results
Figure 1 shows the CSBA location. The size of the CSBA as well as inter-and intra-individual reliability are shown in table 1. At T90 the location of the CSBA was predominantly posterolateral with the largest area overlying the lateral part of the iliac crest and upper thigh. Only a minor proportion of the CSBA was located medially and never crossing the midline. Inter-and intra-individual reliability was unacceptable.

<table>
<thead>
<tr>
<th>Cold hypoesthesia</th>
<th>Diff. T 90 day 1 vs. 2</th>
<th>Percentual</th>
<th>Cronbach’s alpha</th>
<th>ICC single measures</th>
<th>ICC average measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area T 90 day 1</td>
<td>Area T 90 day 2</td>
<td>0.436</td>
<td>0.400</td>
<td>0.250</td>
<td></td>
</tr>
<tr>
<td>321 (216 - 564)</td>
<td>387 (181 - 604)</td>
<td>77 (22 - 382)</td>
<td>21.2 (7.0 - 176.4)</td>
<td>0.436</td>
<td>0.400</td>
</tr>
</tbody>
</table>

Table 1: Reliability and consistency of TAP block 2 days apart assessed by sensory mapping

Cronbach’s alpha internal consistency

α = 0.9
Excellent

0.8 ≤ α < 0.9
Good

0.7 ≤ α < 0.8
Acceptable

0.6 ≤ α < 0.7
Questionable

0.5 ≤ α ≤ 0.6
Poor

0.4 ≤ α
Unacceptable

Methods
After Ethics Committee approval and informed consent 16 healthy volunteers were randomly assigned to receive a unilateral TAP block on either the right or the left side in a double blind placebo-controlled study.

The TAP was identified in the mid-axillary line between the 12th rib and the iliac crest. Using in plane technique the needle tip was positioned in the plane approximately 2 cm anterior to the posterior arcuateus of the internal oblique and transversus abdominis muscles. 20 ml of ropivacaine 7.5 mg/ml was injected unilaterally and 20 ml of isotonic saline on the contralateral side. After a minimum of 48 hours the procedure was repeated identically in each volunteer. Primary outcomes were CSBA 90 minutes after the block at day one and two. Sensory block area was determined using a 5°C cool roller and recorded as either cold/cool not cold. Data is expressed as medians [range]. Block area size T90 was calculated in cm² and inter- and intra-individual block area reliability analyzed using interclass correlation, calculated as average of all measures and single measures interclass correlation (two-way mixed, absolute agreement).

Conclusion
The CSBA after a TAP block showed a more posterolateral location and with a much smaller medial component than previously suggested in the literature. Furthermore, we demonstrated that the CSBA is highly variable both within and between individuals.