A cadaveric study of needle insertion at LI11

INTRODUCTION
Adequate needling at LI11 (Quchi) can be achieved by perpendicular angulation of the needle so that the needle tip enters the extensor carpi radialis longus (ECRL) muscle, which corresponds to the dermatomes and myotomes of the fifth and sixth cervical spinal segments. Although indirect methods using modern technology can be used to examine the variable effects of different depths of insertion at a given acupuncture point, direct observation can be achieved by cadaveric dissection. In this study, we directly observed the anatomical relationships relevant to acupuncture needling at LI11, in order to inform the standardisation of needling depth at this particular point.

METHODS
For this study, a routine dissection was performed on six Korean cadavers (table 1) with no known pathology of the forearm; the cadavers were fixed with 10% formalin in the Department of Anatomy, School of Medicine, Jeju National University. A stainless steel needle with a length of 30 mm and a diameter of 0.6 mm (Whashin Industrial Co, Ltd, Incheon, Republic of Korea) was inserted by an acupuncture practitioner (HJO; a Korean oriental medical doctor, qualified since 1997) at LI11 bilaterally, as previously described. The angle of needle insertion was perpendicular to the surface of the skin, and the depth of insertion was 20 mm. After placing the needles, the region around LI11 was exposed. Skin, subcutaneous tissue, fascia superficialis, and the muscles around the elbow were dissected. During each dissection, the structures adjacent to the path of the needle were observed.

RESULTS
One of the 12 needles perforated the cephalic vein (figure 1A). Ten needles were inserted into the ECRL (figure 1B) and reached the depth of the brachialis muscle and the radial nerve (figure 1C), or crossed behind the tendon of the

Table 1 Information on the cadavers used in this study

<table>
<thead>
<tr>
<th>No.</th>
<th>Age (years)</th>
<th>Sex</th>
<th>Cause of death</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>75</td>
<td>Female</td>
<td>Bladder cancer</td>
</tr>
<tr>
<td>2</td>
<td>85</td>
<td>Male</td>
<td>Sepsis</td>
</tr>
<tr>
<td>3</td>
<td>61</td>
<td>Male</td>
<td>Laryngeal cancer</td>
</tr>
<tr>
<td>4</td>
<td>65</td>
<td>Male</td>
<td>Lung cancer</td>
</tr>
<tr>
<td>5</td>
<td>46</td>
<td>Male</td>
<td>Chronic renal failure</td>
</tr>
<tr>
<td>6</td>
<td>53</td>
<td>Female</td>
<td>Cholangiocarcinoma</td>
</tr>
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</table>
biceps brachii muscle in the antecubital fossa. One of the needles was inserted into the origin of the brachioradialis muscle. There was no contact with the radial nerve.

**DISCUSSION**

It is important for practitioners to consider the depth of needling when practising acupuncture. LI11 has a close association with the cephalic vein, the radial artery and its branches, the superficial branch of the radial nerve and the ECRL.1 Penetration of the cephalic vein is arguably less likely to occur in clinical practice than in this cadaveric study, because the lateral epicondyle of the humerus and the cephalic vein can be easily identified by physical examination in the living state. However, the relationship between LI11 and its associated anatomical structures should be kept in mind when needling at this point.

There have been occasional reports of significant adverse events associated with acupuncture. Acupuncture needles probably impale peripheral nerves fairly frequently, but rarely do harm. The most common sites at which such contact occurs are likely to be the radial nerve at LI4, the sciatic nerve at GB30 or BL54, the common fibular nerve at GB34, and the median nerve at PC6.1 Theoretically the radial nerve could be encountered during acupuncture at LI11, but peripheral injury has not been reported to the best of the authors’ knowledge. There is also no evidence of significant anatomical variation in the vascular supply or innervation of the area surrounding the lateral epicondyle.4 Nevertheless, it should be remembered that more subtle variations may occur in any structure around the acupuncture point LI11.

This study has some limitations. Tissue depth is not directly comparable between cadavers and living humans due to factors such as dehydration and tissue shrinkage. In patients, this is further compounded by the inconsistent reporting of safe needling depth, as measured in different subject groups using different measuring tools. This is partially related to ethnicity, gender, age, body size, the presence of underlying disease, and the needling technique.2 3

Based on our existing knowledge of LI11, proper needling should involve perpendicular angulation of the needle to target the ECRL. Although there was no evidence of significant (only subtle) interindividual variation around the acupuncture point LI11, it should be remembered that anatomical knowledge should be carefully considered when needling at any point.

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**Contributors** All authors participated in the study design. JK was responsible for obtaining and analysing the data. HJO was responsible for performing the acupuncture. S-PY was responsible for

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**Figure 1** Photographs demonstrating the topographical relationships of anatomical structures around an acupuncture needle inserted at LI11 (arrow within dotted circle). LI11 is located at the radial end of the antecubital crease, halfway between the biceps tendon and the lateral epicondyle. (A) Needle perforating the cephalic vein (indicated by arrowheads). (B) Needle inserted into the extensor carpi radialis longus (ECRL) muscle. (C) Fully inserted needle demonstrating lack of any contact with the radial nerve (RN). BR, brachioradialis muscle; MN, median nerve.
analysing the data and drafting the manuscript.

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**REFERENCES**

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