

## Use of X-rays to study acupuncture points of the hand: implications for education

### BACKGROUND

Location of traditional acupuncture points has historically been based on surface anatomical landmarks. In recent years, Western medical education has utilised X-rays<sup>1</sup> and CT<sup>2</sup> of cadavers to enable students to better comprehend human anatomy, with positive responses. In a previous study, we explored the potential use of ultrasonography for the location of anatomical points.<sup>3</sup> The aim of the present study was to use X-rays to examine the relationship between acupuncture needles and bony structures and to consider the addition of bony landmarks as a means to locate acupuncture points.

### PROCEDURES

This study was conducted on a human cadaveric hand. A 25×40 mm disposable stainless steel acupuncture needle was inserted at PC8 (*Laogong*), SI3 (*Houxi*) and TE4 (*Yangchi*), based on an acupuncture text.<sup>4</sup> PC8 is situated within the interosseous muscle space between the second and third metacarpal bones, next to the metacarpophalangeal joint (MCPJ). After making a loose fist, SI3 is found proximal to the fifth MCPJ, at the end of the transverse crease of the hypothenar muscle, on the dividing line between the red and white flesh. TE4 is located on the transverse crease of the dorsum of the wrist during extension, in the depression lateral to the tendon of extensor digitorum communis. Three insertions were performed at each acupuncture point to ensure consistency of needling location. X-rays were performed using a mini C-arm (Orthoscan mobile DI). Posteroanterior (PA) and lateral views of the cadaveric

hand were obtained after needle insertion.

### FINDINGS

In the PA view, the needle tip at PC8 lay in the described location, radial to the neck of the third metacarpal bone (figure 1A) following all three insertions. The tip of the needle at SI3 was at the diaphysis of the fourth metacarpal in both the PA and lateral views (figure 1B) in all three cases. However, following needle insertion based on the anatomical landmarks for TE4, as described above, final needle location was noted to be more variable. After the first insertion, the needle tip came to lie at the midcarpal joint distal to the lunotriquetral joint (figure 2A). On the second attempt, the needle tip was nearer the ulnar side, at the radiocarpal joint, proximal to the lunotriquetral joint (figure 2B). After the third attempt, the needle tip was nearer the radial side, at the midcarpal joint over the scapholunate joint (figure 2C). The lateral X-ray view demonstrated the needle in the wrist area (figure 2D).

### COMMENT

This study found that the location of acupuncture points using bony landmarks was mostly accurate, as seen at PC8, where needles were found to be consistently placed on all three X-rays. For SI3, which uses both bony (proximal to the fifth MCPJ) and surface landmarks (transverse crease of the hypothenar muscle), the X-ray showed some variation in depth of insertion, consistent with the recommended range (1.7–3.3 cm). Despite this fact, in all three X-rays, the needle tip was consistently observed at the diaphysis of the fourth metacarpal. The largest variance in needle position was seen following insertion at TE4, which used surface landmarks only. A large variance was noted in the final position of the needle, which may at least partially reflect the fact that multiple transverse dorsal wrist creases could be seen on the specimen.

### SUMMARY

Overall, the present study suggests that the use of surface landmarks may result in large variance in the final location of the needle, especially in areas where the landmarks can span over a wide area. Bony landmarks arguably produce the most consistent results in locating acupuncture points. Further studies are needed to determine whether potential variance in needle location results in any difference in the effectiveness of acupuncture treatment. Moreover, the use of bony landmarks may be limited in areas with deeper bone structures, for example, in the pelvic region.<sup>1</sup>

### IMPLICATIONS

The present study also demonstrates the potential usefulness of radiological imaging for teaching acupuncture to students. Acupuncture points are often located in depressions between bones and tissues. The final location of the needle remains unknown to the students after it has been inserted. X-rays of the local area can be acquired within seconds and have the potential to give students immediate feedback on the anatomical relationship between the path of the needle and final location of its tip. These benefits would need to be balanced against the risk of radiation exposure to the subject. Future acupuncture textbooks could also include X-ray images to further aid students in understanding the anatomy.

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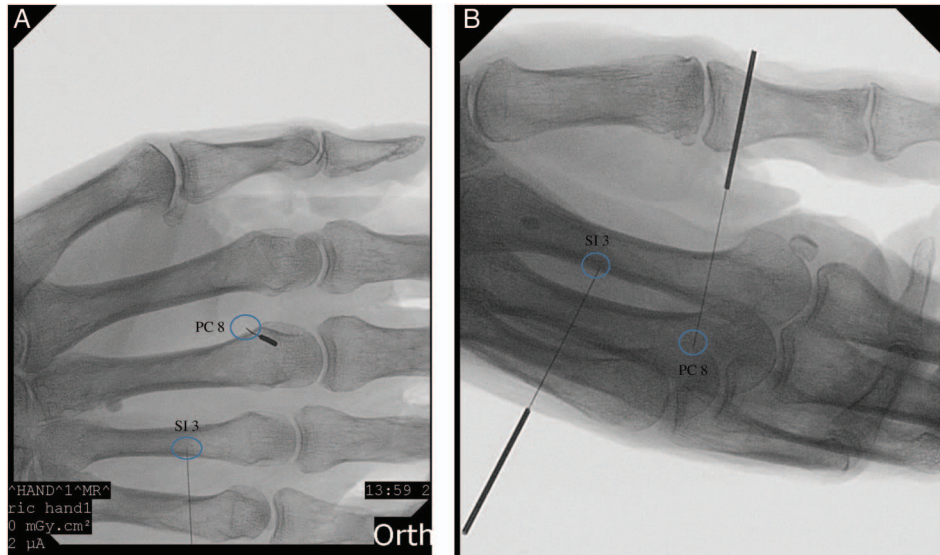
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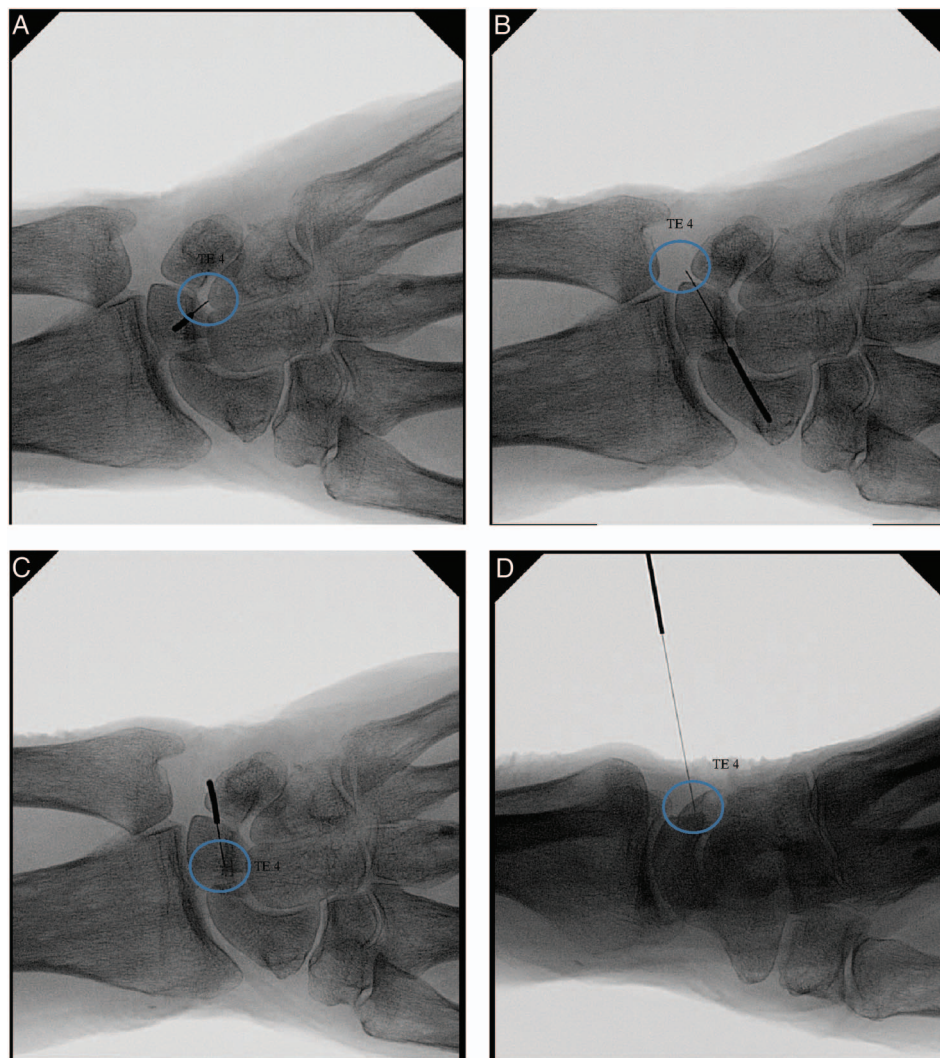
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**Contributors** MQHL, TC and SCT conceived the study. ML performed the



**Figure 1** Posterolateral (A) and lateral (B) X-ray views of acupuncture needles inserted at PC8 and SI3. Images are representative of three different insertions per point.



**Figure 2** Posterolateral X-ray views of an acupuncture needle inserted at TE4 on three different occasions (A, B and C) with variable location of the tip. A single lateral X-ray view (D) is representative of the same three insertions.

data analysis. TC performed the acupuncture. AL performed the X-rays. All authors were involved in the writing of the manuscript and approved the final version accepted for publication.

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