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CONNECTING OUR GLOBAL HAND SURGERY FAMILY

HAND THERAPY
ADVANCED SCOPE OF HAND THERAPY PRACTICE

TIPS AND TECHNIQUES
A SCHEME TO PROJECT THE RADIAL NERVE ON THE HUMERUS

MESSAGES FROM THE IFSSH EXECUTIVE | MEMBER SOCIETY NEWS

THE INTERNATIONAL FEDERATION OF SOCIETIES FOR SURGERY OF THE HAND
THE INTERNATIONAL FEDERATION OF SOCIETIES FOR HAND THERAPY

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A scheme to project the radial nerve on the humerus

Fig. 1. Pablo Picasso "Girl on the ball (1905).

The frequency of iatrogenic damage to the radial nerve in the treatment of humeral shaft fractures is estimated to be 10–20% (Hak D.J., 2009). The radial nerve can get damaged during closed reduction, plating, nailing and external fixation of humerus fractures.
To prevent this complication, the surgeon should avoid contact with the radial nerve and if that is impossible, the radial nerve should be identified beforehand and preserved carefully during operative procedures.

There are many schemes to visualise the radial nerve on the humerus. However, most of them have a similar disadvantage – the use of an absolute fixed modular from any landmarks. These values differ significantly among different authors.
For example, the distance between the lateral epicondyle and the radial nerve in different studies vary from 8 cm to 15,8 cm (Lau T.W. et al., 2007; Chou P. et al. 2008; Ozden H. et al., 2009; Artico M. et al., 2009). Certainly, 15 cm for a large athlete and a young girl is not the same (Fig. 1). Some surgeons suggested that the differences in radial projections may vary in different races. (Chou P. et al. 2008; Ozden H. et al., 2009).

In our opinion, the anatomical position of the radial nerve is primarily tied to the length of the humerus of the individual. This hypothesis was confirmed by studying the topography and anatomical position of the radial nerve in patients during operations, in volunteers during ultrasound examination, and in anatomical dissections (Zolotov A.S. et al., 2010, 2015). According to the results of these studies, the radial nerve crosses the posterior surface of the humerus at a point which divides the measured length of the humerus into two unequal segments: the upper 45% and the lower 55% (Fig. 2). On the lateral surface, the radial nerve crosses the humerus above the lateral epicondyle at a distance equal to 32% of the measured length of the humerus (Fig. 3).
The distance from the acromial process of the scapula to the olecranon was taken as the measured length of the humerus.

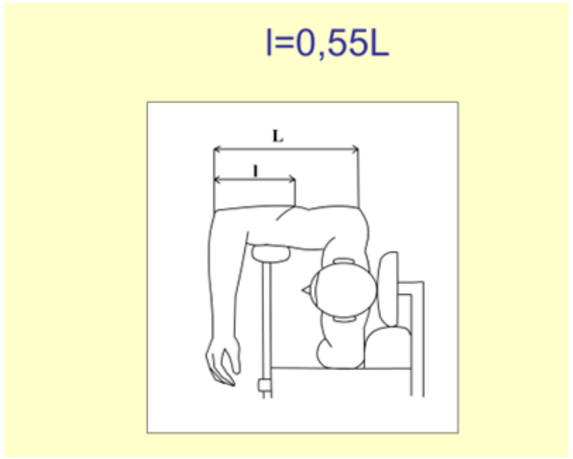

Fig. 2. The radial nerve on the posterior surface of the humerus. "L" - the distance from the "acromial angle" to the olecranon; "l" - the distance from the olecranon to the radial nerve along the posterior surface.

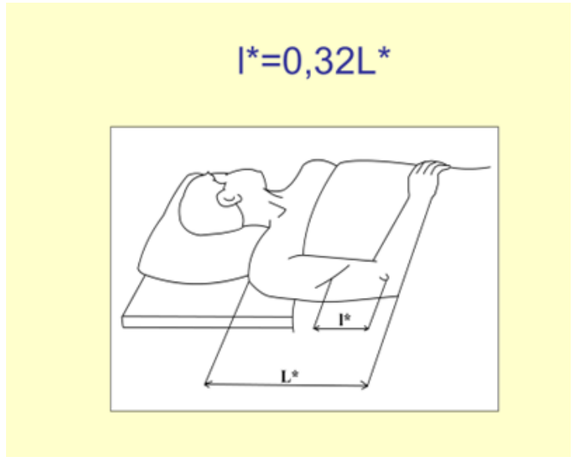

*Fig. 3. The radial nerve on the lateral surface of the humerus. "L *" - the distance from the "acromial angle" to the olecranon; "l *" - the distance from the lateral epicondyle to the radial nerve along the lateral surface.*

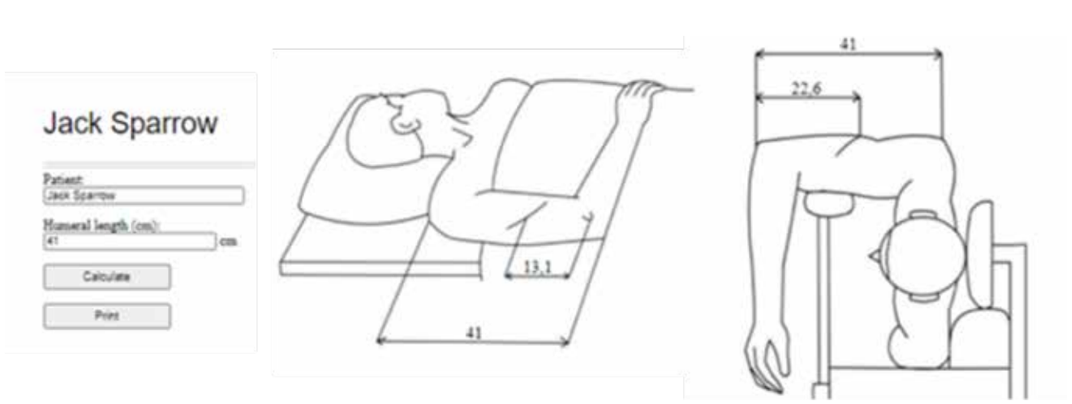

Fig. 4. In the left part of the window, there is a box for entering the measured length of the patient's humerus in cm, the "calculate" button, and the "print" button.

Taking into account this constant anatomical pattern in our studies, a computer program was developed which is available online: http://nerve.drzolotov.com
When the program starts, a window with text and two pictures appears on the computer display (Fig. 4).

In the left part of the window, there is a box for entering the measured length of the patient's humerus in cm, the "calculate" button, and the "print" button. The value in centimeter (cm), obtained by measuring the humerus length, is entered in the appropriate box. By “clicking” on the “calculate” button, the figures show the distances in cm from the olecranon to the radial nerve on the posterior surface, and from the lateral epicondyle to the radial nerve on the lateral surface. The data obtained can be transferred onto the patient's skin by marking the anatomical course of the radial nerve with a surgical marker.

By “clicking” on the “print” button, we get drawings with data in a paper version. A personal smartphone can replace the print version of the picture.

We have been using this radial nerve diagram for a long time and consider it useful and predictable for patients with different anthropometric data, various constitutions, sex, age, and races.

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