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1 ANATOMY OF THE TENAR BRANCH OF THE MEDIAN NERVE: THERAPEUTIC IMPLICATIONS IN OSTEOARTHRITIS OF THE TRAPEZOMETACARPAL JOINT

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Introduction: The most usual methods of surgical treatment of osteoarthritis of the trapezometacarpal joint include trapezectomy, implant arthroplasty and total joint replacement. However, for chronic wrist pain, denervation has been proposed successfully. For osteoarthritis of the trapezometacarpal joint, this procedure is not commonly performed. When one looks at the classic anatomical descriptions of the wrist innervation, it seems that there is a missing link: the thumb branch of the median nerve is the only nerve of the wrist for which no articular branches are clearly defined. The aim of this study is to complete the few anatomical descriptions of the trapezometacarpal joint innervation with microdissections of the thumb branch of the median nerve

Materials and methods: Ten wrist and hand specimens from fresh cadavers were dissected by the same operator under loupe and microscope magnification (3.5–12X). Eight of these specimens were injected with red–coloured latex in the radial and ulnar arteries. The thenar branch was identified at its origin from the median nerve and followed in the thenar muscles. All the divisions were identified and followed to their terminal branches. Drawings and photographs of the observations were performed during the dissections.

Results: The distribution pattern of the thenar branch of the median nerve was slightly variable. The thenar branch divided in all cases in at least three branches, one each to the superficial head of the flexor pollicis brevis, abductor and opponens pollicis muscles. In all but one specimen, the branch to the opponens pollicis muscle passed under or into its proximal origin to spread to the ulnar and palmar side of the trapezium. In the remaining specimen this branch terminates in the opponens pollicis muscle. Anastomoses between the "articular" branch of the thenar branch and a terminal branch of the lateral antebrachial cutaneous nerve was evidenced in one specimen. The accessory thenar branch was identified in 7 cases, supplying the superficial head of the flexor pollicis brevis muscle.

Conclusion: Our results evidence a clear participation of the thenar branch in the innervation of the trapezometacarpal joint. The lack of knowledge of this anatomical feature may explain the poor results obtained with denervation of this joint.

2 Subchondral bone mineral density patterns representing the loading history of the wrist joint

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Indication: In vivo measurements of changes in force transmission patterns in the wrist are of utmost importance to evaluating the biomechanical behaviour of this complex joint over time under physiological and pathological conditions. In order to establish the feasibility of a non-invasive method for measuring these long-term force transmission patterns through the wrist joint, 18 cadaver wrists were examined with CT absorptiometry.

Methods: By measuring the bone density patterns of the distal radius, distal ulna and the proximal carpal row (scaphoid, lunate triquetrum), effects of long-term force transmission are established. By comparing the Hounsfield units of bone and the Hounsfield units of containers with the aqueous solutions of dipotassium phosphate (K₂HPO₄), a soluble equivalent to hydroxyapatite, the bone density is quantified.

Results: Wrists with pathology of the proximal carpal row or distal radius show a bone density pattern in which the scaphoid fossa and lunate fossa of the distal radius contain a centroid in the middle of it and in which an equally distributed bone density throughout the joint surface is seen. The distal ulna and the proximal carpal row show a

similar pattern. Wrists with pathology of the proximal carpal row or distal radius show a shift of bone density towards the scaphoid fossa, especially towards the angles of the joint indicating a shift of force transmission towards the scaphoid fossa. The lunate fossa becomes less dense as well as the distal ulna. On the surface of the scaphoid and the lunate a similar pattern is seen.

Conclusion: Bone density patterns of the distal radius, distal ulna and proximal carpal row of the wrist joint are important in evaluating the long-term force transmission through the wrist joint under physiological and pathological conditions. Therefore this method can be used in vivo. Due to the fact that bone density differs under different loading conditions this method can be used to determine force transmission patterns before and after wrist surgery.

3 Cross-reinnervation after brachial plexus injury and repair in an experimental study in rats

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Indications: Cross-reinnervation after nerve injury or repair results in involuntary co-contractions of muscles. This phenomenon is typically seen after spontaneous recovery of obstetric brachial plexus injury, but is also seen after adequate repair, but it is more common to differentiate between true co-contractions and muscle imbalance. The purpose of this study was to create a model to study this phenomenon and its pathogenesis, and to investigate the possible effect of nerve graft length.

Materials and methods: Sixty male Wistar rats, weighing 300 g, were divided in 6 groups of 10 rats each. Groups 1 and 2 were a model to study spontaneous recovery, in Group 1 the lower 4/5 and, in group 2 the upper 4/5 of the upper trunk was sharply divided and left to regenerate. The remaining groups were used to study the effects of repair, in Group 3 a short 0.5 cm nerve graft was used to connect C5 to C6 and C6 to C7, Group 4 was purposeful cross-innervation, C5 to C6 and C6 to C8. In Group 5 C5 was nerve grafted to the posterior division of the upper trunk, and C6 to the anterior division of upper trunk, in Group 6 the roots 5 and 6 were grafted to the axillary and musculocutaneous nerves, respectively. After 6 months the results were evaluated. Behavioral evaluation consisted of the grooming test, which was videotaped and scored form 1-6 according to the movement of the forepaw. Functional analysis of the contractibility of the biceps brachii and the deltoid muscles was done using the Grass force transducer. The dissected muscles were histologically examined for muscle quality and the percentage of fast and slow twitch fibers. Two rats from each group were retrogradely labelled by injecting the deltoid and biceps muscles with the fluorescent retrograde tracers Procion yellow and Fast blue, respectively, to study the presence of double labelled motoneurons in the ventral horn of the spinal cord at C5 and 6 level.

Results: The five first groups presented double labeled neurons as evidence of cross-reinnervation, and stimulation of the C5and C6 resulted in co-contractions of the deltoid and the biceps. However, in Group 6 no double labelling was found, which may be attributed to the longer nerve graft length. The finalized results will be presented.

Conclusions: The results prove the existence of cross-reinnervation, e.g. one motoneuron can send axons to several muscles resulting in uncontrollable co-contractions. The effect of nerve graft length and repair type will be discussed.

4 THE TREATMENT OF HANDS IN APERT SYNDROME

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Clinical problem: The hand in Apert syndrome is characterised by acromelia, synbrachydactaly and brachydactaly of the thumb with radial clinodactyly. The treatment of these hands is challenging. Among the problems encountered after surgery are clinodactyly in fingers and insufficient web reconstruction in all webs.

Materials and methods: At our department we performed a retrospective study to evaluate the effectiveness of different treatment options with regard to the aforementioned problems. From 1974 until 2000, 48 hands were treated in 24 patients with Apert Syndrome. The group consisted of patients with Type I deformity (separated thumb and little finger) (n = 7); patients with Type II deformity (only thumb separated) (n = 9) and patients with Type III deformity (all fingers together) (n = 8). For the reconstruction of the