

Short Report

An unusual ulnar nerve-median nerve communicating branch

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ABSTRACT

Branching of the ulnar nerve distal to the origin of the dorsal cutaneous branch was investigated in 25 hands in one of which an anatomical variation was observed. This finding may be of importance in the evaluation of certain entrapment phenomena of the ulnar nerve or unexplained sensory loss after trauma or surgical intervention in that particular area.

INTRODUCTION

Ulnar nerve compression phenomena in the lower arm, without a clear anatomical explanation, still give rise to difficulty for clinicians dealing with hand problems. The authors therefore dissected 25 specimens in order to study the anatomical course of the ulnar nerve in the region of the wrist and hand in relation to possible sites of compression. A variation for which no description in the literature could be found was observed. In the same specimen a Kaplan anastomosis was also noted (Kaplan, 1963; Wulle, 1988). This anomaly was found in only 1 hand. If ulnar nerve variations occur, the anomalies are usually at its origin or in the course of its distal branches. Consideration here is confined to the area distal to the origin of the dorsal cutaneous branch of the nerve.

MATERIALS AND METHODS

A total of 25 formalin-embalmed hands were dissected from normal dissection room material. We first exposed the antebrachial fascia and then carefully removed it. The ulnar nerve was exposed by moving the flexor carpi ulnaris muscle medially, by removing the flexor retinaculum and by unroofing Guyon's canal. We carefully avoided disturbing the contents. The dissection was aided by the use of a $\times 6$ – $\times 40$ operating microscope and microsurgical instruments.

Coloured paper was employed to enhance the difference between the ulnar nerve variation and the surrounding tissues in the photographs.

RESULTS

Figure 1 summarises the results of the dissection. Approximately 5 cm proximal to the ulnar styloid process the anomalous branch had its origin from the lateral side of the ulnar nerve (Figs 1, 2). Approximately 1 cm distal to its origin it gave off its first branch. This branch crossed the ulnar artery and pursued a course just lateral to it. The branch entered the hand between the flexor retinaculum and the palmar fascia. Just distal to the flexor retinaculum it merged with the median nerve (Fig. 1).

Along its course in the arm the main branch gave off 3 twigs to the ulnar artery, the so-called Henle branches (Henle, 1868; Kaplan, 1965) (Fig. 1). The main branch followed the course of the ulnar nerve, situated between the ulnar nerve and artery, into Guyon's canal where it accompanied the superficial branch of the nerve. Within Guyon's canal the branch crossed the ulnar artery and ran further distally on the lateral side of the artery, between the palmar fascia and the superficial flexor tendons. Just distal to Guyon's canal it merged with a branch that originated from the superficial ramus of the ulnar nerve, eventually joining the median nerve (Figs 1, 3, 4). Before merging, the

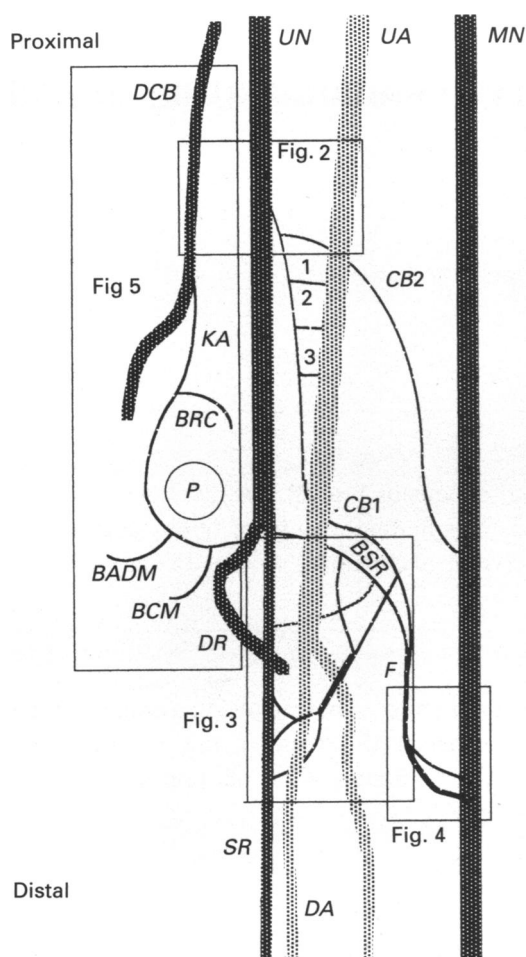


Fig. 1. Diagrammatic reconstruction of the anatomical variation of the ulnar nerve. UN, ulnar nerve; UA, ulnar artery; MN, median nerve; DCB, dorsal cutaneous branch of ulnar nerve; 1,2,3, Henle branches; CB1, communicating branch 1; CB2, communicating branch 2; KA, Kaplan anastomosis; BRC, branch to radiocarpal joint; P, pisiform bone; BADM, branch to abductor digiti minimi; BCM, branch to fifth carpometacarpal joint; BSR, branch of superficial ramus of ulnar nerve; F, fusion between the BSR and the BS1; DR, deep ramus of ulnar nerve; SR, superficial ramus of ulnar nerve; DA, digital artery.

above mentioned nerve structures both gave off small branches which intertwined. Further distally this structure bifurcated around the digital artery to the fourth finger and ultimately joined the superficial ramus of the ulnar nerve (Fig. 1). A second small branch which sprang from the branch of the superficial ramus of the ulnar nerve ran back to this ramus (Figs 1, 3, 4).

The Kaplan anastomosis was a branch which arose from the dorsal cutaneous branch of the ulnar nerve approximately 2.5 cm proximal to the ulnar styloid process. Along its course it gave off 3 branches. The first emerged just proximal to the ulnar styloid process and ran towards the radiocarpal joint. During its course towards the palmar aspect of the hand, the

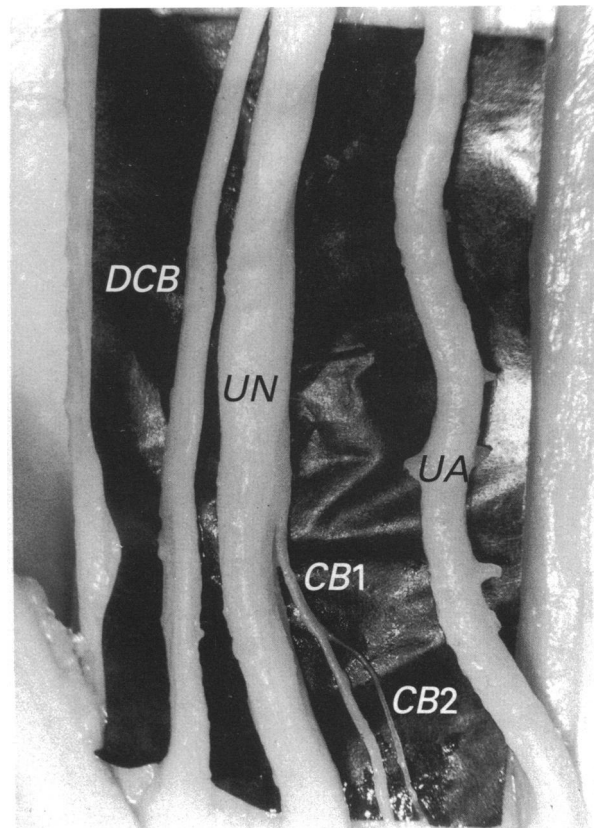


Fig. 2. Origin of the ulnar nerve–median nerve communicating branch. UN, ulnar nerve; UA, ulnar artery; CB1, communicating branch 1; CB2, communicating branch 2. DCB, dorsal cutaneous branch of ulnar nerve.

Kaplan anastomosis penetrated the tendon of abductor digiti minimi. It was between this muscle and the deep ramus of the ulnar nerve that the Kaplan anastomosis gave off 2 branches. It is of interest that eventually the Kaplan anastomosis merged with the deep ramus of the ulnar nerve. The branch closest to the abductor digiti minimi muscle ran towards this muscle while the second branch, closest to the deep ramus of the ulnar nerve, ran towards the fifth carpometacarpal joint (Figs 1, 5). In contrast to the findings of Kaplan (1965) and Wulle (1988), this Kaplan anastomosis merged with the deep ramus of the ulnar nerve instead of the superficial ramus.

DISCUSSION

Communicating branches between the ulnar and median nerves have been described throughout anatomical history. A communicating branch was first recorded by Berettini (1741) in his anatomical drawings of 1741. Gehwolf (1921), Hirasawa (1931), Meals (1983) and Sunderland (1978) described communicating branches. All these branches arose within

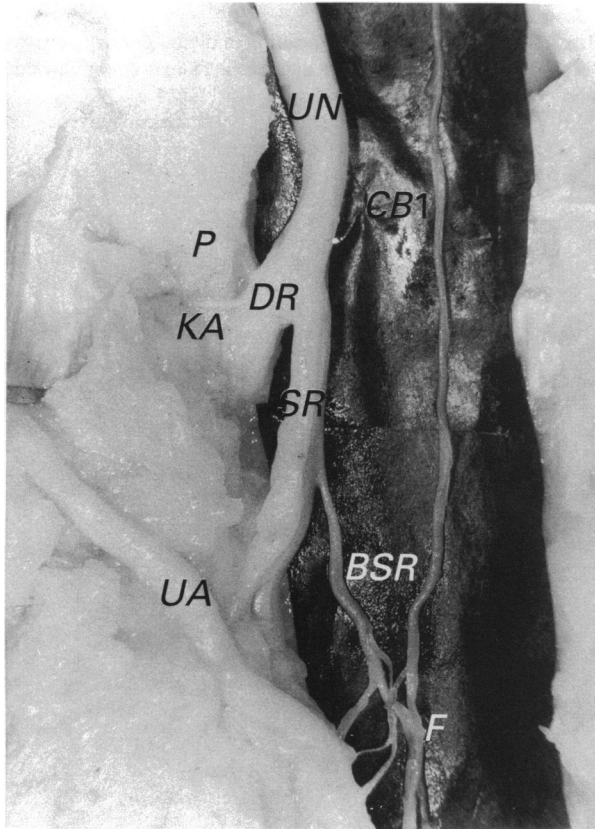


Fig. 3. The fusion between the ulnar nerve–median nerve communicating branch and the branch of the superficial ramus of the ulnar nerve. UN, ulnar nerve. UA, ulnar artery, moved medially; SR, superficial ramus of ulnar nerve. DR, deep ramus of ulnar nerve. BSR, branch of superficial ramus of ulnar nerve. CBI, communicating branch number 1. P, pisiform bone. KA, Kaplan anastomosis. F, fusion between the BSR and the CBI.

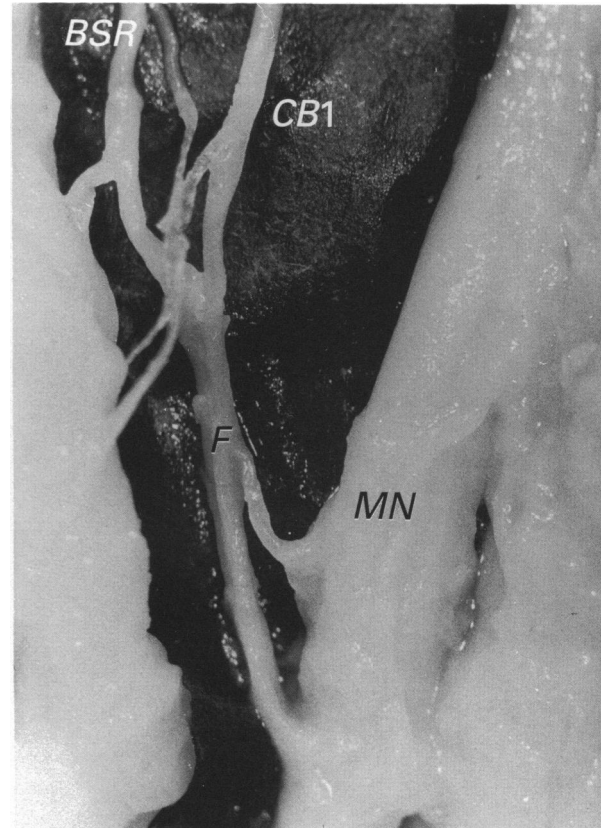


Fig. 4. The fused branch joins the median nerve. BSR, branch of superficial ramus of ulnar nerve; CBI, communicating branch 1; F, fusion between the BSR and the CBI; MN, median nerve.

the hand itself. An ulnar nerve–median nerve communicating branch arising from the ulnar nerve within the forearm has not been recorded before. Ulnar nerve–median nerve sensory communicating branches are at risk during surgery in the hand and forearm, especially with carpal tunnel release in the conventional way (May & Rosen, 1981) or with endoscopic ring finger flexor tendon surgery, Dupuytren’s fasciectomy and mobilisation of neurovascular island flaps (Meals & Shaner, 1983).

A Kaplan anastomosis is at risk during surgery involving the pisiform bone or the tendon of flexor carpi ulnaris, or in fractures of the pisiform bone (Kaplan, 1963). An anatomical variation such as the ulnar nerve–median nerve communicating branch or a Kaplan anastomosis must therefore be taken into account when inexplicable pain or sensory disturbances occur after surgery or trauma (Kaplan, 1963; Meals & Shaner, 1983).

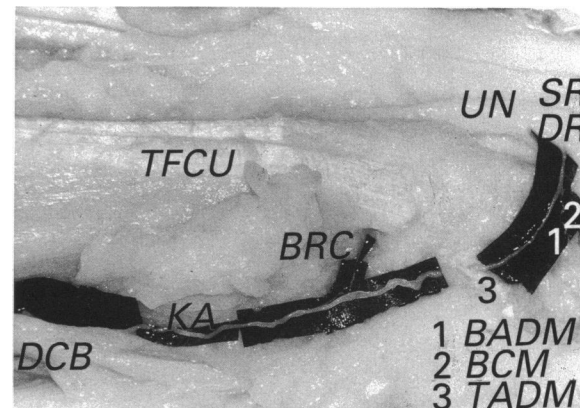


Fig. 5. Kaplan anastomosis. DCB, dorsal cutaneous branch of ulnar nerve; KA, Kaplan anastomosis; BRC, branch to radiocarpal joint; TFCU, tendon of flexor carpi ulnaris; 1, branch to abductor digiti minimi; 2, branch to fifth carpometacarpal joint; 3, tendon of abductor digiti minimi. DR, deep ramus of ulnar nerve; SR, superficial ramus of ulnar nerve; UN, ulnar nerve.

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