

DESCRIPTION OF A NEW MINIMALLY INVASIVE APPROACH OF THE MEDIAN NERVE IN THE CARPAL TUNNEL

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INTRODUCTION

Carpal tunnel syndrome (CTS), caused by compression of the median nerve at the wrist, is considered to be the most common entrapment neuropathy.

Pulsed Radiofrequency has been used in the last decade for a variety of neuropathic peripheral conditions. It has been developed with the goal of providing reduction in pain from the use of electrical fields, without producing lesions by heat. Several prospective studies have demonstrated its efficacy in relieving pain in various pain conditions.

We describe the interventional technique for treating symptoms of median nerve entrapment neuropathy at the carpal tunnel, with this percutaneous, minimally invasive approach of the median nerve in the wrist.

EQUIPMENT

A newly developed prototype of Radiofrequency generator which enabled us to deliver bipolar pulsed radiofrequency (Cosman Radiofrequency Generator RFG-1A), was created (Cosman Medical & Ricardo Ruiz-López) in March 2007. This device was employed for the first 19 cases. The remaining 6 cases in the series published elsewhere were treated with a Cosman Four-Electrode Radiofrequency Generator (G4).

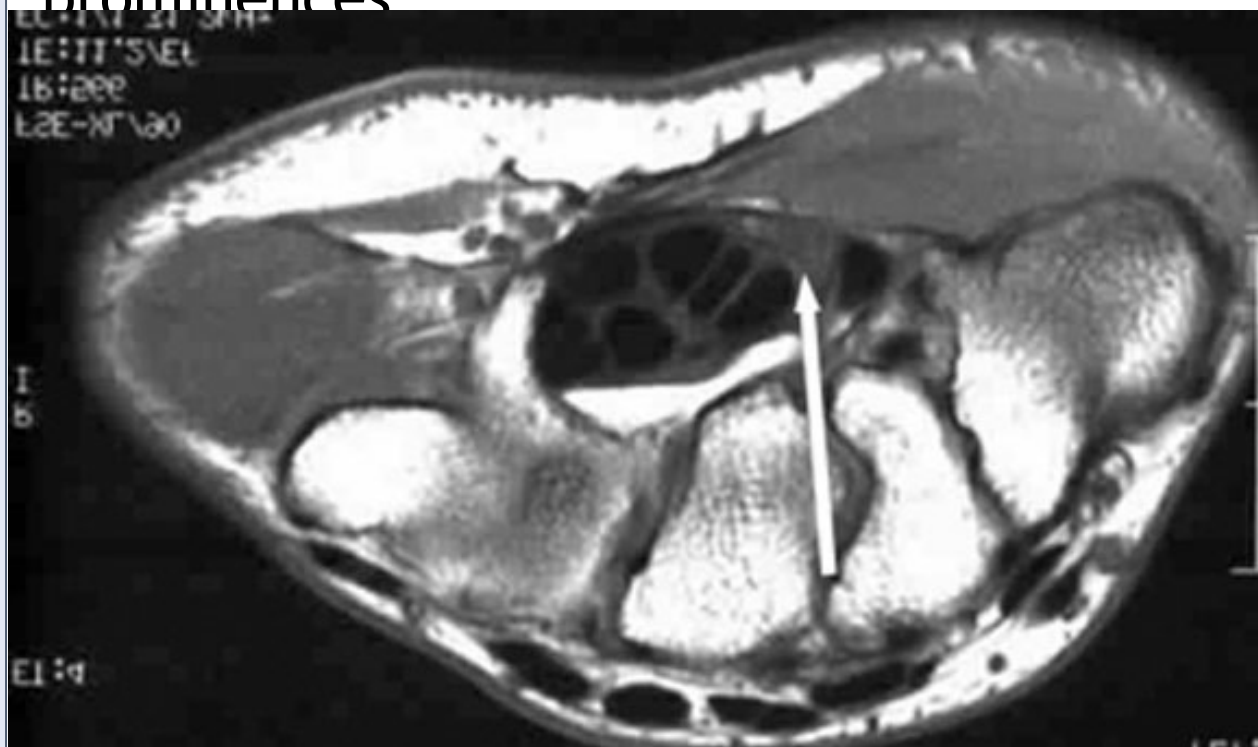
Two radiofrequency cannulae of 10 cm with 10 mm active tip were used. The procedures were performed under fluoroscopy control with a Siemens C-arm.



ANATOMICAL LANDMARKS

Transverse carpal ligament, is a band of fibers which runs between hamate & pisiform medially, to scaphoid & trapezium laterally, and forms a fibrous sheath which contains the carpal tunnel.

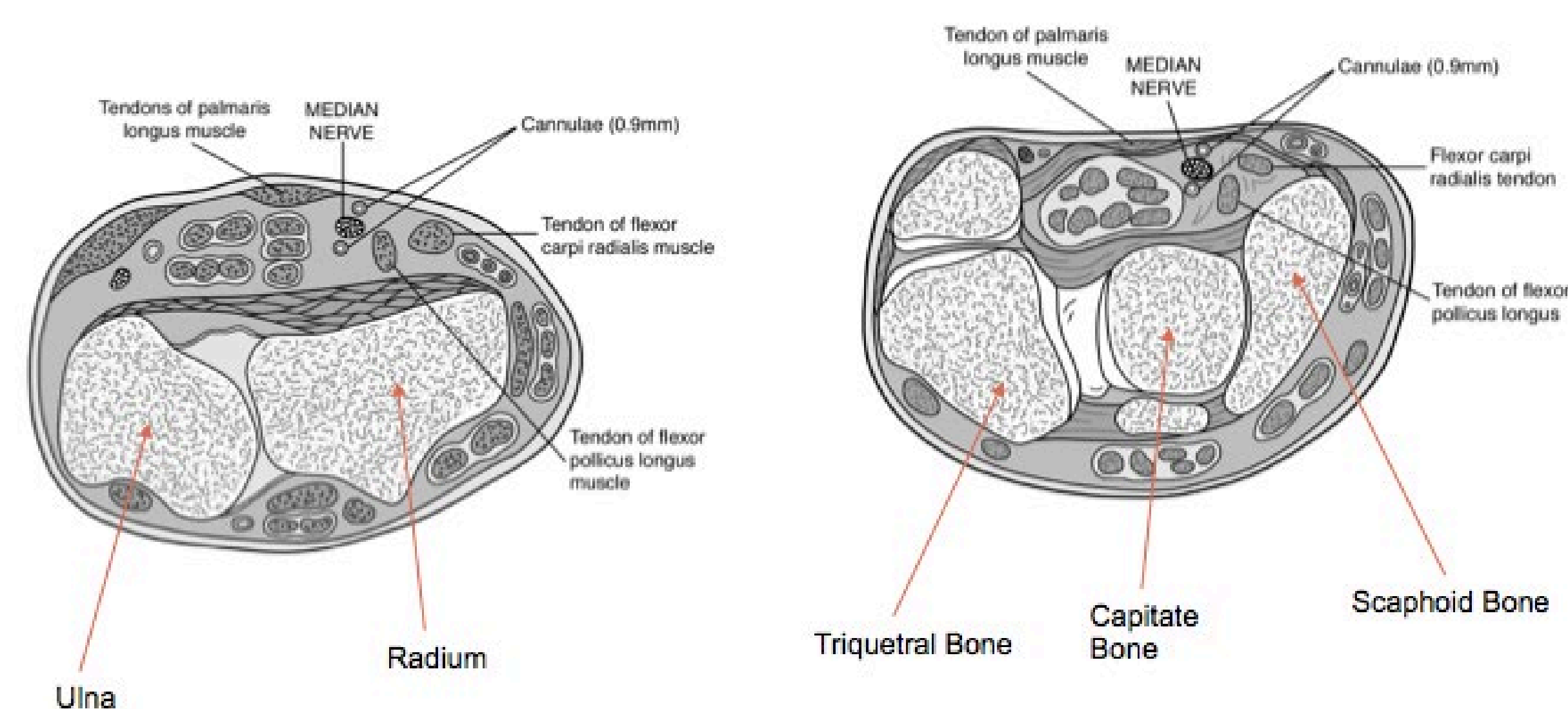
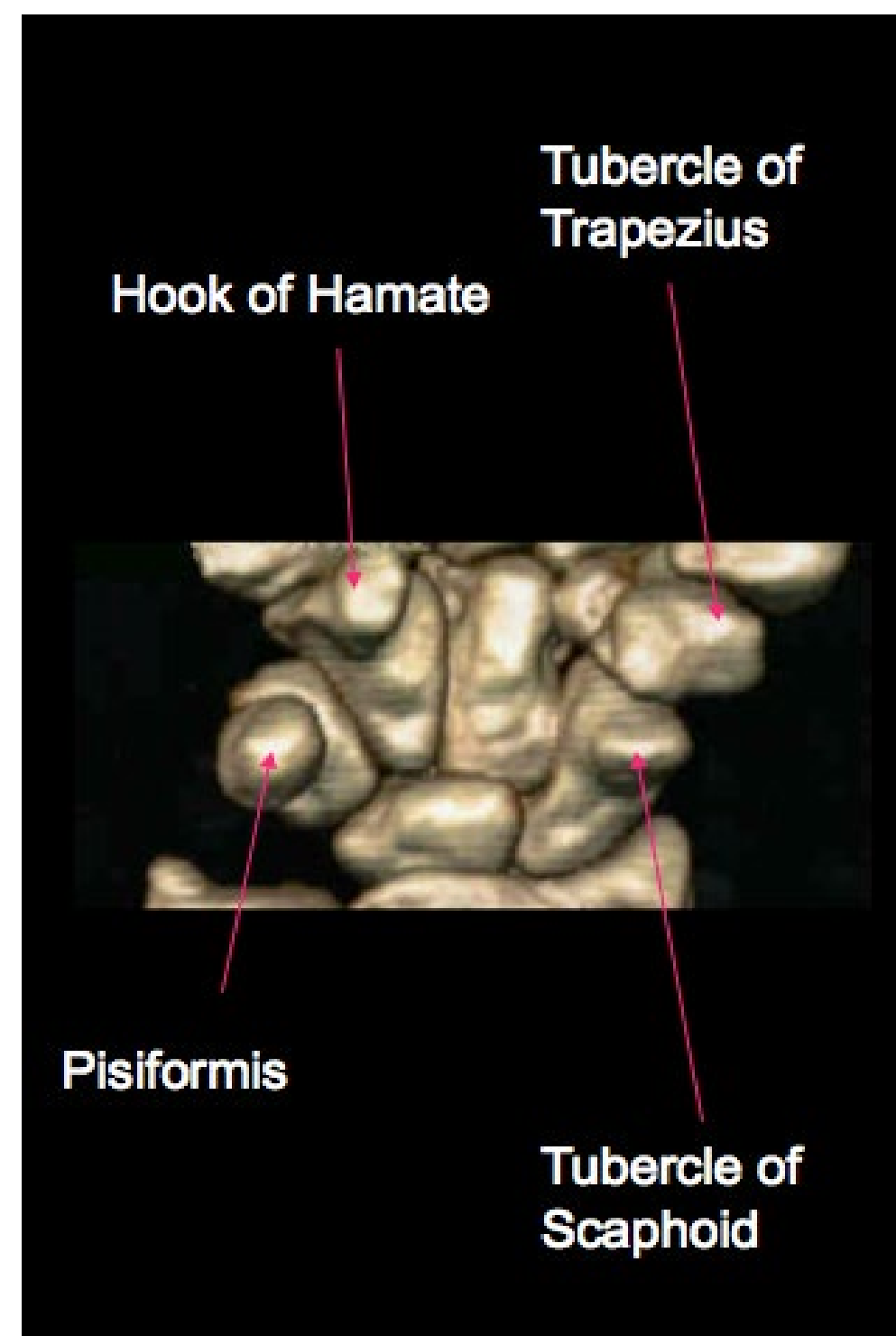
The carpal tunnel lies deep to palmaris longus and is defined by 4 bony prominences



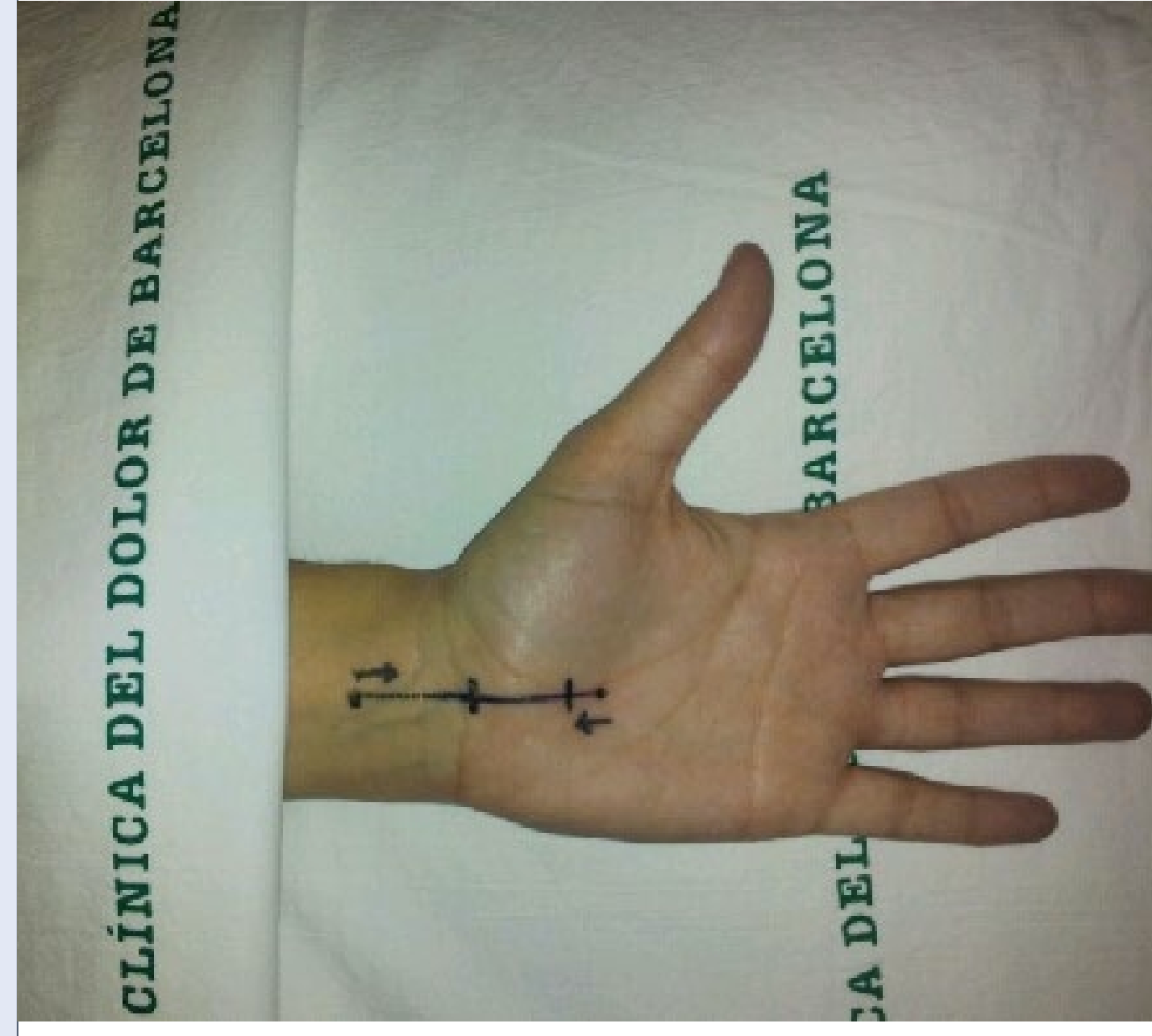
Carpal Tunnel holds median nerve and flexor tendons (FPL, FDS, FDP)

Motor branch of median nerve arises under or just distal to flexor retinaculum, and reaches hypothenar muscles and the lateral 2 lumbricals. Numerous variations in the branching have been described.

Sensory branches innervate lateral three and 1/2 digits & palm of the hand.



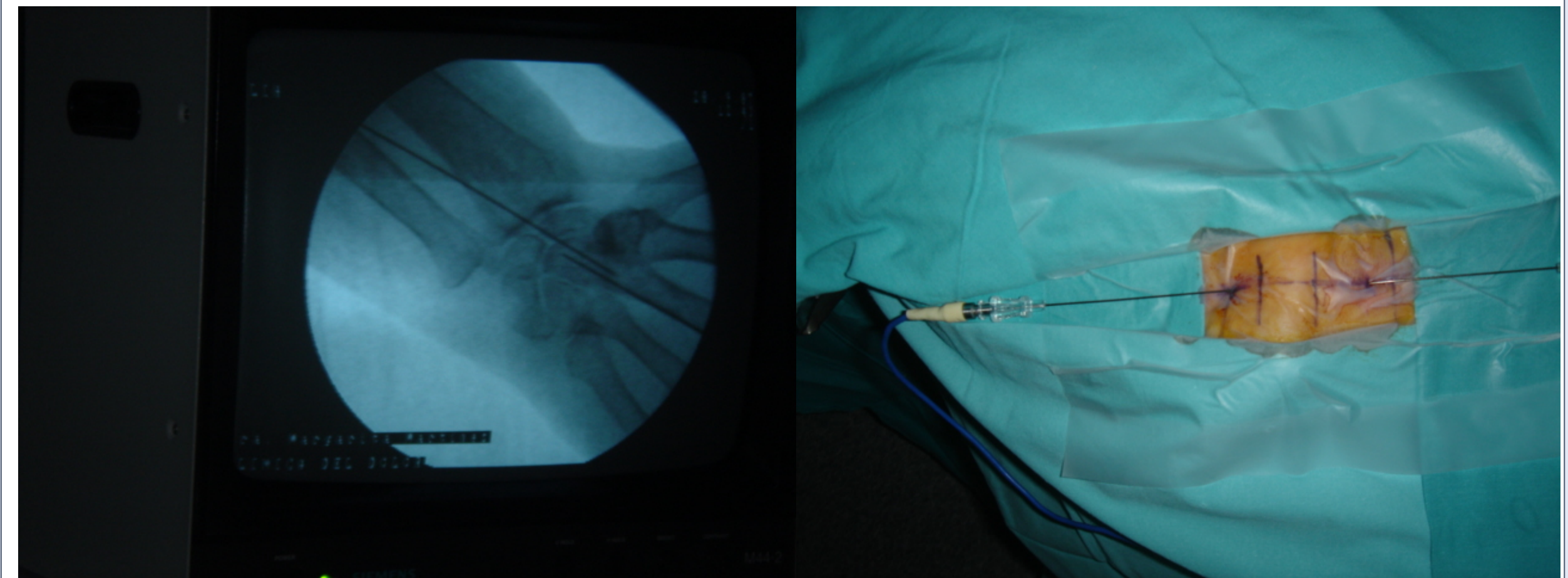
SURGICAL PROCEDURE



Following the application of standard monitors with the patient supine on the procedure table, mild sedative agent is administered through an IV line. Hand was placed in the supine position with a rolled towel under the carpal region to enhance dorsal flexion of the wrist. Skin is prepared with iodine and draped. Anatomical landmarks are used to place the cannulae.

After anesthetizing skin entry point with 2% lidocaine, a proximal cannula is inserted between the tendons of palmaris longus muscle and flexor carpi radialis muscle, and directed towards the carpal tunnel in a slightly oblique direction, to the ventral surface of the median nerve, to place its tip in the vicinity of the nerve, tangential to it, within the carpal tunnel at the level of the capital bone.

A distal cannula is inserted at the junction of the tenar and hypotenar eminences, and its tip is directed proximally towards the carpal tunnel region, slightly deeper than the proximal cannula, on the dorsal surface of the median nerve, at the level of the capital bone. Fluoroscopy is used for cannulae guidance. Both tips are placed thus parallel to the median nerve, in the radial half of the os capitis of the carpal region, one at each aspect of the median nerve: ventral-radial, and dorsal-cubital. This disposition of the needle tips enhances the activity of an electromagnetic field surrounding the median nerve.



After checking the situation of the needle tips, 50 Hz and 2 Hz stimulation was applied to each cannula. If the stimulation did not elicit a sensory response at 50 Hz or contraction of finger flexors at 2 Hz, the cannulae were repositioned. If a positive response was obtained at a voltage less than 0.5 v for the sensory and motor components of the nerve, the radiofrequency generator was switched to the pulsed RF mode, and 14-20 minutes pulsed radiofrequency, 10 msec, 2-4 Hz, 45-50 volt, is applied through each cannula, simultaneously. Therefore, total stimulation time is doubled for each procedure.

Before removing the cannulae, 10 mg of triamcinolone + 1-2 ml of 0,25 bupivacaine are injected.

Patient is instructed to avoid wrist movements or weight carrying for the following 24 hours.

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