

Surgery technical

Technical note: How to spare the pronator quadratus during MIPO of distal radius fractures by using a mini-volar plate

Conservation du carré pronateur par abord mini-invasif et mini-plaque dans les fractures de l'extrémité distale du radius : note technique

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Received 12 June 2013; received in revised form 11 November 2013; accepted 18 December 2013

Available online 25 February 2014

Abstract

Few surgical approaches have been described that spare the pronator quadratus (PQ) during the treatment of distal radius fractures. The PQ supplies blood to the distal radial epiphysis, helps stabilize the distal radio-ulnar joint, and contributes 21% of pronation strength. Sparing the PQ should result in faster bone union and shorter recovery time. To achieve these goals, we currently use a minimally-invasive volar procedure using a specially-designed short plate (APTUS Wrist 2.5 XS, Medartis[®]). A 20 mm incision is made over the fracture line as described by Henry. The PQ is dissected and then detached from the volar side of the radius. Forceps are used to slide the plate under the muscle. The screws are locked after carefully elevating the distal edge of the PQ. A preliminary study of distal radius fracture fixation by this technique was performed in 31 patients. The scar was 26 mm in length and the duration of surgery was 34 minutes on average. Patients wore a removable brace for 15 days, and passive wrist motion without loading was allowed during the first week. Functional recovery was faster than seen in previously published series. An average Quick DASH score of 10 was achieved by the 10th post-operative week. Although there are no contraindications to this technique, the quality of the reduction is more important than the scar size and desire to spare the PQ. Never hesitate to convert the incision to a classical Henry approach if technical difficulties arise. Our technique seems best suited to patients with high functional demands. It is currently being evaluated in a prospective series.

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Keywords: Fracture; MIPO; Locked plate; Wrist; Osteoporosis

Résumé

Quelques abords respectant le carré pronateur (CP) ont été décrits dans le traitement des fractures du poignet. Afin de diminuer la durée de récupération postopératoire, nous présentons une technique avec abord palmaire « mini-invasif », en utilisant une plaque courte dédiée : APTUS Wrist 2,5 XS (Medartis[®]). Un abord de 25 mm selon Henry est centré sur le trait de fracture. La dissection expose le CP. L'implant est glissé sous le muscle après l'avoir détaché de la face antérieure du radius. Les vis sont verrouillées en relevant légèrement le bord distal du CP. Une orthèse amovible est portée 15 jours à titre antalgique avec autorisation de mobilisation passive sans résistance dès la première semaine. Trente et une ostéosynthèses ont été réalisées avec une cicatrice moyenne de 26 mm et une durée opératoire de 34 min en moyenne. La récupération fonctionnelle est plus rapide que dans les séries publiées et le Quick DASH est de 10 à la 10^e semaine. Le CP vascularise l'épiphyse radiale distale, participe à la stabilisation de l'articulation radio-ulnaire distale, il est responsable de 21 % de la force de pronation. Sa conservation semble permettre une consolidation plus rapide et une récupération accélérée. Il n'y a pas de contre-indication à la technique, mais la qualité de la réduction prime sur la taille de la cicatrice et sur la conservation du CP : il ne faut pas hésiter à convertir en voie de Henry classique en cas de difficulté technique. La technique semble adaptée aux patients à forte demande fonctionnelle, elle est en cours d'évaluation dans une série prospective.

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Mots clés : Fracture ; Mini-invasif ; Plaque verrouillée ; Poignet ; Ostéoporose

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1. Introduction

The availability of locking volar plates has helped reduce secondary displacements that occur with pin fixation [1]. Volar plates provide satisfactory functional results that are maintained in the medium term [1–3]. We also want to reduce the post-operative recovery time. This may be accomplished by sparing the pronator quadratus (PQ) [4–6]. Here, we describe a surgical technique that uses a minimally-invasive volar approach and a specially-designed short volar plate.

2. Surgical technique

The patient is placed supine, with the injured limb on an arm board. We then verify that the fracture can be reduced easily with external maneuvers. A tourniquet is placed at the base of the arm. A volar locking plate is used for this procedure (APTUS Wrist 2.5, Medartis[®], Basel, Switzerland). The plate is positioned on the skin. Under fluoroscopy, the plate is centered mediolaterally within the radius, and its height adjusted relative to the fracture line and joint line. The plate outline is marked on the skin to help define the limits of the incision: starting at 5 mm proximal to the distal end of the plate and then going 20 mm in the proximal direction in the forearm axis (Fig. 1).

The skin incision (Henry approach) is made with a scalpel over the flexor carpi radialis tendon and deepened to open the sheath. The tendon is reflected medially to protect the median nerve and its palmar branch. After opening the antebrachial fascia, the digital flexor tendons are reflected. The skin is elastic enough that the fracture can be exposed with two Senn-Miller retractors or two small Farabeuf retractors (Fig. 2). The inferior edge of the pronator quadratus is identified. It is important to run a small bone rasp under the fleshy part to detach it from the



Fig. 1. Skin landmarks: the plate is precisely positioned using fluoroscopy. A 20-mm long incision is then drawn over the flexor carpi radialis tendon on an outline of the plate. This incision can be extended if the exposure is not satisfactory.

Repères cutanés : la plaque est positionnée précisément à l'aide de l'amplificateur de brillance. Une incision de 20 mm sur le fléchisseur radial du carpe est ensuite dessinée dans l'empreinte de la plaque. Cette incision pourra être élargie si l'exposition n'est pas satisfaisante.

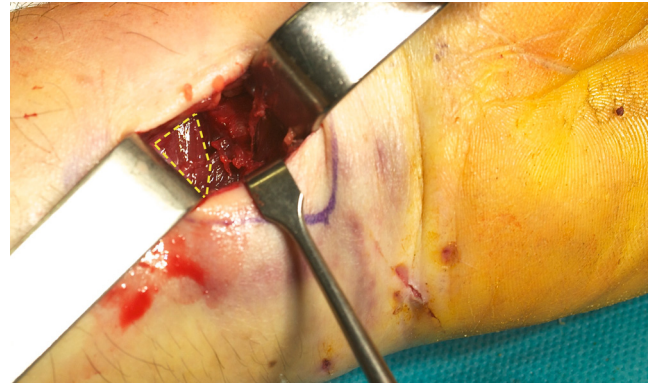


Fig. 2. The pronator quadratus (yellow dotted line) is exposed by reflecting the flexor tendons.

Le carré pronateur (pointillés jaunes) est exposé en réclinant la masse des fléchisseurs.

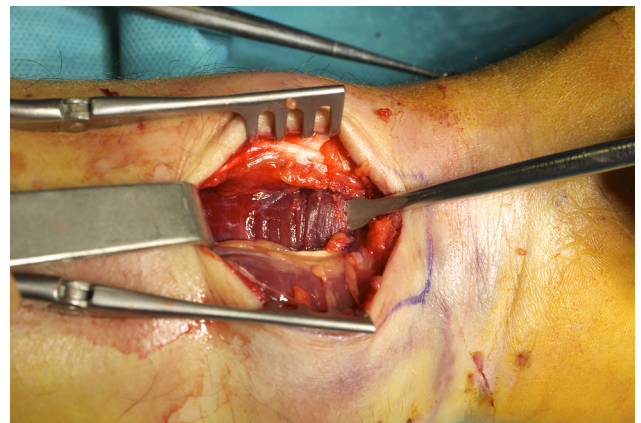


Fig. 3. A bone rasp is passed under the muscle to separate it from the anterior cortex of the radius.

Une rugine est glissée sous le muscle, afin de le détacher de la face antérieure du radius.

anterior side of the radius (Fig. 3). The fracture is then reduced using either internal or external maneuvers.

Adson-Brown tissue forceps are used to slide the plate under the muscle. The plate is inserted from distal to proximal and its position verified by fluoroscopy (Fig. 4). Once the plate is



Fig. 4. Adson-Brown forceps are used to slide the plate under the muscle belly. La plaque est manipulée par une pincette d'Adson-Brown. Elle est glissée sous le corps musculaire.

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