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Original article

Denervation of the wrist with two surgical incisions. Is it effective? A review of 33 patients with an average of 41 months' follow-up

*La dénervation du poignet par 2 voies d'abord est-elle efficace ?
À propos de 33 patients revus à 41 mois de recul moyen*

S. Delclaux, F. Elia, C. Bouvet, C. Aprédoaei, M. Rongièrès, P. Mansat*

Département d'orthopédie et traumatologie-urgences mains hôpital Pierre-Paul-Riquet, hôpital universitaire de Toulouse, place du Dr-Baylac, 31059 Toulouse cedex, France

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ABSTRACT

The goal of wrist denervation is to decrease pain at the wrist, whether caused by an intra- or extra-articular problem or even when the reason for the pain is unknown. It is an alternative to partial or total arthrodesis and proximal row carpectomy. Our hypothesis was that wrist denervation with a two-incision technique was a reliable and efficient way to treat painful degenerative wrists. Thirty-three patients, 48 years old on average, were included in this study. Indications were scapholunate advanced collapse (SLAC) in 18 cases, scaphoid nonunion advanced collapse (SNAC) in 10, distal radius fracture sequelae with advanced radiocarpal osteoarthritis in 4, and post-traumatic ulnocarpal impingement in 1 case. At 41 months' follow-up (12–161), there was a 75% reduction in pain levels, decreasing from 7.1 to 1.8 on a visual analog scale (VAS). There were no modifications related to wrist range of motion or grip strength. The QuickDASH averaged 23 points (5 to 70). Radiographic evaluation showed progression of intracarpal degeneration in 6 patients. All but 2 patients returned to their previous work. Persistent dysesthesia was observed in 7 patients; it resolved in 3 cases and persisted in 4. One patient developed complex regional pain syndrome (CRPS). A midcarpal arthrodesis with scaphoidectomy was performed in one patient because of disabling pain 5 months after surgery. Wrist denervation with a two-incision technique for post-traumatic osteoarthritis led to satisfactory results in 75% of cases with reduction in pain, preservation of range of motion and grip strength. However, this technique does not stop the progression of osteoarthritis. It can be discussed as a therapeutic alternative to proximal row carpectomy or intracarpal arthrodesis to treat degenerative painful wrists.

Type of study/level of evidence: Therapeutic IV.

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R É S U M É

Le but d'une dénervation du poignet est de diminuer la symptomatologie douloureuse. Il s'agit d'une alternative à l'arthrodèse partielle ou totale, ou à la résection de la rangée proximale du carpe. Notre hypothèse était que la dénervation du poignet réalisée par 2 voies d'abord permet d'obtenir des résultats satisfaisants et reproductibles dans le traitement des poignets dégénératifs. Trente-trois patients, d'âge moyen 48 ans, ont été inclus dans cette étude. Les indications étaient des séquelles de lésion du ligament scapho-lunaire (SLAC wrist) dans 18 cas, de pseudarthrose du scaphoïde (SNAC wrist) dans 10 cas, de fracture articulaire de l'extrémité distale du radius dans 4 cas, et une arthrose par conflit ulnocarpien dans 1 cas. À 41 mois de recul moyen (12–161), l'amélioration de la douleur était de 75 %, l'intensité passant de 7,1 à 1,8 sur une échelle visuelle analogique (EVA). La mobilité du poignet et la force de la poigne n'étaient pas modifiées. Le score QuickDASH était de 23 points (5 à 70). L'évaluation

* Corresponding author.

E-mail addresses: mansat.p@chu-toulouse.fr, pierre.mansat@univ-tlse3.fr (P. Mansat).

radiographique montrait une progression des lésions dégénératives intracarpéennes dans 6 cas. Tous les patients, sauf 2, ont pu reprendre leur activité professionnelle. Des dysesthésies persistaient chez 7 patients ; 3 étaient transitoires et 4 ont persisté. Un patient a développé un syndrome douloureux régional complexe. Une arthrolyse médiocarpéenne avec scaphoïdectomie a été nécessaire chez un patient pour persistance des douleurs 5 mois après la dénervation. Dans le cadre de poignet dégénératif, la dénervation du poignet réalisée par 2 voies d'abord permet d'obtenir des résultats satisfaisants dans 75 % des cas, avec diminution de l'intensité des douleurs et conservation des amplitudes articulaires et de la force de la poigne. Cependant elle ne stoppe pas l'évolution de l'arthrose. Cette technique peut être discutée par rapport aux autres options thérapeutiques classiques : résection de la rangée proximale du carpe, et arthrolyse partielle ou totale du carpe.

Type d'étude/Niveau d'évidence. – Thérapeutique, IV.

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1. Introduction

The goal of wrist denervation is to decrease pain at the wrist, whether caused by an intra- or extra-articular problem or even when the reason for the pain is unknown [1]. It is an alternative therapeutic option to intracarpal procedures such as partial or total arthrodesis [2] and proximal row carpectomy (PRC) [3]. The original surgical technique used eight approaches to resect all 10 articular nerve branches responsible for pain transmission [1]. An anatomic study performed by Dubert et al. [4] showed that wrist denervation could be performed through only three surgical approaches. Berger et al. [5] proposed a single posterior approach to resect the posterior interosseous nerve (PIN) and anterior interosseous nerve (AIN). However, this technique has a risk of pronator quadratus muscle denervation [6].

Wrist denervation through two approaches has been used in our department for many years. Our hypothesis was that this surgical technique was a reliable and efficient way to treat painful degenerative wrists.

2. Material and methods

2.1. Patients

A retrospective study was conducted in our Orthopedic and Traumatology Department at a University Hospital. Institutional review board approval was not required for this study. All patients were informed about the use of their personal data for this study. Included were all patients who underwent isolated wrist denervation through two approaches between 1995 and 2010, with at least 1 year of follow-up. Excluded were all patients who underwent wrist denervation with associated procedures, or with a different surgical technique, or with less than 1 year of follow-up.

Between January 1995 and May 2010, 33 patients who were 48 years old on average (range 23 to 68 years) fulfilled the inclusion criteria and were included in this study. The dominant side was involved in 17 patients. Fifteen patients were manual laborers.

Indications for wrist denervation were scapholunate advanced collapse (SLAC) in 18 cases and scaphoid nonunion advanced collapse (SNAC) in 10. In 4 cases, wrist denervation was performed for distal radius fracture sequelae with advanced radiocarpal osteoarthritis. Finally, wrist denervation was performed in one case for post-traumatic ulnocarpal impingement.

3. Methods

Preoperative pain assessed with a visual analog scale (VAS) was 7.1 on average (4 to 10). Preoperative range of motion assessed

with a goniometer found wrist flexion of 51.6° (30° to 70°) and wrist extension of 50.8° (20° to 70°). Preoperative wrist strength measured with a Jamar[®] dynamometer was 33 kg (13 to 50 kg).

Preoperative posteroanterior and lateral views of the wrist with CT-exam was available for all patients. Degenerative changes of the carpus were classified according to Watson and Ballet [7] and Alnot [8] (Table 1).

3.1. Surgical technique

Two different hand surgeons performed all procedures under regional anesthesia. A tourniquet at the arm was used in all cases.

A dorsal skin incision was performed between the 3rd and 4th extensor compartments. Subcutaneous dissection was performed to the radial styloid to resect all articular nerves branches of the superficial branch of the radial nerve and the lateral cutaneous nerve of the forearm. Then dissection was directed to the ulnar head to resect all articular nerves branches of the dorsal branch of the ulnar nerve and posterior cutaneous nerve of the forearm. Depth of soft tissue dissection was then limited at the extensor retinaculum level dorsally. The extensor retinaculum was then transected between the 3rd and 4th extensor compartment to locate the terminal branch of the PIN and to resect it on 3 cm. The extensor retinaculum was then repaired.

A volar arcuate incision was then performed parallel to the radial artery and parallel to the distal radius articular surface. Dissection around the radial artery was then performed to identify the pair of venae comitantes, which were coagulated and resected 3 to 4 cm. The distal part of the pronator quadratus muscle was then identified. It was incised transversely distally and a periosteal elevator was used to remove the undersurface of the muscle from the bone, blindly transecting the terminal articular branches of the AIN. This volar approach did not include deflection of the palmar branch of median nerve.

Patients were immobilized in a splint for 2 weeks, and then were allowed to move their wrist. No therapy was prescribed.

3.2. Evaluation methods

All patient records were reviewed retrospectively. The mean follow-up was 41 months (range, 12 to 161 months). Clinical evaluation was based on the VAS pain rating. Pain at rest and during exercise was also specified. Wrist range of motion in flexion/extension was measured with a goniometer. Grip strength was measured with a Jamar[®] dynamometer. Functional evaluation of the upper limb was performed using the QuickDASH questionnaire [9]. At the last follow-up, posteroanterior and lateral views of the wrist were taken to look for progression of intracarpal degenerative lesions.

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