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Original article

## Long-term outcomes of proximal row carpectomy: A series of 62 cases

### *Devenir à long terme de la résection de la rangée proximale du carpe. À propos d'une série de 62 cas*

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#### ABSTRACT

The aim of this study was to determine and analyze the functional and radiographic outcomes after proximal row carpectomy (PRC). We hypothesized that this surgery could restore wrist mobility and function in case of radiocarpal osteoarthritis or severe carpal trauma. Sixty-two patients who had undergone PRC were included in this study: 44 patients with wrist osteoarthritis (11 SNAC, 24 SLAC, 3 Kienböck's disease, 6 other) and 18 patients with severe carpal trauma. Each patient underwent clinical (pain, range of motion, grip strength, functional scores) and radiographic evaluations. At the latest evaluation after a mean of 11.8 years, 15 patients (24.2%) required revision total wrist arthrodesis surgery in a median of 2 months (range, 6–179) because of disabling pain and lack of strength. The failure was statistically correlated with being young and a manual laborer. The range of motion and strength of the operated wrist were 61.5% and 70%, respectively, compared to the contralateral side. PRC remains a reliable procedure for treating wrist arthritis and severe carpal trauma. However, manual activity and being under 50 years of age can lead to an early salvage procedure such as total arthrodesis of the wrist. In this subset of the population, another alternative must be considered.

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#### R É S U M É

L'objectif de ce travail était d'analyser les résultats cliniques, fonctionnels et radiographiques après résection de la rangée proximale du carpe (RRPC) avec un recul minimum de 5 ans. Notre hypothèse était que cette intervention chirurgicale dans le cadre d'une arthrose radio-carpienne ou d'un traumatisme grave du carpe pouvait rendre un poignet mobile et fonctionnel de façon pérenne. Il s'agissait d'une série rétrospective multi-opérateur de 62 patients. Quarante-quatre patients présentaient une arthrose radio-carpienne (11 SNAC, 24 SLAC, 3 maladies de Kienböck, 6 autres) et, pour 18 cas, la RRPC était effectuée dans le cadre d'un traumatisme sévère du poignet sans traitement conservateur possible. Une évaluation clinique et radiographique a été réalisée pour chaque patient. Avec un recul moyen de 11,8 ans, 15 patients (24,2 %) ont nécessité une reprise chirurgicale par arthrodèse totale du poignet dans un délai médian de 22 mois (6 à 179) consécutive à des douleurs invalidantes et un manque de force. Cette reprise chirurgicale était statistiquement corrélée au statut de travailleur manuel et au jeune âge du patient. Les mobilités du poignet et la force de poigne étaient mesurées à 61,5 % et 70 %, respectivement, par rapport au côté opposé. Dans le traitement de l'arthrose du poignet et des traumatismes graves du carpe, la RRPC reste une procédure fiable. Cependant, une activité manuelle et un âge inférieur à 50 ans peuvent conduire à une reprise précoce par arthrodèse totale du poignet. Il est nécessaire dans cette population d'envisager une autre alternative.

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**1. Introduction**

Post-traumatic osteoarthritis of the wrist is rare, with 5% prevalence in the general population [1]. It is asymptomatic for a long time before decompensating and causing major functional disability. Treatment is first and foremost medical, and surgery should only be considered after failure of conservative treatment. The surgical methods used today are controversial and consensus has not been achieved [2]. The therapeutic armamentarium includes total wrist denervation, proximal row carpectomy (PRC), total or partial arthrodesis, interposition implants, and more recently, arthroplasty.

The aim of this study was to determine and analyze the long-term results of PRC at a minimum of 5 years after surgery. We hypothesized that in patients with radiocarpal osteoarthritis or severe carpal trauma, PRC can restore the wrist's range of motion and function. This study could validate this therapeutic option, which continues to be debated because of the appearance of arthritis between the capitate and the radius, particularly in young subjects and manual workers [3].

**2. Patients and methods**

*2.1. Population*

This was a retrospective, continuous, single-center, and multisurgeon study on patients operated between June 1994 and April 2009 (Table 1). We performed 62 PRC procedures on 14 females and 48 males who had a mean age of 46.5 ± 13 years (range, 22–73 years); there were 39 right wrists and 23 left wrists. Forty-one patients (66%) were operated on their dominant side. Thirty-eight patients had a manual occupation. Twenty-four patients took part in sports with significant radiocarpal loading (e.g., mountain biking). In 19 cases (31%), the operation was performed secondary to a work-related accident or an occupational disease.

*2.2. Surgical indication*

In this study, PRC was indicated for radiocarpal arthritis (44 cases) or perilunar dislocation of the carpus (18 cases) (Table 1). Arthritis was secondary to scaphoid nonunion advanced collapse (SNAC) in 11 cases, scapholunate advanced collapse (SLAC) in 24 cases, Kienböck's disease in 3 cases, fracture of the distal radius in 4 cases, and inflammatory disease in 2 cases. The main reason for consultation was pain. Preoperatively, using Watson's radiological classification [1], which could be applied to 35 of the 62 cases, we found 2 cases at stage 1, 24 at stage 2, and 9 at stage 3 (Fig. 1). Other than the trauma cases, the indication for PRC was retained for degenerative wrist that was painful, stiff, with loss of strength, and radiocarpal and/or intracarpal arthritis. When arthritis of the lunate fossa of the radius or capitulate osteoarthritis demonstrated, we performed the procedure described by Salomon and Eaton (41 cases) (Fig. 2) [4].

*2.3. Surgical technique and treatment protocol*

The proximal row was exposed through a longitudinal or transversal dorsal cutaneous approach, followed by opening of the

fourth extensor compartment, and then quadrangular capsulotomy preserving a distal hinge. The posterior interosseous nerve was resected in 36 cases (58%) to relieve pain. When cartilage lesions were present in the lunate fossa of the radius and the capitate head, we also performed the Eaton technique (41 cases) with interposition of a capsular flap attached to the anterior capsule (30 cases) or associated with partial capitate resection (11 cases) (Fig. 2) [4]. Styloidectomy of the radius was performed in 10 cases. In the 21 cases for which the Eaton procedure was not performed, the capsule was closed very loosely so as not to compromise range of motion in flexion. After skin closure and bandaging, the wrist was immobilized in a cast, except for five patients who received intermittent immobilization with an orthosis so that functional rehabilitation could begin immediately. The cast was left in place for 27.5 ± 11.4 days (range, 7–45 days). The mean hospital stay was 1.9 ± 2.2 days (range, 0–11 days). Four patients underwent outpatient surgery.

Functional rehabilitation with a physical therapist began systematically on the 1st postoperative day with active and passive mobilization of the fingers, and then of the wrist, as soon as possible. Rehabilitation lasted a mean of 7.3 ± 5.2 months (range, 0–24 months) with a minimum of two sessions per week.

*2.4. Evaluation*

The patients underwent clinical and radiographic assessments.

To avoid bias, the clinical examination was conducted by a clinician who was not involved in the surgery and the X-rays were read by two specialists. The patients were either seen in-person (48 cases) by an independent examiner (CBB) or they filled out a questionnaire and sent in their X-rays (14 cases). At the last follow-up, various clinical parameters were collected (Table 2) to better define the population. Comparative range of motion of the two wrists was measured in degrees with a goniometer. Grip and pinch strength were measured with a Jamar digital hand dynamometer. The functional results were assessed using the Patient-Rated Wrist Evaluation (PRWE) score [5], the QuickDASH score [6], and the Mayo Wrist score [7] (Table 2). Satisfaction was assessed on a scale of 1 to 4 (dissatisfied, disappointed, satisfied, very satisfied) and pain was evaluated using a visual analog scale (VAS 0–10).

The radiological results were assessed using X-rays of the wrist (AP and lateral) to describe the stage of radiocapitate arthritis of the new joint using the Culp and Jebson classification [8,9] (Fig. 1). A subgroup analysis was performed for the Eaton technique cases, cases with more or less than 10 years of follow-up, and cases with perilunar dislocations of the carpus.

Failure of the PRC procedure was defined as surgical revision with total arthrodesis of the wrist; these patients were not seen clinically for this study. We evaluated the impact of loss of strength, stiffness, and pain on the wrist's function relative to the follow-up duration.

*2.5. Statistical methods*

In this study, descriptive statistical tools were used for the initial analyses. The quantitative parameters were evaluated for

**Table 1**  
Preoperative demographic data.

Patients	Age (years)	Gender		Side		Dominant side affected	Manual laborer	Surgical indication				
		Female	Male	Right	Left			SNAC	SLAC	Kienböck	Injury	Other
n=62	46.5 ± 13 (22–73)	14	48	39	23	43 66%	38 61%	11	24	3	22	2

SLAC: scapholunate advanced collapse; SNAC: scaphoid nonunion advanced collapse.

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