

Original article

Amandys[®] implant: Novel pyrocarbon arthroplasty for the wrist

L'implant Amandys[®] : nouvelle arthroplastie en pyrocarbure pour le poignet

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Abstract

Objectives. – Post-traumatic, arthritic or degenerative destruction of the midcarpal and radiocarpal joints are difficult to treat. A new arthroplasty with a free interposition pyrocarbon implant, Amandys[®], is proposed for the treatment of extensive destruction of midcarpal and radiocarpal joints. Preliminary results are reported.

Methods. – The prospective series included 25 patients, 15 males and 10 females with a mean age of 60. The indications were degenerative, post-traumatic or rheumatoid destruction of the wrist. Sixty percent of the patients had already had surgery on their wrist before the operation. The mean follow-up was 24 months.

Results. – Three patients had a reoperation: two for a repositioning of the implant and one for a styloïdectomy. At the last follow-up, the mean grip strength was 16 kg (51% of the contralateral side), the mean range of motion in flexion–extension was 68°. Mean strength and range of motion did not change significantly with the operation. Pain and function showed significant improvement. The mean pain score decreased from 6.7/10 to 3.7/10 postoperatively. The mean PRWE score decreased from 61/100 to 32/100. The mean QuickDash score decreased from 63/100 to 36/100. Ninety-six percent of the patients were satisfied or very satisfied. No dislocation or subsidence of the implant was noticed.

Conclusions. – This minimally invasive pyrocarbon interposition increases the possibilities for the treatment of extensive articular destructions of the wrist. Indications must be limited to a well-aligned wrist with competent capsuloligamentous structure. This new arthroplasty is a reliable alternative to other surgical options, which are more radical or invasive such as total arthrodesis or total wrist prosthesis.

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Keywords: Wrist arthroplasty; Pyrocarbon implant; Wrist osteoarthritis; Interposition

Résumé

Objectifs. – L'atteinte dégénérative du poignet pose de difficiles problèmes thérapeutiques. Une nouvelle arthroplastie par interposition d'un implant libre en pyrocarbure, l'Amandys[®], est proposée pour le traitement des destructions articulaires étendues, radio- et médio-carpiennes. Les résultats préliminaires sont rapportés.

Méthodes. – La série prospective comprenait 25 patients, 15 hommes et dix femmes d'âge moyen 60 ans. Les indications étaient des atteintes dégénératives arthrosiques, post-traumatiques ou rhumatismales. Soixante pour cent des patients avaient déjà été opérés du même poignet. Le recul moyen était de 24 mois.

Résultats. – Trois patients ont eu une reprise chirurgicale : deux pour un repositionnement de l'implant et pour un complément de styloïdectomie. Au dernier recul, la force moyenne (de poigne) était de 16 kg (51 % de la force controlatérale), l'arc moyen de flexion–extension était de 68°. La force et la mobilité moyenne n'ont pas été significativement différentes après l'intervention. L'amélioration des scores sur la douleur et la fonction a été significative. La douleur moyenne est passée de 6,7/10 à 3,7/10 en postopératoire. Le score du PRWE est passé de 61/100 à 32/100 en postopératoire. Le score QuickDash est passé de 63/100 à 36/100 en postopératoire. Quarante-vingt-seize pour cent des patients étaient satisfaits ou très satisfaits. Aucune luxation ou migration de l'implant n'a été constatée.

Conclusions. – Ce nouvel implant d'interposition libre en pyrocarbure permet d'élargir les perspectives de traitement des destructions articulaires importantes du poignet. Les résultats montrent qu'il s'agit d'une alternative valable aux autres solutions chirurgicales plus radicales et plus

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invasives comme l'arthrodèse ou la prothèse totale. Les indications doivent être réservées aux poignets correctement alignés dont les parties molles capsuloligamentaires ont conservé leur compétence.

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Mots clés : Poignet ; Arthroplastie ; Pyrocarbone ; Arthrose ; Implant d'interposition

1. Introduction

Extensive painful invalidating articular destruction of the wrist, whether traumatic, degenerative or rheumatoid in origin can cause difficulty in choice of therapeutic options whether palliative (denervation) or surgical (arthrodesis or total arthroplasty).

Wrist denervation is mainly indicated for painful wrists without great limitation of force or mobility. Results are unpredictable, often transitory and sometimes paradoxical according to different series [1–3].

Total wrist fusion is a palliative option that is often not well tolerated functionally and is not free of complications [4–9].

Total arthroplasty using a prosthesis gives superior functional results; their use is limited by the high rate of complications and failure [10–17]. New models of the prosthesis have recently been developed but still lack follow-up [18,19]. The same goes for limited series of partial arthroplasties [20–22].

We present a new arthroplasty using a free interposition pyrocarbon implant called Amandys[®]. We hereby present our preliminary results.

2. Materials and methods

2.1. Concept of the implant

Amandys[®] (Tornier SAS-Bioprofile Grenoble, France) is a pyrocarbon free interposition implant for radiocarpal and midcarpal placement. It replaces the lunate, the proximal two-thirds of the scaphoid and a portion of the capitate head. It is a mobile spacer, not fixed to the bone, which avoids load peaks at the radius or the carpus. It allows the reconstruction of two articular intervals, one in relation to the radius, the other in relation to the second carpal row. It is quadri-elliptical in shape. The two proximal elliptical curvatures, orthogonal to each other mimic the proximal anatomic curvatures of the scaphoid and lunate providing optimal congruence with the radial glenoid.

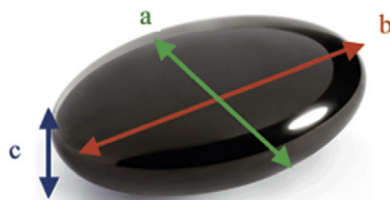


Fig. 1. The implant Amandys[®] exists in eight sizes with two lengths and four thicknesses: a: width (AP-axis); b: length (transverse-axis); c: thickness (proximodistal-axis).

The two distal curvatures of the implant are less marked than the proximal ones. The implant has three main axes: anteroposterior corresponding to the width, transverse corresponding to the length and proximodistal corresponding to the thickness (Fig. 1). The implant exists in eight sizes varying according to the length (24 or 26 mm) and thickness (S, M, L, XL).

The bony surfaces in contact with the implant can slide and roll; a slight rotation is also possible, especially at the carpal surface of the implant, which is less convex than the radial one.

The minimal osseous resection — mainly intra-articular — associated with this procedure and the conservation of the triquetrum and the distal third of the scaphoid, means that this arthroplasty spares the principal extrinsic ligaments of the wrist [23]. These ligaments play an important role in the kinematics of the wrist during different movements especially the “dart-throwing motion” [24].

2.2. Operative technique

The arthroplasty is performed under locoregional anesthesia with an arm tourniquet. The kit includes an ovoid burr, a curved periosteal elevator, an extractor and the eight trial implants. One of two access incisions may be used: the dorsal or the radial incision.

2.2.1. Dorsal incision

This access is preferred when associated removal of hardware or bony reconstruction (filling of bone cysts) is programmed. It is also preferred when anterior or posterior capsular reinforcement is planned.

The incision is dorsal and sinuous on the dorsum of the wrist; a previous surgical incision may also be reused.

The annular ligament is incised at its radial border or the ulnar border of the 4th extensor compartment so as to allow a reinforcement of the dorsal capsule at the end of the procedure.

The capsulotomy is either midline longitudinal or a capsular flap is raised [25].

2.2.2. Radial incision

This original access is indicated in virgin wrists where the osteoarticular anatomy has not been significantly altered and there is no need to fear capsular deficiency. The wrist is positioned in lateral position with a support under the ulnar side to allow ulnar inclination. An ‘S-shaped’ incision of about 5 cm is made on the radial wrist opposite to the radial styloid and the anatomical snuffbox (Fig. 2). The sensory branches of the radial nerve are carefully identified and retracted. Articular access is longitudinal between the first and second extensor compartments, to expose the scaphoid and the radial styloid, which is stripped of its periosteum over 1 cm.

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