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Original article

Treatment of radiocarpal degenerative osteoarthritis by radioscapholunate arthrodesis: Long-term follow-up

Traitement de l'ostéoarthrite dégénérative radiocarpale par arthrodèse radioscapholunaire : résultats à long-terme

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Abstract

Radioscapholunate arthrodesis is the treatment of choice for symptomatic, degenerative radioscapholunate osteoarthritis. We report on three patients after radioscapholunate arthrodesis with a follow-up of 22–28 years. There were no short-term postoperative complications; range of motion and strength were stable. All three patients showed radiological evidence of progressive, but clinically asymptomatic midcarpal osteoarthritis. The conversion rate for radioscapholunate to panarthrodesis of the wrist is reported at 31% with follow-ups of more than five years, invariably due to either non-union, or progressive, symptomatic midcarpal osteoarthritis. Primary excision of the distal pole of the scaphoid during radioscapholunate arthrodesis probably plays an important role in avoiding these conditions in the long-term. This measure allows a residual range of motion more than previously believed; considering that the dart thrower's motion is the physiological axis of wrist motion.

Keywords: Radioscapholunate arthrodesis; Radiocarpal; Degenerative osteoarthritis; Long-term follow-up

Résumé

L'arthrodèse de l'articulation radioscapholunaire est le traitement de référence de l'ostéoarthrite dégénérative symptomatique radioscapholunaire. Nous présentons trois patients ayant bénéficié d'une arthrodèse radioscapholunaire avec un recul de 22 à 28 ans. Aucune complication n'a été relevée à court terme. Les résultats fonctionnels concernant la mobilité et la force étaient stables au terme du suivi. L'ostéoarthrite médiocarpienne progressive, mais cliniquement asymptomatique, était évidente radiologiquement pour les trois patients. Le risque de convertir une arthrodèse radioscapholunaire en une panarthrodèse du carpe est de 31 % dans les séries pour un recul de plus de cinq ans, sans variabilité imputable à l'étiologie (défaut de consolidation ou athrose médiocarpienne progressive symptomatique). La résection primaire du pôle distal du scaphoïde au cours de l'arthrodèse radioscapholunaire pourrait permettre d'éviter la panarthrodèse à long terme. Par ailleurs la résection du pôle distal améliore la mobilité résiduelle, en particulier, en préservant notamment l'axe physiologique de mouvement du poignet.

Mots clés : Arthrodèse radioscapholunaire ; Radiocarpienne ; Arthrose dégénérative ; Résultats à long-terme

1. Introduction

The objective of partial wrist arthrodesis is selective fusion of painful joints while preserving unaffected healthy articulations.

Radioscapholunate (RSL-) arthrodesis with resection of the distal ulna was initially described in 1955 by Watson-Jones [1]. In 1961, Gordon and King [2] reported on isolated RSL fusion; the technique was subsequently further modified. Chief criticisms of these methods were directed at the often high rates of non-union (primarily at the radioscaphoid fusion), the very limited range of motion postoperatively as well as the subsequent midcarpal osteoarthritis. Therefore, RSL-arthrodesis enjoyed

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limited popularity, hence the small number of publications. Long-term results, however, are of prime importance, particularly in view of future indications of the method.

In Anglo-American literature, we found only two case series with a follow-up of more than ten years after RSL-arthrodesis in non-rheumatoid wrists. Some of our results were presented in German with a follow-up of 18 years [3]. We were able to enlist three of those five patients for another follow-up exam, so that we report an unprecedented average follow-up of 24 years.

The objective of our study was to examine the durability of RSL-arthrodeses, if only in a very small number of patients. Durability was assessed in terms of pain reduction, postoperative range of motion and strength as well as radiological findings. In view of previous studies on such long-term follow-ups, further results were obtained for the dart thrower's motion (physiologic axis of wrist motion from extension/radial inclination to flexion/ulnar inclination), and the effect of excision of the distal scaphoid pole performed during RSL-arthrodesis.

2. Methods

Between 1976 and 1988, 11 patients underwent RSL-arthrodesis, as described by Gordon and King [2]. All procedures were performed under general anaesthesia. After exsanguination with an Esmarch bandage and tourniquet inflation, the skin was incised axially between the third and fourth extensor tendon compartment and the wrist joint capsule was opened. Cartilage was removed down to cancellous bone on the joint surfaces between radius and scaphoid, radius and lunate, as well as scaphoid and lunate. Cancellous bone from the iliac crest was grafted into these joint spaces. No internal fixation of any kind was used. The wound was closed in layers and the wrist was immobilised in a splint initially, which was subsequently exchanged for a forearm scaphoid cast for 8-12 weeks. No further procedures were performed on any of the patients.

Follow-up exams of the included patients were performed in 1990, 2000 and 2006. For the third and last exam, we were able to summon three of the original patients. On each occasion, we recorded patient history, DASH score (2000 and 2006 only), range of motion (using the neutral-zero-method and a goniometer) and strength (grip strength measured with a JAMAR dynamometer and pinch grip strength using pinch gauge). We obtained standard anteriorposterior and lateral views. Due to the 10-year limitation of compulsory record retention, preoperative X-rays were unfortunately no longer in the patients' files. We were able to compile clinical and radiological follow-up of 24 years (22–28). All three patients were and remained engaged in medium to heavy manual labour (road construction, internal mail service, construction). The dominant hands were operated on. The average age was 27 years (21–38) at the time of surgery.

3. Results

Following the operation, all three patients were able to return to their previous work; however, our records are incomplete as to time off work for rehabilitation. Two patients are in the same line of work to this day; one retired prematurely due to an unrelated back problem. All three patients are generally very satisfied and would have the procedure again if faced with the same problem. They report a very constant postoperative course over the past decades with only slight pain on loading. The average DASH scores recorded in 2000 and 2006 were 30 (9–49) and 21 (13–32), respectively. No scores were recorded before or immediately after the operation.

Table 1
Average range of wrist motion.

	1990	2000	2006
Flexion	28° (42%)	30° (50%)	27° (44%)
Extension	23° (40%)	27° (47%)	25° (52%)
Radial inclination	18° (56%)	12° (48%)	5° (28%)
Ulnar inclination	23° (60%)	18° (60%)	25° (60%)
Pronation	80° (89%)	80° (89%)	80° (89%)
Supination	80° (96%)	80° (96%)	85° (100%)

Average range of wrist motion of the three patients over the years and in comparison to the contralateral side (% values in brackets).

3.1. Range of motion

Postoperative range of motion remained constant over the years, for both absolute values and compared to the contralateral wrist. Table 1 shows the average measurements over the years. Flexion-extension measured 51° (41% of the contralateral wrist) in 1990, 57° (49%) in 2000 and 52° (48%) in 2006.

3.2. Strength

Grip and pinch grip strength remained very constant during follow up, in absolute values as well as compared to the contralateral wrist. Table 2 shows the average results over the years. Average grip strength measured by the JAMAR dynamometer — an important parameter for patients engaged in manual labour — was 392 N (93% of the contralateral side) in 1990, 363 N (84%) in 2000 and 343 N (88%) in 2006.

3.3. Imaging (X-ray)

X-ray series taken in 2006 (anterior-posterior and lateral views of the wrists of all three patients) are depicted in Figs. 1–6. Despite the fact that no bony fixation was performed between scaphoid, lunate and the radius, good bony alignment was seen on conventional X-rays. Only patient 3 (Figs. 5,6)

Table 2
Average grip and pinch grip strength.

	1990	2000	2006
Grip strength	392 N (93%)	363 N (84%)	343 N (88%)
Pinch grip strength	98 N (91%)	98 N (91%)	88 N (90%)

Average grip and pinch grip strength of all three patients during follow up and in comparison to the contralateral side (% values in brackets).