Rotatory subluxation of the scaphoid in Kienböck's disease is not a cause of scapholunate advanced collapse (SLAC) in the wrist

Y. Taniguchi, T. Tamaki, T. Honda, M. Yoshida

From Wakayama Medical University, Wakayama, Japan

We have examined whether the rotatory subluxation of the scaphoid which is seen in patients with advanced Kienböck's disease is associated with scapholunate advanced collapse (SLAC) wrist. We studied 16 patients (11 men, 5 women) who had stage-IV Kienböck's disease with chronic subluxation of the scaphoid. All had received conservative treatment. The mean period of affection with Kienböck's disease was 30 years (14 to 49). No wrist had SLAC. In eight patients, 24 years or more after the onset of the disease, the articular surface of the radius had been remodelled by the subluxed scaphoid with maintenance of the joint space. The wrists of six patients were considered to be excellent, nine good, and one fair according to the clinical criteria of Dornan.

Our findings have shown that rotatory subluxation of the scaphoid in Kienböck's disease is not a cause of SLAC wrist and therefore that scaphotrapezio-trapezoid arthrodesis is not required for the management of these patients.

J Bone Joint Surg [Br] 2002;84-B:684-7.

Received 14 August 2001; Accepted after revision 17 November 2001

In 1984, based on an analysis of more than 4000 radiographs of wrists, Watson and Ballet¹ and Watson and Ryu² reported that the most common presentation of degenerative arthritis of the wrist was scapholunate advanced collapse (SLAC) wrist. This particular pattern of osteoarthritis of the wrist has become an established disorder.¹⁻⁹

They noted that the most common cause of SLAC wrist

was rotatory subluxation of the scaphoid due to scapholunate dissociation and that it could also be secondary to nonunion of a fracture of the scaphoid, Kienböck's disease, fracture of the distal radius, Preiser's disease, and deposition of crystals of calcium pyrophosphate dihydrate.⁴⁻⁹ They emphasised the need to avoid the development of SLAC secondary to rotatory subluxation of the scaphoid which accompanies advanced Kienböck's disease,¹⁰⁻¹³ and advocated scaphotrapeziotrapezoid (STT) arthrodesis to prevent its inevitable development.¹⁰⁻¹⁴

None of their previous studies, however, and no other reports have included patients with SLAC secondary to Kienböck's disease,¹⁻¹⁸ and there remains some doubt as to whether Kienböck's disease leads to SLAC wrist. We have investigated the long-term outcome of the conservative treatment of patients with Kienböck's disease associated with rotatory subluxation of the scaphoid.

Patients and Methods

We studied 16 patients (11 men, 5 women) with Kienböck's disease and associated rotatory subluxation of the scaphoid. Their mean age at the time of the study was 62 years (46 to 84). The mean age at the time of onset of the disease was 32 years (18 to 65). This was the age at which symptoms in the wrist were first noted. The mean period affected with the disease was 30 years (14 to 49). Table I gives the details of the patients.

Posteroanterior radiographs of the wrist were taken in the neutral position and symptoms were recorded for all patients. The radiographs were analysed in regard to osteoarthritic changes and the degree of SLAC wrist was evaluated according to the classification of Krakauer, Bishop and Cooney¹⁹ as follows: stage I, narrowing limited to the region between the radial styloid and scaphoid; stage II, involvement of the entire radioscaphoid joint; and stage III, narrowing and sclerosis of the radioscaphoid and capitolunate joints with sparing of the radiolunate joint.

In order to evaluate the degree of collapse of the carpal bones, the carpal height ratio (CHR) was measured according to the method of Youm et al.²⁰ This was compared with the normal CHR of 0.54 as reported by these authors. The wrists were classified into four grades of excellent, good, fair or poor, using the criteria of Dornan.²¹

Y. Taniguchi, MD, PhD, Assistant Professor

T. Tamaki, MD, PhD, Professor

T. Honda, MD

Department of Orthopaedic Surgery

M. Yoshida, MD, PhD, Associate Professor

Department of Physical Medicine and Rehabilitation

Wakayama Medical University, 811-1 Kimiidera, Wakayama City, Wakayama 641-8510, Japan.

Correspondence should be sent to Dr Y. Taniguchi.

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0301-620X/02/512746 \$2.00

Table I. Details of the 16 patients with Kienböck's disease accompanied by rotatory subluxation of the scaphoid

Case	Gender	Age at follow-up (yrs)	Age at onset of Kienböck's disease (yrs)	Affected period of Kienböck's disease (yrs)	Involved wrist	Treatment
1	M	61	27	34	R	Immobilisation
2	F	57	24	33	R	Immobilisation
3	M	51	20	31	R	Immobilisation
4	M	52	21	31	R	Immobilisation
5	M	63	29	34	R	Immobilisation
6	F	53	22	31	L	Immobilisation
7	M	46	18	28	L	Immobilisation
8	M	69	42	27	R	Non-immobilisation
9	F	68	35	33	R	Non-immobilisation
10	M	70	21	49	R	Immobilisation
11	M	84	65	19	R	Immobilisation
12	M	52	18	34	L	Non-immobilisation
13	M	62	30	32	R	Non-immobilisation
14	M	72	48	24	R	Immobilisation
15	F	71	57	14	L	Non-immobilisation
16	F	67	40	27	R	Non-immobilisation

Results

Radiological findings. Although degenerative changes were seen in the midcarpal and the radiocarpal joints, the joint spaces were preserved in all patients. In eight who had had the disease for more than 24 years, the articular surface of the radius adjacent to the subluxed scaphoid had been remodelled (Fig. 1).

SLAC wrist. None of the patients had SLAC wrist. In 11, some stage-I changes, with slight narrowing between the radial styloid and the scaphoid, were seen. However, the degenerative changes were seen not only in the radial styloid but also at other sites, and these were not therefore considered to be stage-I SLAC.

CHR. The mean CHR was 0.47 (0.34 to 0.59). There were 15 patients with a value of 0.54 or less (Table II).

Clinical symptoms. All patients were either asymptomatic or had only minor symptoms. Six wrists were classified as excellent, nine as good, and one as fair according to the criteria of Dornan²¹ (Table II).

Discussion

Kramer and Lichtman²² subclassified stage-III Kienböck's disease into IIIA and IIIB according to whether it was accompanied by rotatory subluxation of the scaphoid and presented guidelines for treatment. Watson et al¹⁰⁻¹³ noted that unless appropriate treatment is given for the subluxation of the scaphoid which always accompanies advanced Kienböck's disease, wrist pain, synovitis, and SLAC will occur. They advocated STT arthrodesis to prevent SLAC and to reduce the forces which pass through the lunate. Voche, Bour and Merle²³ and Minami, Kimura and Suzuki²⁴ reported satisfactory results after STT arthrodesis for stage-III Kienböck's disease. STT arthrodesis is thus currently one of the surgical options for this condition.

However, Blanco²⁵ and Kawai et al²⁶ described the long-

Fig. 1

Posteroanterior radiograph showing remodelling of the articular surface of the radius adjacent to the subluxed scaphoid with maintenance of the radioscaphoid joint space, and advanced Kienböck's disease without SLAC.

term results after excision of the lunate for Kienböck's disease. The clinical results were good despite some cases of carpal instability accompanied by rotatory subluxation of the scaphoid and collapse of the carpal bones. Blanco²⁵ also noted that the biomechanical changes caused by malalignment of the carpal bones did not affect the function of the wrist. Their clinical studies suggested that rotatory subluxation of the scaphoid is not a cause of SLAC wrist in Kienböck's disease, and does not affect the clinical outcome.

We have shown that rotatory subluxation of the scaphoid in Kienböck's disease does not proceed to SLAC wrist. Even in the presence of chronic subluxation of the

Table II. Results for the 16 patients with Kienböck's disease accompanied by rotatory subluxation of the scaphoid

Case	SLAC wrist	Carpal height ratio (CHR)	Wrist range of movement (% of normal side)	Grip strength (% of normal side)	Criteria of Dornan ²¹
1	None	0.45	83	88	Good
2	None	0.52	71	106	Good
3	None	0.53	58	94	Good
4	None	0.52	63	89	Excellent
5	None	0.59	62	60	Good
6	None	0.47	84	63	Excellent
7	None	0.52	93	70	Excellent
8	None	0.43	70	100	Good
9	None	0.42	78	110	Excellent
10	None	0.46	75	91	Fair
11	None	0.48	59	150	Excellent
12	None	0.42	84	98	Good
13	None	0.46	46	71	Good
14	None	0.34	61	90	Excellent
15	None	0.40	73	47	Good
16	None	0.46	91	67	Good

scaphoid, the articular surface of the radius adjacent to the scaphoid was remodelled and the radioscaphoid joint space was maintained. Most of our patients had only minor symptoms, whereas in SLAC wrist they are usually severe.^{4,27-29} We therefore conclude that Kienböck's disease is not a cause of SLAC wrist. Thus STT arthrodesis is not indicated for the prevention of SLAC.

Yajima, Ono and Tamai³⁰ also reported that STT arthrodesis was not necessary for the treatment of Kienböck's disease, and described limitation of movement of the wrist after this procedure. Rogers and Watson³¹ found that patients with STT arthrodesis developed radial styloid impingement characterised by pain on the radial side of the wrist or limitation of radial deviation. They therefore recommended the performance of radial styloidectomy at the same time as an STT arthrodesis. Kleiman and Carroll³² in a retrospective review of patients after STT arthrodesis over ten years, reported a complication rate of 52%. They suggested that preoperative screening of patients was essential if complications were to be avoided.

We believe that STT arthrodesis is unnecessary in the treatment of Kienböck's disease since rotatory subluxation of the scaphoid does not lead to SLAC wrist. If STT arthrodesis is performed in patients with Kienböck's disease, the indications should be carefully considered, taking into account the complications of the procedure³⁰⁻³² and the potentially benign course of this disease.^{33,34}

No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.

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