

# The treatment of lunatomalacia

## Radial shortening or ulnar lengthening?

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In 35 patients with lunatomalacia, radial shortening (20 cases) was compared with ulnar lengthening (15 cases) 5 (1-14) years postoperatively. There was no radiographic evidence of recovery of the architecture of the lunate bone. The time of consolidation of the osteotomy with screw and plate fixation averaged 3 months after radial shortening and 4 months after ulnar lengthening. Pseudoarthrosis developed in 1 case of radial shortening and in 3 cases after ulnar lengthening. The two groups were equal with satisfactory results in two thirds of the patients.

Kienböck (1910) discussed the origin of lunatomalacia, but the possible effect of a negative ulnar variant was first mentioned by Hultén (1928). Persson (1945) supported Hultén's theory and advocated ulnar lengthening to correct the inequality in length; many have reported generally good results with this operation (Desenfans 1953, Verbrugge and Verjans 1963, Besutti 1964, Decoulx et al. 1965, Tillberg 1968, Potma 1973, Armistead et al. 1982), but the frequent occurrence of pseudoarthrosis has limited the indications. Other authors report good results following radial shortening (Calandriello and Palandri 1966, Viernstein and Wiegert 1967, Rosemeyer et al. 1976, Grassi et al. 1978, Regele and Retting 1979, Eiken and Niechajev 1980, Marti et al. 1981, Axelsson 1973), but we have not found any direct comparisons between the two methods. We present our results of ulnar lengthening compared with radial shortening in 35 cases of lunatomalacia.

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### Patients and methods

Radius shortening was performed in 20 patients between 1972 and 1980 and ulnar lengthening in 15 patients between 1967 and 1979. Their mean age was 32 (16-62) years; 22/35 patients were male, and in 24/35 cases the abnormality affected the dominant wrist. Fifteen patients had heavy manual work, and 5 patients reported a trauma preceding onset of symptoms. The time between onset of symptoms and operation averaged 1 year (2 months-10 years).

The preoperative radiographs were studied with special consideration to the relationship between the distal radius and ulna and the size of the collapsed portion of the lunate bone. A negative ulna variant was demonstrated preoperatively in 28 patients; 5 had a 0 variant and the remaining 23 were positive variants. The relationship of the distal radius and ulna was on an average +0.7 mm in the radial-shortening group; 0 mm in the ulnar-lengthening group.

With regard to the collapse of the lunate bone, a modification of the radiographic classification described by Lichtman et al. (1977) was used:

Stage 0. Normal.

Stage 1. The architecture of the lunate bone is normal, but there are alterations in the density of the bone.

Stage 3. As well as density changes, there are also changes in the architecture of the lunate

Table 1. Radiographic stages of lunatomalacia preoperatively and postoperatively. (Modified classification as described by Lichtman, see text)

	Radial shortening n 20		Ulnar lengthening n 15	
	preop	postop	preop	postop
0	0	1	3	4
1	1	0	5	4
2	11	6	5	4
3	5	6	2	3
4	3	7	0	1
Mean	2.5	2.9	1.4	1.7

bone, notably loss of height on the radial side.

Stage 4. Severe collapse of the lunate bone with secondary arthrosis.

The disease was generally more advanced in the radial-shortening group (Table 1).

Both groups were operated on under general anesthesia with a tourniquet. Radial shortening was performed through a dorsal incision. A transverse osteotomy was done 5 cm from the distal end of the radius and approximately 3-mm shortening was obtained. Fixation was secured by the use of a small DCP AO plate. When the osteosynthesis was stable, no plaster was used. The ulnar lengthening was performed with a Z-shaped osteotomy to obtain an average lengthening of 3-4 mm. Fixation was secured with a semitubular AO plate. All the patients were treated with a plaster bandage until consolidation. All the patients with radial shortening were reexamined after 4 (1-8) years, and all the patients with ulnar lengthening after 6 (2-14) years.

Table 2. Wrist function before and after operation

Range of motion (mean values)	Radial shortening n 20		Ulnar lengthening n 15	
	perop	postop	perop	postop
flexion	43°	55°	65°	66°
extension	39°	67°	60°	70°
pronation		90°		90°
supination		80°		80°
radial deviation		11°		17°
ulnar deviation		21°		25°
<b>Pain</b>				
painless	0	10	0	9
mild pain on exercise	0	5	2	4
pain with light work	15	5	9	2
pain at rest	5	0	4	0

## Results

Totally, 28/35 patients were free of pain or had only mild pain on exercise, with no difference between the two groups.

Flexion-extension of the wrist improved by 47°, with better extension than flexion, whereas the preoperative situation was the opposite (Table 2). Of the 7 patients without a negative ulnar variant, 4 were without pain, 2 had mild pain during exercise, and 1 had pain during light work. Grip strength, expressed as a percentage of the power of the nonoperated on wrist, was 76 per cent in the radial-shortening group and 71 per cent in the ulnar-lengthening group. Twenty-six patients were able to return to their previous work, 3 had to change occupation, while 6 patients had to entirely discontinue working.

The consolidation averaged 3 months in the radial-shortening group and 4 months in the ulnar-lengthening group. One pseudoarthrosis occurred in the radial-shortening group, whereas 3 occurred in the ulnar-lengthening group.

## Discussion

Our study showed no major difference between ulnar lengthening and radial shortening, as both procedures gave a favorable effect on the symptoms, and the objective results were nearly the same.

However, the complications from radial shortening were less than from ulnar lengthening. Also, the time for good functional recovery, the length of aftercare, and the fusion time were all shorter for radial shortening than for ulnar lengthening; and pseudoarthrosis was more frequent after ulnar lengthening.

We found a difference between radiographic (Table 1) and functional (Table 2) results, which might be explained by the function of the triangular fibrocartilaginous complex. A local malacia of the lunate is often seen as a consequence of perforation of this complex in those with a positive ulnar variant (Poglayen and Nevinny-Stickel 1953, Palmer 1981). Armistead et al. (1982) suggested that distal advancement of the ulnar articular surface provides support for the carpus through the triangular fibrocartilage, which would prevent carpal collapse. An improvement in vascularization might play a role, but this is difficult to prove.

Lee (1963) and Gelberman et al. (1980) studied the vascularization of the lunate and found that particularly the proximal portion of the lunate is poorly vascularized. Osteotomy may have a favorable effect on the vascularization.

While the same results were found between ulnar lengthening and radial shortening, an effect of denervation of the posterior interosseous

nerve, which can only take place in radial shortening, is not likely.

Our subjective results of radial shortening or ulnar lengthening were less favorable than those obtained by many previous authors, possibly because we applied stricter criteria for assessment.

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