Does wrist fusion cause destruction of the first carpometacarpal joint in rheumatoid arthritis?

18 patients followed for 2–6 years

Eero A Belt[1], Kalevi Kaarela[1], Hannu J Kautiainen[1], Markku J Kauppi[1] and Matti U K Lehto[2]

We evaluated radiographic destruction of the first carpometacarpal joint (CMC I) in 18 hands with wrist fusions and compared it with the unoperated contralateral hands preoperatively and after a follow-up of a mean of 4.4 (2–6) years. Patients were obtained from a prospective 20-year follow-up study of 103 patients with seropositive rheumatoid arthritis. The degree of destruction in the CMC I- joints was evaluated with Larsen grades. The mean value of Larsen indices for CMC I was 0.9 before wrist fusion and 2.5 ($p < 0.001$) at the follow-up, compared to 0.8 and 1.3 ($p = 0.06$) in the control hands, respectively. No preoperative difference was found between the hands to be fused and the control hands, but the difference was significant ($p = 0.009$) after the follow-up.

[1]Rheumatism Foundation Hospital, FIN-18120 Heinola, Finland. Tel +358 3-84911. Fax -8491298; [2]Tampere University Hospital, Finland
Submitted 96-11-23. Accepted 97-05-12

The wrist joint is involved at an early stage of rheumatoid arthritis (RA) and rheumatoid destruction of the joint complex often proceeds rapidly (Wilson 1986, Hämäläinen et al. 1992, Terrano et al. 1995). In a previous study at our hospital, erosive destruction was present in two thirds of the wrist joints (Hämäläinen et al. 1992).

The degree of radiographic destruction of hand joints can be staged with the Larsen method on a scale from 0 to 5 (Larsen et al. 1976). Recently, Larsen divided the wrist joint into quarters, but destruction of CMC I was not separately defined (Larsen 1995). However, erosions and destruction of the CMC I-joint are common and cause thumb deformities, especially of swan-neck type (Wilson 1986, Toledano et al. 1992, Terrano et al. 1995, Belt et al. 1996). After wrist fusion, biomechanics are altered and this may lead to additional stress to CMC I and cause joint destruction.

We have assessed the radiographic destruction of CMC I after total wrist fusions in seropositive RA patients.

Patients and methods

During 1973–1975, 103 patients (70 women) with recent (less than 6 months) seropositive RA were studied at our hospital (Kaarela 1985, Kaarela et al. 1993). 68 patients attended a 20-year follow-up during 1995–1996; 28 patients had died and 7 did not attend. At onset of the disease, the mean age was 45 (17–70) years.

15 patients had unilateral fusions during the follow-up. 3 patients with bilateral wrist fusions had an interval of 5–8 years between the fusions and were included in the study until the other side was fused. A group of 18 patients (15 women) was thus available for evaluation; their mean age at the time of wrist fusion was 51 (34–65) years.

Destruction of the CMC I was defined according to our modification of Larsen grades before fusion and postoperatively after 4.4 (2–6) years in the operated hands and in the unoperated control sides. The Larsen (1995) grades were applied as follows:

Grade 0 deformity: intact bony outlines and normal joint space.

Grade 1: erosions less than 1 mm in diameter or joint space narrowing.

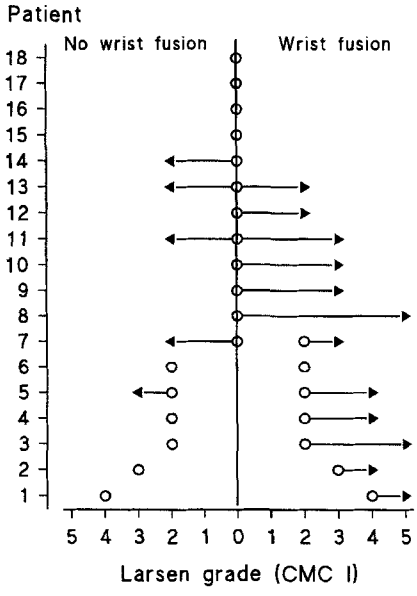
Grade 2: one or several small erosions (diameter more than 1 mm).

Grade 3: marked erosions.

Grade 4: severe erosions usually with no joint space left; original bony outlines are partly preserved.

Grade 5: mutilating changes with destruction of the original bony outlines.

In the statistical analysis, median and mean were used, because Larsen grading is chiefly an ordinal



Changes in destruction of CMC I-joints after wrist fusions in 18 RA patients with a follow-up period of a mean of 4.4 years. Contralateral unoperated hands served as control.

variable. The analysis was performed using the Wilcoxon matched-pairs signed-rank test with exact p-values.

Results

12 fusions were performed on the right side and 6 on the left. 1 patient was left-handed, but the unilateral fusion was perfomed on the right side. The mean Larsen grade for the CMC I-joint was 0.9 (SD 1.3) before fusion and 2.5 (1.9) ($p < 0.001$) at follow-up. In the control hands, the values were 0.8 (1.3) and 1.3 (1.3), respectively ($p = 0.06$). No preoperative difference was seen between the hands to be fused and the control hands, but a significant difference was found after the follow-up ($p = 0.009$).

Discussion

Our study indicates that the CMC I-joint is destroyed more rapidly after total wrist fusion than in the contralateral hand. There can be several reasons for this development. The wrist joint with more advanced destruction is usually fused earlier; rheumatoid destruction may also proceed more rapidly in ipsilateral joints, including CMC I. The dominant hand is often operated on first and wrench and stress are higher in CMC I in the dominant thumb. Hand function clearly improves after wrist fusion, and a hand with a stable wrist is used more strongly, which may cause extra stress on CMC I.

The normal CMC I is a biconcave saddle joint comparable to a universal joint, whose axes are offset from one another (Imaeda et al. 1996). In total wrist fusions, the load is transmitted through the scaphoid fossa to the base of the thumb (Ishikawa et al. 1992, Siegel and Ruby 1996). The lack of wrist motion on the proximal side of the trapezium may increase stress in the saddle joint.

In our study, the destruction of the CMC I-joint started rapidly, and 2–6 years after fusion the difference from the unoperated side was significant. Our findings stress the importance of follow-up examinations of the CMC I-joint after wrist fusion with respect to swan-neck deformity or joint destruction. We cannot prove the pathogenetic correlation between wrist fusion and destruction of the CMC I-joint, because we had only a few patients and factors other than the wrist fusion may be involved in the development of CMC I-joint destruction.

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