LONG-TERM RESULTS OF SILICONE RUBBER IMPLANTS FOR KIENBÖCK'S DISEASE

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Between 1971 and 1976 eight patients underwent excision of the carpal lunate for pain from Kienböck's disease. The bone was replaced by a silicone rubber implant. An average of 84 months had elapsed when they were reviewed in December 1980. All eight were very satisfied with their operations. Objectively, the clinical results were good, but radiographs showed the presence of degenerative change in the region of the wrist and alteration of the position of the prosthesis on ulnar deviation of the hand. No implant has had to be removed.

Between 1971 and 1976 nine patients were seen in this hospital with pain in the wrist which proved to be due to Kienböck's disease of the lunate. One patient recovered with conservative treatment but the pain persisted in the remaining eight patients, six of whom were men, in spite of intermittent conservative treatment carried out over an average period of 45 months. The dominant hand was affected in six patients and six had some shortening of the ulna. Five gave a history of an acute hyperextension injury of the wrist due to a fall.

In every patient the lunate was therefore excised and replaced by a silicone rubber prosthesis originally designed by Swanson and manufactured by Dow Corning Corporation Limited (Swanson 1970b). The operative technique was as described by Swanson (1970a). The diseased lunate was excised through a dorsal incision. A snug fit of the prosthesis was aimed at but, since at that time there was a range of only three trial prostheses, could not always be obtained. When forced to choose, a slightly undersized implant was preferred because a larger one tended to dislocate when the wrist was dorsiflexed. Before closure the joint was put through a full range of movement to test stability. The wrist was immobilised in a padded plaster, which was changed after two weeks, for a total of six weeks after which a course of physiotherapy was instituted to regain movement of the wrist. The average stay in hospital after operation was four days.

Dorsal dislocation of the implant occurred in two patients. The first occurred two weeks after operation when the plaster was changed. The second followed a heavy fall on the outstretched hand at work six years after the operation. There has been no case of infection either superficial or deep. No patient has suffered from symptoms suggestive of compression of the median nerve. There has been no evidence of reaction to the prosthesis nor of fragmentation of the implant and no implant has had to be removed.

RESULTS

The duration of follow-up ranged from 57 to 108 months. All the patients were reviewed by one author (BR) and were assessed subjectively and objectively with reference to various criteria.

Pain. The operation relieved the pain of all eight patients. They had an occasional ache but only after prolonged or vigorous use of their wrists.

Stiffness. All wrists felt less stiff after the operation.

Domestic activity. All the men and one of the women could wring clothes in reasonable comfort. The other woman experienced slight discomfort at the end of her housework. They could all open food cans and turn screwdrivers. The housewives preferred to carry their shopping baskets in the unoperated hand.

Working activity. All the men had undertaken heavy manual labour before the onset of their symptoms. They had been off work for an average period of 21 weeks before the operation. They had all been able to return to their previous occupations in reasonable comfort apart from one of the four coal-miners, who had had to take up relatively lighter work although he still had to undertake some heavy lifting. One of the women, who was a barmaid, has taken up heavier employment as a nursing assistant where she frequently has to lift patients.

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The range of dorsiflexion and volar flexion 72 months after operation in a patient who had to be reoperated upon for dislocation of the implant two weeks after insertion.

Lateral view of the wrist showing anterior subluxation of the implant.

The implant appears to stay with the triquetral on ulnar deviation of the wrist, creating a gap between the scaphoid and the implant into which the capitate seems to migrate (64 months after operation).

Recreational activity. Three men returned to their leisure pursuits of fishing in the sea, playing golf and gardening respectively. The rest had no hobbies before operation. Cosmetic appearance. All the scars were supple and not adherent. There was no swelling or deformity.

Range of movement. The average range of dorsiflexion and volar flexion was 40 degrees each (Figs 1 and 2). Radial and ulnar deviation were 20 and 25 degrees respectively. There was no crepitus on movement.

Strength of grip. Unfortunately this had not been recorded before the operation. At review, a comparison of strength between operated and the normal wrists showed slight weakness on the operated side in all but two wrists. One of these two had achieved only 60 per cent of the strength of the normal side while in the other the operated wrist was in fact the stronger.
Radiographic assessment. There was some dorsal lipping of the lower end of the radius or of the carpal bones in seven wrists, sclerosis of the articular surface of the lower end of the radius in four and sclerosis of the styloid process of the ulna in two. The ulnar styloid process was worn away in another (Fig. 3). There were degenerative changes in one inferior radio-ulnar joint and cysts in three carpal scaphoid bones. There were specks of calcification in the fronts or backs of the capsules of four wrists and in the remnants of ligaments between lunate and triquetral in another three. An incomplete shell of calcification partially surrounded one prosthesis. A degree of anterior subluxation of the implants was seen in four wrists (Fig. 4), and naviculo-implant dissociation, when the prosthesis moved inwards with the triquetral on ulnar deviation of the wrist, in three others (Figs 5 and 6).

DISCUSSION
Lichtman et al. (1977) defined four radiological and clinical stages of the disease. In his review of 20 patients, nine were operated upon before collapse of the lunate, proximal migration of the capitate and disruption of the carpal architecture had occurred (Stage II), eight obtaining satisfactory results, whereas only six of 10 who were operated on at Stage III did so. Our eight patients were all operated upon in Stage III after the lunate had collapsed. Clinically, they have all obtained a good result seven years later, but the radiological appearances of their wrists are abnormal.

Roca et al. (1976) considered that a volar approach was preferable to a dorsal incision because it reduced the incidence of dislocation and of compression of the median nerve. We used the dorsal approach in all our patients; one dislocation occurred when the plaster cast was changed at two weeks. The other occurred six years later after a fall on the outstretched hand and cannot therefore be attributed to the nature of the approach. We have had no further dislocations in patients operated upon after 1976 nor did any of our patients have symptoms suggestive of compression of the median nerve.

The compression or inward movement of our first eight implants on ulnar deviation of the wrist may have been due to disruption of the carpal architecture found in Stage III but there is also the possibility that the prosthesis was in each case slightly smaller than the replaced bone and allowed the distal row of carpal bones to move upwards. The latest prostheses manufactured by Dow Corning Corporation Limited have a different texture, a deeper concavity to seat the head of the capitate and are available in five sizes. We have used them in more recent cases and have found a snug fit easier to obtain.

It is impossible to state dogmatically that replacement yields a better result than simple excision of the lunate.

The outcome of excision in 24 patients reviewed by Gillespie (1961) was in the majority of cases good. On the other hand, one patient was worse after the operation and another three suffered from severe to moderate pain. One was unable to work. Unlike some of his cases none of our patients had soft-tissue thickening or crepitus. The average range of dorsiflexion and palmarflexion, 40 degrees each, was the same in both series, but significantly our patients did not have the amount of restriction of ulnar deviation noted by Gillespie. In fact, unlike his cases, the average range of the latter was greater than the average range of radial deviation.

There appears to be a case for early replacement arthroplasty. The average range of dorsiflexion and palmarflexion achieved by Lichtman's patients was 60 and 40 degrees respectively. With the benefit of hindsight we no longer wait 45 months before operating upon persistently painful wrists with Kienböck's disease; if six months of conservative treatment has failed, the operation is indicated. On the other hand our experience of operating upon patients who have reached Stage III is such that we would still recommend an implant to those who presented with persistent symptoms, although it would seem only logical that the operation is unlikely to be successful when a patient has reached Stage IV and there are generalised degenerative changes in the carpus in addition to the changes characteristic of Stage III.

REFERENCES