Wrist cysts and fistulae

An arthrographic study of the rheumatoid wrist*

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Iveson, J. M. I., Hill, A. G. S., and Wright, V. (1975). *Annals of the Rheumatic Diseases*, 34, 388-394. **Wrist cysts and fistulae. An arthrographic study of the rheumatoid wrist.** An arthrographic study of the wrist joint, in which 65 rheumatoid wrist joints were satisfactorily shown, gave a high incidence of significant abnormalities even in the absence of clinical signs of wrist involvement. Several synovial protrusion cysts were shown and corresponded to localized clinical swellings on the volar aspect of the wrist joint. These cystic swellings may be apparent before the onset of polyarthritis and may be differentiated from ganglia arthrographically by their association with other features suggesting erosive synovitis. Cystic swelling over the lower end of the ulna is shown to be frequently due to synovial hypertrophy of the inferior radioulnar joint in either a dorsal or volar direction. In one case a fistulous track was delineated connecting the midcarpal joint with the volar surface of the wrist by a flexor tendon sheath.

Contrast radiography of rheumatoid joints has shown characteristic synovial changes of irregular margins, corrugations, and filling defects (Taylor, 1969; Harrison, Freiburger, and Ranawat, 1971). Synovial protrusion cysts, usually about the knee, but arising from other joints, have also been shown. Prospective studies, are however, few and the wrist joint has been the subject of only two previous studies (Morotomi, Tatsuzawa, Hori, and Kira, 1970; Harrison and others, 1971).

In view of the frequent involvement of the wrist by the rheumatoid process an arthrographic study was undertaken to correlate some of the external features with the synovial changes.

Materials and methods

A total of 78 arthrograms were attempted, of which 6 failed and 25 patients had both wrists investigated.

Group 1 Patients with definite or classical rheumatoid arthritis (RA). 12 without clinical evidence of wrist involvement. 33 with at least one feature of active wrist disease.

Group 2 Patients as in group 1, but with localized cystic swellings. 16 wrists (11 volar swellings; 5 distal ulna swellings).

Group 3 11 wrists investigated for diagnostic purposes of which 4 were subsequently diagnosed as RA and are included in groups 1 and 2. One of these latter had a clinical cyst.

Sixty-five wrists were seen in 43 patients (31 females and 12 males), aged between 17 and 75 years, with a mean of 54 years. All but three were persistently seropositive for rheumatoid factor and had had arthritis from 9 weeks to 22 years (mean 9.1 years). Ten had had RA for 3 years or less, and in group 2 the average duration was 5 years, mean age 53.5 years.

External features of the wrists recorded included tenderness, swelling, abnormal mobility of the lower (distal) end of the ulna, and subluxation of the carpus producing prominence of the ulnar styloid.

TECHNIQUE

A standard dorsal approach to the radiocarpal joint was used. Between 1.5 and 5 ml of either meglumide diatrizoate (Angiographin) or 25% sodium diatrizoate (Hypaque) may be injected depending on the capacity of the joint. Anteroposterior and lateral x-rays are taken within a few minutes, absorption of the contrast medium being complete within half an hour.

Results (Table I)

Only one case of RA had an entirely normal arthrogram (Fig. 1). In 16 (24.6%), the changes were purely

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Table 1 *Frequency of the main findings in this study*

	<i>No. of wrists (total = 65)</i>	<i>%</i>
Abnormal arthrograms	64	98.5
Radiocarpal changes only (i.e. synovial)	16	
	(including 5 cysts)	24.6
Radiocarpal changes and communications with other joints	48	73.9
(a) Inferior radioulnar alone	29	44.6
(b) Inferior radioulnar in combination	18	27.8
(c) Midcarpal joint	20	30.8
(d) Tendons (ECU7, Ext 1, Flex 3)	11	16.9
(e) Lymphatics	23	35.4
Cysts		
(1) Volar	8*	12.3
(2) LEU	4	6.1
Fistula	1	

* There was one in group 3 also.

ECU = extensor carpi ulnaris; Ext = extensor sheath; Flex = flexor tendon sheaths; LEU = lower end of ulna.

FIG. 1 Normal wrist arthrogram—with normal ulnar styloid bursa (prestyloid recess)

synovial and confined to the radiocarpal joint (Fig. 2), consisting of corrugation and loss of definition of the synovium. Five of these had cystic projections from the volar surface of the radiocarpal joint. In three cases the wrist was so severely disorganized that the resultant joint cavity was probably a combination of several joint spaces. The average duration of the joint disease in these 16 was 6.5 years.

Communication between the radiocarpal joint and other wrist structures was seen in 48 (73.9%). The most common abnormality, excluding pure synovial changes, was communication between the radiocarpal and inferior (distal) radioulnar joint (IRU) found in 47 (72.4%) (Fig. 3). This occurred alone in 29 (44.6%), but in combination with other abnormalities in 18

FIG. 2 Synovial changes in the radiocarpal joint with an enlarged radial volar pouch, and prominent lymphatics

(27.8%). The appearance of the contrast material within the IRU varied from a well-defined 'beret' of the almost normal joint (see Fig. 3) to an extensive 'halo' around the head of the ulna of the markedly proliferated synovium (Fig. 4). This latter appearance is seen in both anteroposterior and lateral projections. Communication between the radiocarpal and midcarpal joints usually occurred in combination with other abnormalities. The radiocarpal joint also communicated with the tendon sheath of extensor carpi ulnaris (Fig. 7), the common extensor tendons, and the flexor tendon sheaths (Fig. 3). Lymphatic filling occurred in 35.4% usually from the volar surface of the joint (Fig. 2).

The volar cystic swellings in group 2 were 1–3 cm in diameter. Seven were found on the radial side and 4

FIG. 3 Wrist arthrogram in rheumatoid arthritis showing filling of the inferior radioulnar joint (IRU), the midcarpal joint, and the sheath of a flexor tendon

on the ulnar side of the wrist, just proximal to the main volar skin crease. Some were crepitant, and the tension within them increased on injecting contrast into the radiocarpal joint, thus confirming their communication with this joint.

FIG. 4 Biloculated cystic enlargement of the distal radioulnar joint

Of these 11 cysts, 3 did not fill with contrast material. Two were probably due to an unrecognized tenosynovitis and the other to marked volar projection of the hypertrophied IRU joint. Cystic projections from the main joint cavities were seen in 7 of the other 8. One of these became evident only after the injection of contrast into the joint cavity.

The cysts arose from the volar aspect of the radiocarpal joint in 4 (Fig. 5), and of the midcarpal joint in 2 (Fig. 6). In 3 it was not possible to be certain of the site of origin. A narrow duct leading to the cyst was seen in 3 and probably indicates communication with a flexor tendon sheath. The 'cyst' is then a form of cystic tenosynovitis with communication with the wrist joint. It is probably by this mechanism that the fistulous track, seen in one of the cases, developed (Fig. 7). Contrast was seen to track back along the flexor surface of the wrist from a connexion with the midcarpal joint to discharge onto the surface of the skin through a small skin papule. Soft cystic swellings 1–2 cm across were seen over the lower end of the ulna in 5 cases. In 4 of these the arthrograms showed communication of the radiocarpal and IRU joints, with gross hypertrophy of the joint well above the dorsal surface of the ulna (Fig. 4). In one case aspiration of fluid within the cyst during arthrography confirmed that it contained radiographic contrast.

In group 3, 4 cases subsequently were diagnosed as RA. One was the case with a fistula (Fig. 7), and another presented with monarticular arthritis affecting the wrist, which clinically showed a volar cyst. A third, although having had polyarthritis for 9 weeks,

FIG. 5 (a) Anteroposterior and (b) lateral views of wrist, showing synovial changes with a cystic enlargement of the radial volar bursa

developed a small (1 cm) swelling over the volar aspect of the right wrist. Arthrography showed characteristic changes of long-standing synovitis, with outlining of the midcarpal and IRU joints bilaterally and a flexor tendon sheath (Fig. 3).

No correlation was found between the various external features of the wrist and the filling by contrast of the IRU joint. Of the 12 clinically uninvolved wrists, 11 had abnormal arthrograms, with com-

munication of the radiocarpal and the IRU in 8. Excessive mobility of the distal ulna gave no definite indication that the IRU joint would be outlined.

Discussion

In the normal wrist arthrogram the contrast medium shows a thin, sharply defined crescent occupying the radiocarpal joint and extending as a rapidly fading

FIG. 6 A lateral view of a cyst arising from the midcarpal joint. The long neck, possibly formed by a tendon sheath, ends in a terminal dilatation. The hypertrophic IRU extending in a volar direction is also shown

FIG. 7 A fistulous track is seen passing proximally on the radial side. The radiocarpal joint is enlarged with characteristically corrugated synovium. There is filling by contrast of both IRU joint and ECU tendon sheaths

veil over the proximal carpal bones (Fig. 1). Previous studies have recorded the presence also of two normal synovial pouches (Kessler and Silberman, 1961; Wirth, 1968; Harrison and others, 1971), one on the radial volar surface and another near the ulnar styloid process. The former was seen to be enlarged in arthrograms of rheumatoid wrists and was frequently the site of a leash of lymphatics. The other corresponds to the prestyloid recess discussed by Lewis, Hamshire, and Bucknill (1970), and is thought to be

the main origin of ulnar styloid erosions (Webb and England, 1971).

The general findings of the study confirm those of two previous studies, the frequency of communication between the various joints and other wrist structures being comparable (Table II). In only one case with definite RA was there no abnormality. Even when the synovium was not actually corrugated, it appeared hazy and imprecise with an increased joint cavity. Usually the synovium displayed both abnormalities. It should be noted that Harrison and others (1971) found communications between the radiocarpal and radioulnar joints in 16% of normal wrists, especially in the elderly and where a history of trauma was obtained. They point out that the changes shown are not specific, although a combination of two or more features is practically diagnostic of RA. We agree with this but have seen a case with marked degenerative disease of the wrists who had several intercommunications but little synovial change.

Included in our material were several cystic swellings of which 7 were due to projections from the wrist joint. In most it was thought that the cyst was due to enlargement of the radial volar pouch, although two definitely originated in the midcarpal joints by thin necks tracking proximally along tendon sheaths. In some, the site of origin was uncertain. This type of proximal tracking is similar to the appearance seen in the case with a wrist fistula.

Although Baker (1885) refers to having seen a large multilocular cyst on the dorsum of a wrist there is no further description until Croft and Jacox (1968) described two cases of RA presenting with wrist 'ganglia' before the appearance of the polyarthritis. These swellings were both dorsal and volar and communicated with the wrist joint on dissection. Bowerman and Muhlethaler (1973) describe a case of a wrist cyst, but this did not connect with the wrist joint and may have been an example of cystic flexor tenosynovitis. Jayson, Swannell, Kirk, and Dixon (1969) have described rupture of the rheumatoid wrist joint in three cases but it appears not to have

Table II Comparison of results of the present study with those in two previous studies

Type of abnormality	Present study (65) (%)	Harrison and others (1971) (60) (%)	Morotomi and others (1970) (68) (%)
RC and IRU communication	72	70	85
RC and MC communication	31	70	56
RC and ext. tendon sheath	12	21	10
Two or more	74	77	84.5
Lymphatics	35	33	16
Synovial changes	98	90	90

RC = radiocarpal joint; IRU = inferior radioulnar joint; MC = midcarpal.

been associated with synovial cysts. The high prevalence of cysts in this selected group of patients agrees with the frequency of popliteal cysts shown during unselected arthrographic studies of the knee joint. Taylor's (1969) prospective study of the rheumatoid knee showed a 40% incidence of popliteal cysts—a finding recently confirmed by Zizic, Whelton, Bowerman, and Stevens (1974) who found synovial cysts at the knee in 19 of 30 patients with RA.

It is probable that pressure changes within the radiocarpal joint influence the formation of these cysts in a manner similar to that suggested for those seen at the knee (Jayson and Dixon, 1970). Although such large pressure changes are probably not produced in the wrist joint, especially in the presence of pain which will limit activity, there is a pre-existing potential site of weakness in the radial volar pouch. Minor pressure changes may be sufficient to inflate an already enlarged pouch, consequent upon the general increase in the size of the synovial cavity. When a tendon sheath communicates with a joint it too may be easily 'inflated' by fluid from the joint to produce a small cyst.

In the fistulous case (Fig. 7) the rheumatoid involvement of the wrist and flexor tendon had eventually resulted in erosion of the tenosynovitis on to the skin surface at some distance from the joint. As has been shown above, intercommunication between most joint cavities and tendon sheaths is frequent in RA, and yet 'fistulous rheumatism' is rare. Bywaters (1953) suggested that a fistula arose when small bone fragments from joints were extruded as foreign bodies. This theory is supported by the case reported by Rosin and Toghil (1963), who detected necrotic bone

in the wall of such a fistula. The tortuous course taken by the track of the fistula in our case makes this seem improbable. Infection as a cause also seems to be excluded by our inability to culture any significant organisms from the fluid discharge and by its persistent clarity.

The wrist cysts were generally symptomatically unimpressive, as popliteal cysts often are—any discomfort or inconvenience from them being lost in the general wrist joint involvement. They were often painless and improvement has been seen after injection of hydrocortisone into the dorsum of the radiocarpal joint. It is possible that rupture of these cyst-like projections may give rise to the acute symptoms sometimes seen in RA and to which Jayson and others (1969) refer. The cysts may be seen, as with Croft and Jacox's 'ganglia', early in the disease process. Duration of arthritis in group 2 was shorter than in the main group. Five cases were associated with radiocarpal joint changes only on the arthrogram, and not with the intercommunications that are so common in more extensive and prolonged disease. In one case a localized wrist swelling appeared some months before a generalized polyarthritis and this appeared to be due to an enlarged radial pouch producing a cyst. Changes more usually found with a chronic synovitis may also be seen in apparently early disease.

It is suggested that the more frequent use of this simple technique, which is helpful in differentiating periarticular swellings, should increase the diagnostic value of examination of the wrist joint, and allow a more rational approach to the medical and surgical management of this joint.

References

- BAKER, W. M. (1885) *St. Bart. Hosp. Rep.*, **21**, 177 (The formation of abnormal synovial cysts in connection with the joints)
- BOWERMAN, J. W., AND MUHLETALE, C. (1973) *J. Canad. Ass. Radiol.*, **24**, 24 (Arthrography of rheumatoid synovial cysts of the knee and wrist)
- BYWATERS, E. G. L. (1953) *Ann. rheum. Dis.*, **12**, 114 (Fistulous rheumatism—a manifestation of rheumatoid arthritis)

- CROFT, J. D., AND JACOX, R. F. (1968) *J. Amer. med. Ass.*, **203**, 144 (Rheumatoid 'ganglion' as an unusual presenting sign of rheumatoid arthritis)
- HARRISON, M. O., FREIBERGER, R. H., AND RANAWAT, C. S. (1971) *Amer. J. Roentgenol.*, **112**, 480 (Arthrography of the rheumatoid wrist joint)
- JAYSON, M. I. V., AND DIXON, A. St. J. (1970) *Ann. rheum. Dis.*, **29**, 401 (Intra-articular pressure in rheumatoid arthritis of the knee. III. Pressure changes during joint use)
- , SWANNELL, A. J., KIRK, J. A., AND DIXON, A. St. J. (1969) *Ann. phys. Med.*, **10**, 175 (Acute joint rupture)
- KESSLER, I., AND SILBERMAN, Z. (1961) *Surg. Gynec. Obstet.*, **112**, 33 (An experimental study of the radiocarpal joint by arthrography)
- LEWIS, O. J., HAMSHIRE, R. J., AND BUCKNILL, T. M. (1970) *J. Anat.*, **106**, 539 (The anatomy of the wrist joint)
- MOROTOMI, T., TATSUZAWA, Y., HORI, J., AND KIRA, S. (1970) *Orthop. Surg.*, **21**, 846 (Rheumatoid wrist arthrography)
- ROSIN, A. J., AND TOGHILL, P. J. (1963) *Postgrad. med. J.*, **39**, 96 (Fistulous rheumatism. An unusual complication of rheumatoid arthritis)
- TAYLOR, A. R. (1969) *Brit. J. Radiol.*, **42**, 493 (Arthrography of the knee in rheumatoid arthritis)
- WEBB, F. W. S., AND ENGLAND, J. P. S. (1971) *Arthr. and Rheum.*, **14**, 422 (Ulnar styloid erosions and the prestyloid recess)
- WIRTH, W. (1968) 'Arthrography' in 'Roentgen Diagnosis', eds Schinz, Baensch, Frommhold, Glauner, Uehlinger, Wellaher, Vol. 1, p. 346. Grune and Stratton, New York and London
- ZIZIC, T. M., WHELTON, J. C., BOWERMAN, J. W., AND STEVENS, M. B. (1974) *Arthr. and Rheum.*, **17**, 326 (Arthrographic diagnosis of synovial pathology)