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The Hand Complications of Colles' Fractures

H. D. STEWART, A. R. INNES and F. D. BURKE
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Two hundred and thirty-five patients with displaced Colles' fractures were followed to union, and 209 patients to six months, specifically searching for hand pathology.

The incidence of carpal tunnel syndrome was seventeen per cent at three months and twelve per cent at six months. The patients with the syndrome were significantly older and their fractures showed significantly greater residual dorsal angulation.

Sixteen patients developed Dupuytren's disease between three and six months, when the incidence was eleven per cent. These patients were significantly older and had average fractures and anatomical results. All cases were mild, with only two contractures. Twenty-one patients were reviewed at a mean of 20.7 months post-fracture, when no case had significantly progressed.

Material and Method

The patients were those who had entered a prospective randomised trial comparing the use of a supinated orthoplast cast-brace with a below-elbow cast-brace and with a conventional plaster cast in the treatment of displaced Colles' fractures. (Stewart, Innes and Burke, 1984). Two hundred and thirty-five consecutive patients with displaced Colles' fractures at The Derbyshire Royal Infirmary were followed to fracture union. Close attention was paid to any complication arising during the initial fracture management and rehabilitation, and specific assessment for hand pathology was made at three and six months by one of us. (FDB).

Two hundred and fifteen patients were seen at three months and 209 at six months. In addition, twenty-one patients with Dupuytren's disease noted at six months were seen between 15 and 27 months post-fracture with a mean of 20.7 months.

There were 35 males and 200 females and their ages ranged from 18 to 86 years with a mean of 60.2 years.

Correlation between each complication and both the degree of severity of the fractures involved and the anatomy of the same wrists at union compared with the unfractured side was sought by measuring the dorsal angle, radial length and radial angle (Figure 1) on radiographs of the fractured wrists, the wrists at union and the unfractured wrists.

Results

All hand pathology is listed in Table 1.

With regard to the three methods of splintage, there was no significant difference between the incidences of each complication in each group, with the exception of sensory radial nerve irritation (See below).

No patient developed Sudeck's osteodystrophy or shoulder stiffness.

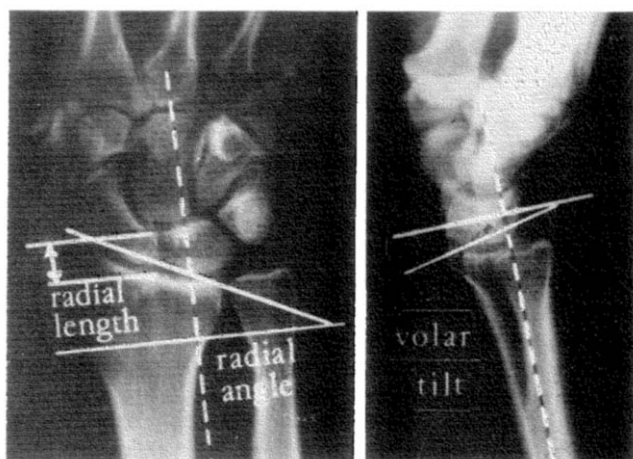


Fig. 1 Measurement routine for the anatomical assessment. In the fracture radiographs dorsal angulation was considered as a negative volar tilt.

Carpal Tunnel Syndrome One patient developed symptoms of median nerve compression in a plaster cast with extreme palmar flexion, the "Cotton-Loder" position, soon after reduction. The position was changed to neutral with permanent relief of these symptoms. Subsequently, the incidence of this syndrome was 17%, (37 patients), at three months and

TABLE 1
Hand pathology.

	3/12	6/12	Operations
Number of Patients	213	209	
Carpal Tunnel Syndrome	37 (17.2%)	26 (12.4%) (10 new, 20 settled)	8 decompressions 3 Injections
Palmar fascia nodules or bands	9	23, (16 new, 2 regressed, 1 DNA)	None
Ulnar nerve compression	2	1	1 decompression
Radial nerve compression	11	1	None
EPL rupture	-	1	None
Trigger finger	3	1, injected	None
De Quervains	0	1, injected	None

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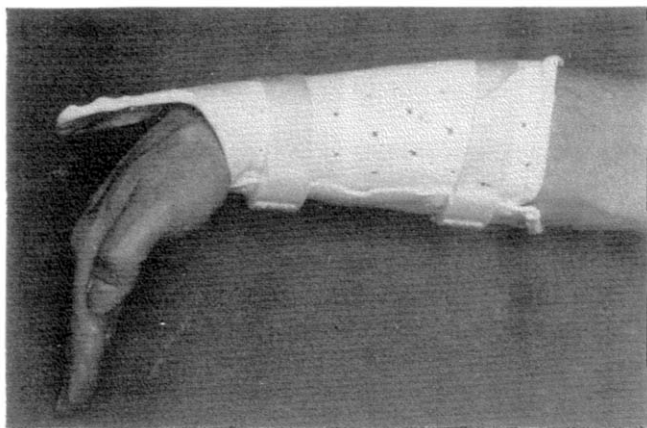


Fig. 2 The below-elbow cast-brace, showing freedom of wrist movement except for dorsiflexion, abolished by the dorsal hood.

12%, (26 patients), at six months. Eight patients required carpal tunnel decompression (3.4% of the total). Two of these eight patients developed symptoms after three months.

The freedom of hand movement allowed in the cast-braces, with only dorsiflexion abolished, (Figure 2), did not obviate development of this syndrome. Nineteen patients out of eighty-four treated in plaster casts developed symptoms by three months, compared with eighteen out of 131 patients treated in cast-braces. This is not statistically significant, ($0.1 > P > 0.05$).

Table 2 shows details of the patients with this syndrome and the anatomical parameters of their wrists. This shows that the symptomatic group of patients was significantly older, mean age 66.0 years, than the non-symptomatic group of patients, mean age 58.7 years, ($P < 0.001$). Six of the symptomatic patients were males, 12.7%, which corresponds with the incidence of males in the whole group, 14.8%. The mean values of each of the three initial anatomical measurements of the forty-seven fractures associated with the syndrome were not significantly different from those of the 188 fractures not associated with the syndrome, and the percentage of fractures with intra-articular involvement was similar in the two groups.

Analysis of each anatomical parameter at union, however, revealed a highly statistically significant difference, ($P < 0.001$), between the mean value of the residual dorsal angle of the forty-seven fractures associated with the syndrome, 12.6° , and the mean residual dorsal angle of the remainder, 7.0° . As regards the residual radial length and the angle there was no such statistical correlation with the syndrome. The severity of displacement of the fractures and the anatomical results of the eight patients requiring carpal tunnel decompression were not worse than those of the whole symptomatic group.

Clinical details of these eight patients are shown in Table 3. Seven underwent simple decompression of the carpal tunnel without decompression at the fracture level, and the eighth had a more extensive decompression.

Dupuytren's Disease The incidence was 4% at three months and 11%, (twenty-three patients) at six months. Two patients had noticed palmar nodules prior to the fracture. Sixteen patients were noted to develop the condition between three and six months. All cases were mild, taking the form of palmar nodules in thirteen patients out of the twenty-three, palmar bands in nine patients and a digital nodule in one patient. Twenty-one patients were seen between fifteen and twenty-seven months post-fracture, mean time 20.7 months, and the disease process had not progressed significantly in any patient. Minor progression was seen in two patients; two patients felt that the nodules were definitely less prominent, and the remainder were unchanged. Only two patients had contractures at final review. Both involved the proximal interphalangeal joint and were limited to 15° and 20° respectively.

The patients with this condition were statistically significantly older, mean age 67.3 years, than those without the condition, mean age 59.4 years, ($P < 0.001$). Only one of the twenty-three patients was male. The associated fractures and anatomical results were average for the group as a whole.

Ulnar nerve Two patients developed sensory symptoms of ulnar nerve compression at the wrist during treatment, one case was mild and had settled by six months but the other was troublesome and was decompressed at six months, following positive electromyographic tests. This patient was a fifty-six-year-old female with a poor anatomical result for her wrist at union, showing marked radial deviation. (20° loss of radial angle compared with normal side).

Radial nerve Eleven patients developed symptoms of mild irritation of the terminal branches of the radial nerve, all but one had settled by six months, and all had been treated in orthoplast cast-braces.

Others One rupture of the Extensor Pollicis Longus tendon was noted, at six months in a forty-four-year-old female who had sustained a minimally displaced fracture not requiring reduction, which at union showed a dorsal angle of 13° and no radial shortening.

There were three patients with trigger finger noted at three months, one of which persisted to six months and required injection, with success. One patient with De Quervain's stenosing tenosynovitis was injected

COMPLICATIONS OF COLLES FRACTURES

TABLE 2
Details of the patients with carpal tunnel syndrome, and the anatomical parameters of their wrists.

	<i>Patients with</i>		<i>Patients without</i>	<i>Patients operated on</i>
No.	47		188	8
Age	66.0	P<0.001	58.7	70.2
Percentage Intra-articular fractures	42		45	50
Dorsal angle (degrees)	12.6	P<0.001	7.0	12.1
Anatomical parameters at union	Radial length (mm)		5.6	3.1
	Radial angle (degrees)		22.5	21.0
Anatomical parameters of the fractures	Dorsal angle (degrees)		19.8	16.6
	Radial length (mm)		4.5	4.2
	Radial angle (degrees)		20.8	20.5

The only two comparisons between the first two columns reaching statistical significance are shown (Using the standard error of the difference between the two means).

TABLE 3
Clinical details of the patients requiring carpal tunnel decompression.

<i>Sex</i>	<i>Age</i>	<i>EMGs</i>	<i>Time of onset Post-fracture</i>	<i>Time of Operation</i>	<i>Motor signs</i>	<i>Compression at Operation</i>	<i>Results</i>	<i>Comment</i>
F	74	Positive	1/12	13/12	No	Yes	Good	
F	73	Not done	3/12	4/12	No	Yes	Good	Some residual thumb paraesthesiae
F	70	Not done	7 weeks	6/12	No	No	Poor	Refused follow up EMGs.
F	76	Not done	3/12	6/12	Mild Thenar Atrophy	Yes	Good	
M	71	Positive	3/12	6/12	Mild Thenar Atrophy	Yes	Fair	+ proximal decompression; residual thumb paraesthesiae
F	60	Not done	3/12	6/12	No	Yes	Good	+ Baldwin's osteotomy
F	76	Not done	6/12	10/12	No	Yes	Good	
F	62	Positive	6/12	1 year	No	Yes	Good	

successfully at six months, she was also the only patient to have persistence of radial nerve irritation over the radial styloid at six months. None of these patients had associated carpal tunnel syndrome or rheumatoid arthritis.

Discussion

The incidence of carpal tunnel syndrome of 17% at three months is much higher than those of previous reports, which vary from 0% (Lidstrom, 1959) to a maximum of 5.4% (Pool, 1973), and reflects specific clinical searching by a hand surgeon. The incidence had settled to 12% by six months, but the subsequent operation rate of 3.4% of our whole group for persistent troublesome symptoms (eight patients) of whom seven had operative findings of definite median nerve compression in the carpal tunnel with subsequent resolution of symptoms, suggests there is a tendency to underestimate this condition following Colles' fractures.

Both Lynch (1963) and Sponsel (1965) in their papers on Carpal Tunnel Syndrome following Colles' fractures observed that symptoms came on soon after reduction in the majority of cases and usually before three months. They considered that the main aetiological factors were the position of immobilisation of the wrist, and oedema and haematoma in the carpal tunnel, especially following fractures with intra-articular extension. In our series there was only one acute case, due to immobilisation in extreme palmar flexion, which settled completely after correct splintage. There were, however, ten new cases at six months, with two of these subsequently requiring decompression. The reason for this difference is that none of our patients, except the one mentioned, were immobilised in significant wrist palmar flexion. In Lynch's paper, of the fifteen extremities in which the position of immobilisation was known, twelve had the Cotton-Loder position of full flexion and ulnar deviation. In Sponsel's paper, three of nineteen patients had their wrists in the Cotton-Loder position. The lower incidence after three months, stated

in their papers, is probably because of the referred nature of their practice. We reiterate that the condition appears to be common if looked for.

Because of the specific correlation of the incidence of this delayed syndrome and the mean residual dorsal angle of the associated fractures, and the correlation with increased age, we suggest the aetiology to be due to the effect of the changed anatomy acting over several weeks in older patients, whose nerve tissue tolerates the effects of trauma and pressure relatively poorly. Tenosynovitis of the flexor tendons, as suggested by Lynch (1963) as a possible cause of compression, may be a consequence of this altered anatomy.

We therefore challenge the view that these fractures are not worth reducing in the elderly, because it is accepted that the final anatomical result is related to the completeness of reduction, (Green, 1956; Lidstrom, 1959; Pool, 1973; Van der Linden, 1981; Stewart, Innes and Burke, 1984).

The clinical success rate of seven out of eight following classical carpal tunnel decompression tends to refute the suggestion of Lewis (1978), that treatment of this syndrome following Colles' fractures produces poor results. Because the one patient with a poor result refused follow up E.M.G. studies and further treatment, we cannot confirm or deny that this result was due to compression proximal to the carpal tunnel caused by swelling deep to the fascia over the fracture, which if not decompressed is suggested to be the cause of poor results.

The relationship between trauma and progression of Dupuytren's disease is of interest. The incidence of the disease in manual workers is no higher than the incidence in clerks, (Early, 1962). The disease is evenly distributed between dominant and non-dominant hands. For these and other reasons discussed by Fisk (1974), it is generally accepted that chronic minor trauma does not play a role in the causation of Dupuytren's disease.

However, one occasionally sees a patient with pre-existing Dupuytren's disease which appears to have been exacerbated by an episode of trauma to the involved limb, a correlation supported by the conclusion of Clarkson, (1961) in a survey of numerous authorities.

Using the incidences of the disease for each decade of age in both sexes quoted by Early (1962), the predicted incidence in our group is 4.2% which is statistically significantly lower than the actual incidence at six months of 11%, ($0.05 > P > 0.01$). This increase in incidence of Dupuytren's disease following Colles'

fracture has not previously been noted. Bacorn (1953) in a study of 2100 cases of Colles' fractures noted only four cases (0.2%); neither Lidstrom (1959) nor Frykman (1967) in their detailed reviews noted any cases, and Colles' fracture as a predisposing factor is not mentioned in the monograph on Dupuytren's disease edited by Hueston and Tubiana, (1974).

We support the hypothesis that an episode of limb trauma exacerbates a pre-existing tendency to develop Dupuytren's disease, and suggest that Colles' fracture definitely accelerates the Dupuytren process, although this is only temporary, and rapid development of contractures is unlikely to occur.

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References

- BACORN, R. W. and KURTZKE, J. F. (1953). Colles' Fracture: A Study of 2,000 cases from The New York State Workman's Compensation Board. *The Journal of Bone and Joint Surgery*, 35-A: 643-658.
- CLARKSON, P. (1961). The Aetiology of Dupuytren's Contracture. *Guy's Hospital Reports*, 110: 52-62.
- EARLY, P. F. (1962). Population Studies in Dupuytren's Contracture. *The Journal of Bone and Joint Surgery*, 44-B: 602-613.
- FISK, G. (1974). The Relationship of Trauma to Dupuytren's Contracture. In: *Dupuytren's Disease*. 1st Edition. Ed. Hueston, J. T., Tubiana, R. Edinburgh and London. Churchill Livingstone 43-44.
- FRYKMAN, G. (1967). Fracture of the Distal Radius Including Sequelae—Shoulder-Hand-Finger Syndrome. Disturbance in the Distal Radio-Ulnar Joint and Impairment of Nerve Function. A Clinical and Experimental Study. *Acta Orthopaedica Scandinavica Supplementum* 108.
- GREEN, J. T. and GAY, F. H. (1956). Colles' Fracture-Residual Disability. *American Journal of Surgery* 91: 636-642.
- HUESTON, J. T. and TUBIANA, R. Editors of Dupuytren's Disease. 1st Edition, Edinburgh and London. Churchill Livingstone. (1974).
- LEWIS, M. H. (1978). Median Nerve Decompression After Colles's Fracture. *The Journal of Bone and Joint Surgery*, 60-B: 195-196.
- LIDSTRÖM, A. (1959). Fractures of the Distal End of the Radius. A Clinical and Statistical Study of End Results. *Acta Orthopaedica Scandinavica Supplementum* 41.
- LYNCH, A. C. and LIPSCOMB, P. R. (1963). The Carpal Tunnel Syndrome and Colles' fractures. *The Journal of the American Medical Association*, 185: 363-366.
- POOL, C. (1973). Colles' Fracture. A Prospective Study of Treatment. *The Journal of Bone and Joint Surgery* 55-B: 540-544.
- SPONSEL, K. H. and PALM, E. T. (1965). Carpal Tunnel Syndrome following Colles' fracture. *Surgery Gynecology and Obstetrics* 121: 1252-1256.
- STEWART, H. D., INNES and A. R., BURKE, F. D. (1984). Functional Cast-Bracing for Colles' Fractures: A Comparison between Orthoplast Cast-Bracing and Conventional Plaster Cast. *The Journal of Bone and Joint Surgery*, 66-B: 749-753.
- VAN DER LINDEN, W. and ERICSON, R. (1981). Colles' fracture. How Should Its Displacement Be Measured and How Should It Be Immobilised? *The Journal of Bone and Joint Surgery* 63-A: 1285-1288.