

FRACTURES OF THE TUBULAR BONES OF THE HAND

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Age related differences in demographics, morphology, treatment and outcome were investigated in 701 fractures of the metacarpals or phalanges, including fracture-dislocations, in 655 patients. Fractures mainly due to sport occurred in 184 children, usually after 10 years of age. The base of the proximal phalanx was especially vulnerable. Thirty-seven percent of 256 young adults fractured their fifth metacarpal. The thumb was rarely involved. Half of these two groups fractured the fifth ray. Older adults had more fractures of the distal phalanx and displaced extraarticular fractures requiring stabilisation. Women predominated in the patients over 65. Forty percent of this group sustained their fracture on the road and more fractures involved the thumb, were oblique, intraarticular or multiple than in other groups. Detailed analysis of 423 X-rays demonstrated that only 10% of 70 intraarticular fractures and 19% of 363 extraarticular fractures were completely undisplaced. Patient response to postal questionnaire based outcome assessment using SF-12, MHQ was very poor.

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Hand and wrist injuries are responsible for up to 29% of the patients seen in an Accident and Emergency Department (Angermann and Lohmann, 1993), with hand fractures representing up to 19% of all hand injury patients seen (Edwards, 1975). Hand fractures are frequent but are mainly treated in an outpatient setting. Only a minority require surgery, commonly stabilisation with K-wires. These injuries are primarily recreational and domestic, rather than industrial. This may, in part, be related to Health and Safety legislation and a declining manufacturing base in the UK.

There has been relatively little published work in Europe on the demographics, nature, treatment and outcome of fractures and dislocations involving the metacarpals and phalanges of the hand. In particular, there is little information on displacement of extra-articular and intraarticular fractures and the age-related differences in the patterns of fractures in the digital skeleton.

A prospective audit of all injuries was conducted (Burke et al., 2004) and data from this audit was used to investigate the patterns of fractures of the digital skeleton and their displacement.

PATIENTS AND METHODS

We studied all patients who had sustained fractures of the metacarpals and phalanges, including those patients with a dislocation of an adjacent joint. One thousand four hundred and forty-four trauma cases presented in the six month period of this study. Of these cases, 653 patients had fractures of metacarpals or phalanges, with two patients sustaining a further fracture, resulting in 655 patient episodes (an average of 109 patients

presenting each month). This represented 45% (655/1444) of the total number of patients seen as a result of hand injuries during this period. These 655 patient episodes included a total of 701 tubular bone fractures. There were 486 male and 167 female patients in this patient group.

All aspects of treatment for every new patient attending were documented. The age, sex, dominance and occupation of the patients were noted, as was the place where the injury occurred, the mechanism of injury and the day and time of injury. The ray that was injured, the bone within each ray fractured and the location of the fracture within each bone was recorded in each case. We divided the 655 patients into four age groups as follows: Group 1 – children 0 to 16, Group 2 – young adults 17 to 40, Group 3 – older adults 41 to 65 and Group 4 – those of retirement age, 65+.

To evaluate these fractures further, the X-rays of these patients were analysed for the fracture morphology, the degree of split, depression and angulation of intraarticular fractures and the degree of angulation and displacement of extraarticular fractures. Four hundred and twenty-three sets of X-rays were analysed further with specific measurement of displacement, accounting for 65% of the patients. In intraarticular fractures, the degree of split and depression were measured in mm. In extraarticular fractures, undisplaced fractures were graded: Grade 1 (0–25% of the shaft diameter displacement), Grade 2 (26–50%), Grade 3 (51–75%), Grade 4 (76–100%) and Grade 5 (greater than 100% displacement). Fracture angulation was graded as none, mild (0–10°), moderate (10–20°) and severe (greater than 20°).

The resources used to treat these injuries were noted, including the number of clinic visits, whether an

operation was performed, the duration of inpatient stay in days and the duration of surgery in minutes.

To assess outcome we used the SF-12 general health questionnaire and the Michigan Hand Questionnaire (MHQ), which is a hand-specific outcomes instrument measuring the health outcomes of patients with chronic hand conditions (Chung et al., 1998). We also recorded the patients' and surgeons' view of outcomes as 'poor', 'fair', 'good' or 'back to normal'.

The time of return to work was recorded in days.

Analysis was conducted looking at the pattern for each age group using cross-tabulation and analysis of variance.

RESULTS

Table 1 presents demographic and injury details. Males were affected approximately three times as often as females (2.9:1, i.e. 74% overall). However, there were significant differences in sex distribution between the different age groups. In children and in older adults, the distribution was similar to the overall distribution. In young adults, more males sustained fractures. In patients of retirement age, females sustained slightly more fractures than males. The fracture involved the dominant hand in 65% (396/613) of cases, with no

difference in the distribution between the different age groups.

Fractures were most common in the 10 to 15 year olds, comprising 19% (121/631) of the total. Fractures were less common in those above 45 years of age and the overall age range was from 11 months to 102 years.

Twenty-eight percent (185/653) of the patients were still at school. Thirty-eight percent (245/653) of the cases were individuals involved in light, moderate or heavy manual work. Professionals and desk workers only represented 11% (73/653) of all cases.

The commonest place for the injury to happen was either in the home or while playing sport (Table 1). Sport was responsible for 44% (76/174) of the paediatric fractures, but only 24% (64/271) of those fractures occurring in young adults. Work was responsible for 15% (41/271) of the fractures in young adults, but 29% (32/111) in older adults. Road related injuries were more common in young adults and those above retirement age, accounting for 23% (61/271) of the injuries in young adults and 43% (13/30) in those above retirement age. The proportion of fractures occurring in the home remained constant, at around 30%, in all the younger age groups, but increased at retirement age to 43% (13/30).

The commonest mechanism of injury was by crush/direct injury to the finger itself, occurring in 83%

Table 1—Demographic and injury details

		<i>Children</i> (0–16 years) <i>n</i> = 183	<i>Young Adults</i> (17–40 years) <i>n</i> = 303	<i>Older Adults</i> (41–65 years) <i>n</i> = 131	<i>Retired Patients</i> (over 65 years) <i>n</i> = 36	<i>Total</i> <i>n</i> = 653	χ^2	<i>p</i>
Mean age (years)		11.8	27.9	50.3	78.4	31		
	SE	0.3	0.4	0.6	1.2	18.5		
Sex	m:f	129:54	246:57	94:37	17:19	486:167	23.3	0.0001
Injury dominance (<i>n</i> = 613)								
Dominant		104	198	76	18	396		
Non-dominant		66	91	45	15	217	4.4	0.2
		<i>n</i> = 184	<i>n</i> = 304	<i>n</i> = 131	<i>n</i> = 36	<i>n</i> = 655		
Nature of injury (<i>n</i> = 648)								
Crush		154	256	94	31	535		
Laceration		1	9	12	3	25		
Indirect		25	33	22	2	82		
Other		1	4	1		6	24.8	0.003
Where injury occurred (<i>n</i> = 586)								
Home		53	85	34	13	185		
Sport		76	64	19		159		
Work		2	41	32		75		
Road		18	61	14	13	106		
Other		25	20	12	4	61	105.1	0.0001

Age was analysed and SE represents standard error. The remaining information was categorical and analysed using cross tabulation, the chi square and the *p* value is documented.

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