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ORIGINAL STUDY

Tumours of the hand presenting as pathological fractures

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Tumours represent one of the important differential diagnoses that need to be considered while investigating fractures of the small bones of the hand, as this can sometimes be the sole or the first presenting complaint. We conducted a retrospective study of the Scottish Bone Tumour Registry, analysing the records of patients with hand tumours which primarily presented as pathological fractures.

The registry held records of 233 patients with tumours involving the bones of the hand, of which 53 (22.7%) had pathological fractures as the first presenting complaint. The average age at presentation was 36.9 yrs. The proximal phalanx was the most common bone involved (50.9%). The distal phalanx rarely developed pathological fractures due to tumours (5.3%). Most of the lesions affected the fifth ray (43.9%) Chondroma was the most common tumour seen (43 patients). Malignant lesions were an infrequent cause of pathological fractures (7 chondrosarcomas and 1 Ewing's sarcoma).

Tumours are less commonly seen as a cause of fractures in the hand with most such fractures initially treated as minor injuries with buddy strapping and early mobilisation. A carefully obtained history and study of radiographs is essential to diagnose these lesions.

Keywords : hand ; tumours ; pathological fractures.

INTRODUCTION

Hand fractures account for up to 19% of all fractures (*17*). They are commonly seen within the age group of 10-40 years (*13*). They frequently involve the phalanges and have a similar incidence in both hands irrespective of dominance (*1, 10, 13, 17*). In the younger age group, sports related trauma is the main cause of both metacarpal and phalangeal fractures, whereas accidental falls cause these fractures in the elderly (*5, 6*). Although tumours both benign and malignant are known to affect the small bones of the hand, there is very little literature available on tumours as a potential cause of hand fractures.

The purpose of the study was to review cases from the Scottish bone tumour registry to identify the types and location of tumours of the hand that can present to the emergency room as a fracture. We attempt to highlight these fractures as the first and often the only mode of presentation of these tumours.

MATERIAL AND METHODS

The Scottish Bone Tumour Registry was analysed retrospectively, evaluating all cases of tumours involving

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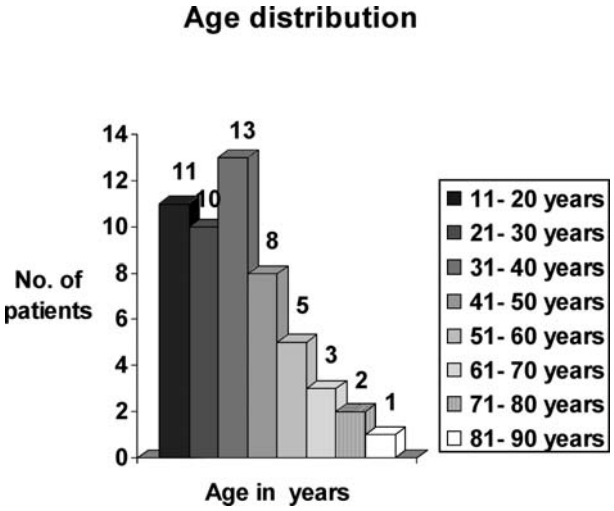

Fig. 1. — Age distribution of patients with hand tumours presenting as pathological fractures ; number of patients diagnosed with pathological fractures of hand bones in various age groups in shown in the chart.

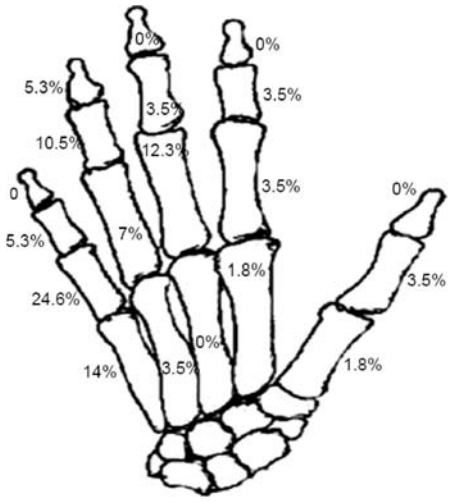

Fig. 2. — Distribution of hand tumours with pathological fractures ; the percentage of tumours detected in each of the small bones of the hand is depicted in the figure.

the hand. This registry is a regional database which systematically includes clinical, pathological and radiological details of patients with musculoskeletal tumours diagnosed and treated in Scotland. The records of patients with hand tumours were assessed for the mode of presentation. Patients who had fracture at first presentation were identified. Radiographs and histopathology reports of these patients were reviewed.

RESULTS

The tumour registry included 233 patients with tumours involving bones of the hand. Fifty-three patients (22.7%) with hand tumours had pathological fractures as the first presenting complaint. The majority of these patients were below fifty years of age (79.2%) with the average age being 36.9 years (fig 1). The right hand was involved in 54.7% of these patients. Two patients (3.8%) presented with fractures at multiple bones of the hand. The proximal phalanx was the bone most commonly involved (50.9%). The distal phalanx was affected in only 5.3% of patients. Most of these lesions affected the fifth ray (43.9%). The distribution of these lesions among various bones of the hand is depicted in figure 2.

The diagnosis was confirmed in all cases by curettage and biopsy of the lesion. The majority of the tumours were benign (81.1%) and all of these were chondromas (43 patients). There were one case each of fibrous dysplasia and benign giant cell tumour. Malignant lesions were less frequent with chondrosarcoma being the commonest (13.2%). There was a solitary case of Ewing's sarcoma.

All patients with chondroma were treated by curettage and bone grafting of the lesion. There was a local recurrence in two patients requiring a second surgical procedure. Of the seven patients with chondrosarcoma, six underwent ray amputation and one had only curettage. One patient with dedifferentiated chondrosarcoma required further chemotherapy. This patient developed pulmonary metastasis within one month of diagnosis and died 10 months following diagnosis.

The patient with a diagnosis of Ewing's sarcoma had post operative chemotherapy but developed local recurrence and intracranial metastasis 3 years following diagnosis, resulting in death. Diagnosis and outcome are summarised in table I.

Table I. – Results - Diagnosis and outcome of patients with pathological fracture of bones of the hand

Diagnosis	No of patients	Primary treatment	Adjuvant chemotherapy	Local recurrence	Metastasis	Death
Chondroma	43	Curettage and bone grafting	0	2	0	0
Chondrosarcoma	7	Amputation (6 patient), curettage and bone graft (1 patient)	1	1	1	1
Ewing's sarcoma	1	Amputation	1	1	1	1
Benign giant cell tumour	1	Amputation	0	0	0	0
Fibrous dysplasia	1	Curettage and bone grafting	0	0	0	0

DISCUSSION

Pathological fracture is a term used to describe a fracture occurring in a weakened bone following a trivial injury. Tumours, both primary and secondary, can weaken a bone resulting in a fracture. There have been numerous studies to identify and predict risk factors for fractures in a bone affected by a tumour, although these have been primarily done on long bones and in cases with metastasis (*7, 12, 15*). Benign and malignant tumours can affect the small bones of the hand (*3, 14*). As in a long bone they can weaken the bone sufficiently to cause a pathological fracture. However as most fractures of bones of the hand occur secondary to sports related injury or a fight, it is necessary to actively seek the patients who could have a tumour by appropriate history and examination of radiographs.

As in cases with all hand fractures (*13*), these fractures occurred in the age group of 20-39. None of the patients gave any history of an injury severe enough to cause a fracture. Traumatic hand injuries in adults commonly affect the outer rays and the tip of the middle finger (*10, 17*) and the proximal phalanx in children (*16*). In our series, fractures were more commonly seen in adults and involved the proximal phalanx and the fifth ray. A previous study has noted that tumours of the hand predominantly affect the metacarpals and proximal phalanges (*4*).

The majority of benign tumours were chondromas. This is in agreement with other studies which note that the majority of tumours affecting the hand are benign (*11*), usually chondromas which predominantly involved the proximal phalanges (*4*).

Malignant tumours of the hand are rare (*9*). Fifteen percent of patients with pathological fractures of the hand in our series had a malignant lesion as the underlying cause. Although previous studies have indicated that malignant tumours occurring in the hand generally have a favourable prognosis (*2, 8*), the five year mortality rate in our series was 25%. Tumour pathology, peripheral site, early diagnosis and ease of aggressive management contribute to survival compared to similar tumours in the long bones of upper and lower limbs. We feel that the presence of a pathological fracture reflects the aggressiveness of the lesion and hence a high mortality rate.

Hand fractures are a common presentation in most emergency departments. Not all patients who develop a fracture through the small bones of the hand are investigated further. In most emergency departments the routine treatment is splinting followed by early mobilisation. Such patients are not routinely followed up and even when they are, not routinely radiographed. Hence tumorous lesions not clearly visible radiologically can be missed. The database does not have a record of every case of hand tumour from the region. This being a retrospective analysis, the suggestion of pathological fracture as the first mode of presentation in some cases does not necessarily represent a true picture of the mode of presentation of all hand tumours. Due to all these factors it is difficult to accurately specify an incidence rate for these lesions. Hence it is essential to assess patients with an atypical mechanism of injury and location of fracture for the presence of a tumour.

CONCLUSION

Fractures of small bones of the hand may be indicative of an underlying tumour. The age of incidence of these lesions is similar to that from traumatic causes. Fractures involving an uncommon site or the absence of a history suggestive of a significant trauma should alert the emergency physician to the possibility of an underlying pathology.

REFERENCES

1. **Barton NJ.** Fractures of the shafts of the phalanges of the hand. *Hand* 1979 ; 11 : 119-133.
2. **Bovee JV, van der Heul RO, Taminiau AH, Hogendoorn PC.** Chondrosarcoma of the phalanx : a locally aggressive lesion with minimal metastatic potential : a report of 35 cases and a review of the literature. *Cancer* 1999 ; 86 : 1724-1732.
3. **Buecker PJ, Villafuerte JE, Hornicek FJ *et al.*** Improved survival for sarcomas of the wrist and hand. *J Hand Surg* 2006 ; 31-A : 452-455.
4. **Campbell DA, Millner PA, Dreghorn CR.** Primary bone tumours of the hand and wrist. *J Hand Surg* 1995 ; 20 : 5-7.
5. **De Jonge JJ, Kingma J, van der Lei B, Klasen HJ.** Fractures of the metacarpals. A retrospective analysis of incidence and aetiology and a review of the English-language literature. *Injury* 1994 ; 25 : 365-369.
6. **De Jonge JJ, Kingma J, van der Lei B, Klasen HJ.** Phalangeal fractures of the hand. An analysis of gender and age-related incidence and aetiology. *J Hand Surg* 1994 ; 19-B : 168-170.
7. **Dijstra S, Wiggers T, van Geel BN, Boxma H.** Impending and actual pathological fractures in patients with bone metastases of the long bones. A retrospective study of 233 surgically treated fractures. *Eur J Surg* 1994 ; 160 : 535-542.
8. **Euler E, Wilhelm K, Permanetter W, Kreusser T.** Ewing's sarcoma of the hand : localization and treatment. *J Hand Surg* 1990 ; 15-A : 659-662.
9. **Frassica FJ, Amadio PC, Wold LE *et al.*** Primary malignant bone tumors of the hand. *J Hand Surg* 1989 ; 14-A : 1022-1028.
10. **Hove LM.** Fractures of the hand. Distribution and relative incidence. *Scand J Plast Reconstr Surg Hand Surg* 1993 ; 27 : 317-319.
11. **Mankin HJ.** Principles of diagnosis and management of tumors of the hand. *Hand Clin* 1987 ; 3 : 185-195.
12. **Mirels H.** Metastatic disease in long bones. A proposed scoring system for diagnosing impending pathologic fractures. *Clin Orthop* 1989 ; 249 : 256-264.
13. **Packer GJ, Shaheen MA.** Patterns of hand fractures and dislocations in a district general hospital. *J Hand Surg* 1993 ; 18-B : 511-514.
14. **Plate AM, Lee SJ, Steiner G, Posner MA.** Tumorlike lesions and benign tumors of the hand and wrist. *J Am Acad Orthop Surg* 2003 ; 11 : 129-141.
15. **Spruijt S, van der Linden JC, Dijkstra PD *et al.*** Prediction of torsional failure in 22 cadaver femora with and without simulated subtrochanteric metastatic defects : a CT scan-based finite element analysis. *Acta Orthop* 2006 ; 77 : 474-481.
16. **Vadivelu R, Dias JJ, Burke FD, Stanton J.** Hand injuries in children : a prospective study. *J Pediatr Orthop* 2006 ; 26 : 29-35.
17. **van Onselen EB, Karim RB, Hage JJ, Ritt MJ.** Prevalence and distribution of hand fractures. *J Hand Surg* 2003 ; 28-B : 491-495.