AN EPIDEMIOLOGICAL APPRAISAL OF FEMORAL SHAFT FRACTURES IN A MIXED ASIAN POPULATION—SINGAPORE

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INTRODUCTION

The age and sex distribution of femoral shaft fractures in a defined community was first determined by Buhr and Cooke (1959) in their study from the Oxford District in England. In a more recent survey by Knowelden et al. (1964) the age and sex specific rates of femoral shaft fractures per 10,000 in the Dundee and Oxford communities in the age groups 55-74 and 75 and over were found to be 1 and 6 respectively.

In the current analysis, similar determinations have been made on the mixed Asian population of Singapore.

MATERIAL AND METHODS

Population at Risk

The population at risk was the mixed Asian population of Singapore which in 1962 was estimated to be approximately 1.8 million of which 75% were Chinese, 14% Malays, 9% Indians and 2% Europeans and Eurasians. All the age specific estimates of this study were based on this 1962 projected population (Table I).

Material

The material consisted of femoral shaft fractures diagnosed in the two year period 1962-63 for the whole of the State of Singapore. Fractures caused by metastases, osteomyelitis and osteogenesis imperfecta were excluded from the survey. There were 219 fractures in 218 patients (one boy had fractures involving both femurs sustained during one episode). No attempt was made to separate the fractures into the various racial groups.

Classification of Fracture Types

Examination of X-rays enabled destinction between

Shaft fractures (219)
Supracondylar fractures (30) and
Condylar fractures (5)

Definitions

Age specific rates were calculated from the population figures as the annual incidence of fractures per 100,000 males and females in each 20 year age group.

Patients less than 20 years were called boys or girls, those from 20 through 39 years were referred to as young adults, middle age were those from 40 years through 59 years, and aged were those from 60 years onward.

RESULTS

Femoral Shaft Fractures

There were 169 fractures among the males and 50 among the females with a male to female ratio of 3.4 to 1. The age specific sex ratio males/females was 1·7 to 1.

Sites of Fractures

In both sexes fractures were most commonly situated in the vicinity of the midshaft followed by those at the junction of the proximal one third with the distal two thirds. The least common site was at the junction between the proximal two thirds and the distal one third.

Compounding

No compound fractures were recorded among the females, and maximal incidence of compounding occurred among the young male adults. (Table II).

Degree of Trauma

The degree of trauma which gave rise to these fractures were either of the direct high energy or of the indirect low energy variety. (Bauer et al. 1962). Hospital records permitted the evaluation of the degree of trauma in 94% of the femoral shaft fractures in both sexes.

In the male series 84% resulted from severe trauma and 16% resulted from moderate trauma, and in the female series moderate trauma accounted for 35% and severe trauma 65%. In both sexes, however, moderate trauma increased

TABLE I

PROJECTED SINGAPORE POPULATION (1962)

Age Groups	0 - 19	20 - 39	40 - 59	60 and above
(in thousands)				
MALES	475·6	240·3	147·9	33·3
FEMALES	447·8	214·6	116·6	37·6

TABLE II

FEMORAL SHAFT FRACTURES

Age Groups		0 - 19	20 - 39	40 - 59	60 and above
Number of fractures	MALES	86	65	16	2
	FEMALES	28	6	8	8
Number of fractures	MALES	17	4	3	1
due to moderate trauma	FEMALES	6	0	3	8
Ratio of Moderate to	MALES	17/69	4/65	3/13	1/1
Severe Trauma	FEMALES	6/22	0/6	3/8	8/1
Compound Fractures	MALES	2	11	3	0
	FEMALES	0	0	0	0
Age specific incidences of Compound fractures	MALES	0·2	2·3	1·0	0
per 100,000	FEMALES	0	0	0	0

from young adults through middle age to a maximum in the aged, the rise being less dramatic among the males. (Table II).

DISCUSSION

The variation in strength of the femoral shaft at different age levels and between the sexes is difficult to assess. The age specific incidences of this fracture, especially those of the males, unlike those of the femoral neck and distal radius in females (Bauer 1960, Alffram and Bauer 1962, Alffram 1964, Wong 1964, 1965) were of little guide. Its determination can, however, be derived at indirectly.

In adult life, environment and habit differ widely at the different age levels, trauma to the thigh of the indirect low energy category will thus differ correspondingly. Obviously it must be most frequent in young adults, less in middle age, and least in the aged. The quantitative distribution of fractures sustained as a result of moderate trauma was, however, of the reverse order (Fig. 1). This suggests that in adult life of both sexes the strength of the femoral shaft decreases with age. Again moderate trauma in middle age occurred more often in men than women, and in old age it was as frequent in men as it was in women, but incidences of fractures so caused at these ages were greater in women. The inference, therefore, is that the femoral shaft is more fragile in females than males at the corresponding age levels (Fig. 2).

Femoral shaft fractures in the local male population occurred twice as often as that of the humeral shaft, but were only one third as common as either fractures of the radio-ulnar

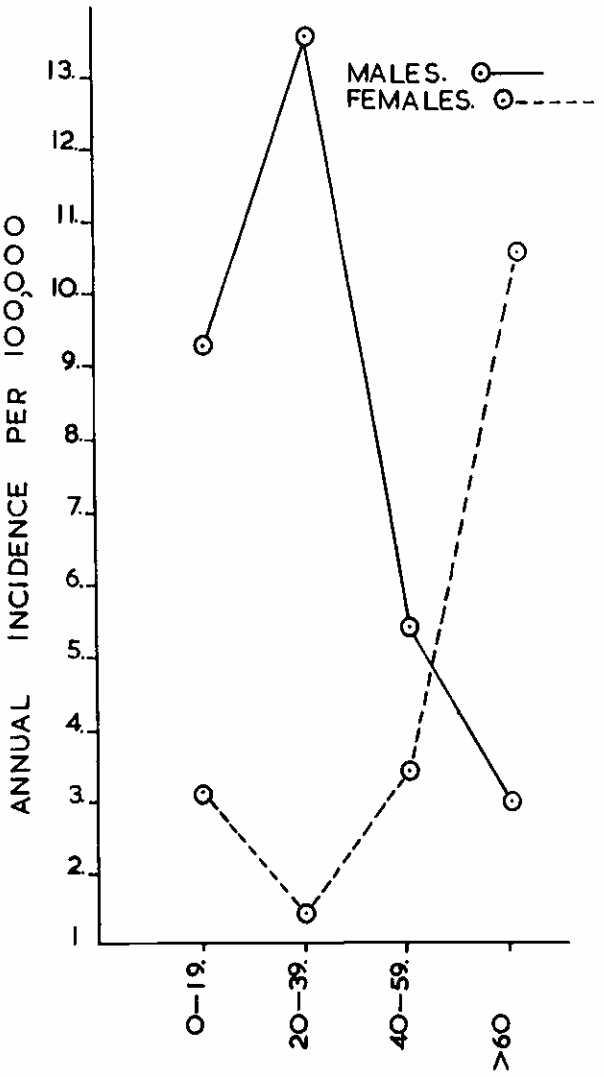

Figure 1.

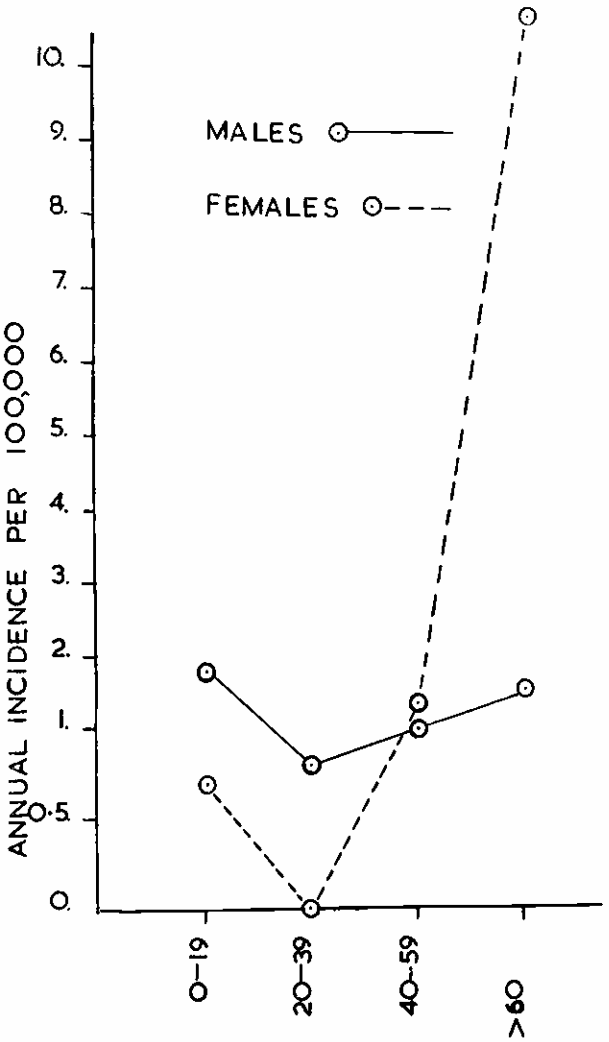

Figure 2.

or tibial shafts. In females radio-ulnar shaft fractures were two and a half times more common than humeral, tibial or femoral shaft fractures.

SUMMARY

In a mixed Asian Community of Approximately 1.8 million on epidemiological survey of 219 femoral shaft fractures occurring over a two year period 1962-63 was made.

The age specific incidences in the males exceeded those of the females in all 20 year age groups except in the aged. Maximal incidence in the males was in young adults and minimal in the aged. The opposite was observed in females.

There were no compound fractures in females. Maximal incidence was in young adult males. Moderate trauma increased with age in both male and female adults.

It was concluded that the strength of the femoral shaft in both sexes was maximal in young adults and least in the aged. In middle and old age the femoral shaft was weaker in females than in males.

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