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THE TIME OF DISABILITY FOLLOWING FRACTURE OF THE SHAFT OF THE TIBIA

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The introduction of new methods for internal fixation and early weight-bearing in cases of fracture of the shaft of the tibia calls for evaluation of these methods with special regard to the time of disability. A review of the literature on the subject gives very little information as to what may be regarded as normal time periods of disability following these injuries. The objective of the present study was to examine the time periods of disability as they were recorded in a clinical material consisting of over 500 cases of fracture of the shaft of the tibia.

MATERIAL

Available for evaluation were all cases of fracture of the shaft of the tibia over the age of sixteen who were treated at the General Hospital, Malmö, 1949-1963. The material included virtually all fractures which had occurred in the city during this time period and, in addition, a limited number of cases referred from other parts of southern Sweden.

Several heavy industries, including a ship-yard, were operating in the city during this time, there was also much construction activity and an abundance of automobiles somewhere between that of the United Kingdom and the United States. During the study period, the population of the city grew from ca. 200,000 to ca. 240,000.

Excluded from the study were all cases with combined injuries and a small number in whom the time of disability could not be estimated, leaving 380 cases.

METHODS

The time of disability was defined as the interval between the accident and the day of the termination of sickleave. A majority of the cases involved in this study were

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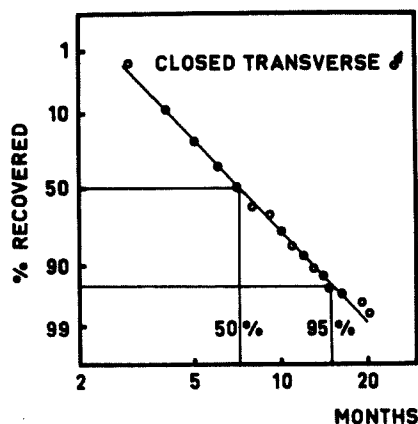


Figure 1. The logarithm of disability time vs. percentage of recovered the intervals of the ordinate derived from probit tables (Fisher & Yates 1963). Good adaptation to a straight line implies a normal distribution. For the method of calculation see Edwards & Nilsson (1965).

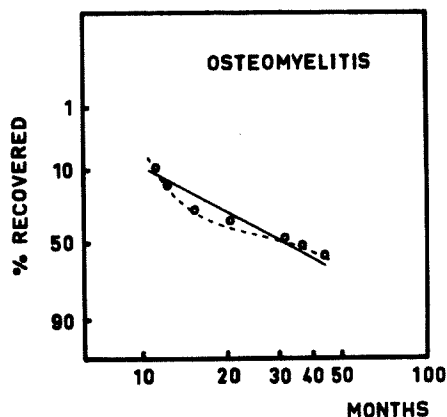


Figure 2. Same as Figure 1 for fractures complicated by osteomyelitis. The variables are best interpreted to form a curve function, recovery of 95 per cent of the cases is never attained.

covered by compulsory national health insurance, traffic accident insurance, workman's compensation, or other accident insurance. This greatly facilitated the evaluation of disability time. A number of individuals did not go back to work, the disability time was in these cases regarded as infinite.

The presence of cases with an infinite disability time and the fact that disability time was found to form a skewed distribution invalidated the use of average disability time as a basis for comparison between the groups. Instead, a method of graphical probit analysis was employed, including a logarithmic transformation of the time scale (Figures 1 and 2). The central tendency of disability time was derived graphically and represents the time period required for 50 per cent of the cases to recover. In addition the time period required for 95 per cent of the cases was recorded and used as a measure of scatter or as an indication of the absence or presence, in the group, of cases with an exceptionally long disability time.

The time of disability may be compared between the various groups of fractures using a T-test of the logarithms of the time values, excluding cases with infinite

time values. In this study differences in central tendencies (the 50 per cent values) of two months or more were significant. Differences of one month were suggestive or non-significant.

RESULTS

Longitudinal fractures are here defined as long oblique or spiral fractures, usually caused by indirect trauma (Table 1). Transverse fractures, including short oblique, transverse, and/or comminuted fractures, were usually caused by direct trauma. The latter group has been demonstrated to contain almost all the complications caused by fractures of the shaft of the tibia, including osteomyelitis (Edwards 1965). This is true particularly for open injuries, that is injuries in which a wound communicates with the fracture. Open transverse fractures were found to have a considerably longer period of disability as compared with other types (Table 1). The groups above include only displaced fractures. The undisplaced fractures in this study include various types of cases and had the shortest disability time of all.

Table 1. Disability time of various fracture types (months).

Type	Males		Females	
	50%	95%	50%	95%
Displaced without osteomyelitis:				
Longitudinal	6	12	6	15
Closed transverse	7	15	9	20
Open transverse	10	29	9	26
	Males + females			
	50%		95%	
Undisplaced without osteomyelitis	4		9	
All types with osteomyelitis	30		∞	

Cases with osteomyelitis, in this study not more than sixteen, were examined separately (Figure 2, Table 1). These cases had an exceedingly long disability time.

Definite sex differences were demonstrated only in the group of closed transverse fractures. This finding was examined further by comparing the relationship of healing time and disability time between males and females (Figure 3). These two variables were, as may be expected, correlated. It was found that for any given healing time the

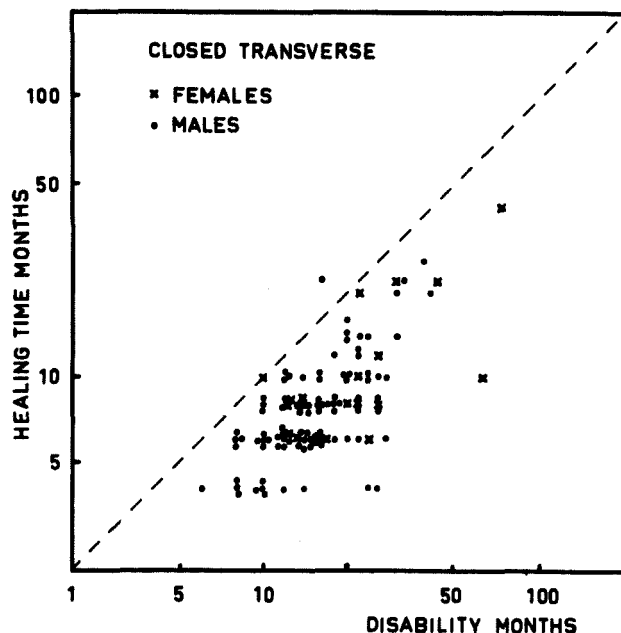


Figure 3. Relationship of disability and fracture healing. Note that in this group only one individual went back to work before the fracture was healed. There is a positive regression between the variables in both sexes but no difference in slope or intercept between the sexes.

time of disability did not differ between females and males (analysis of covariance). Healing time has been demonstrated to be closely related to the severity of the injury (Edward & Nilsson 1965), and it may therefore be concluded that females with closed transverse fractures had generally more severe injuries. There is reason to believe that some of the more severe injuries were excluded from the male group together with the combined injuries.

In the last three years, covered by this study, the treatment of transverse fractures was modified. Skin-incision in the fracture area was avoided and internal fixation was, when needed, accomplished by blind intramedullary nailing. A definite closure of the wound was attained at the time of the primary treatment—skin or muscle grafts were used in cases with threatening necrosis. As a result, osteomyelitis almost vanished as a complication of tibial shaft fractures. In Table 2 the effect of this modification of treatment on the time of disability is shown in males—in females the limited number does not permit a further subdivision of the cases. For open transverse fractures the cen-

tral tendency of disability time was three months shorter in the latter series. There was, however, a difference also in the group of longitudinal fractures where no systematic changes of the initial treatment had been introduced. All the cases, regardless of treatment, had, during the last three years, been treated and followed-up in a special outpatient clinic and by the same person. It appears as if this arrangement *per se* shortened the time required for these cases to go back to work, probably because of a more realistic view of their working ability. This implies that the need of convalescence had previously been over-estimated.

Table 2. Influence on disability time of modified treatment (displaced fractures without osteomyelitis in males, time in months).

Type	Control		Modified	
	50%	95%	50%	95%
Longitudinal	7	13	5	10
Closed transverse	8	15	7	13
Open transverse	11	34	8	22

Table 3. Influence on disability time of occupation (displaced fractures without osteomyelitis in males, time in months).

Demands on ability to stand and walk	50%	95%
Great	8	14
Small or average	8	18

In about one-third of the males, their ordinary occupation included heavy labour or otherwise strong demands on their ability to stand and walk. When these cases were compared with the rest, there was no significant difference in the central tendencies (Table 3). However, the 95 per cent value was less in the heavy labour group. This, again, may be the result of excluding the combined injuries, particularly from the group with heavy labour. Between individuals with small and average demands on standing and walking ability, there were no differences in disability time. It must be concluded that occupation does not substantially influence the time period required for these patients to go back to work.

SUMMARY AND CONCLUSIONS

The time period required to recover from fracture of the shaft of the tibia was examined. The type of trauma as reflected in fracture type was found to influence the time of disability. When the severity of the injury had been taken into account, there were no significant differences between the sexes, nor were there any differences that could be related to occupation. When the injuries were managed in a special clinic, the interval required for these cases to go back to their normal activities was shortened.

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