

Original Research Article

Incidence of ankle fracture among general population

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Abstract: Ankle fractures are among the most common injuries treated by orthopaedic surgeons. Approximately 2% of the general population will sustain an ankle fracture during their life. This study was done to study incidence of ankle fracture among general population. The present study was carried out over a period of 5 years. Total number of incidence of all fractures of bone was recorded among the general population of 5 nearby villages. A total of 2653 patients were checked and recorded in the study having various types of fractures. Motor vehicle accident (MVA) was the most common cause of ankle fractures (67.34% of all study subjects. Among all fractures 231 (8.6%) were ankle fractures. The medial malleoli (40.2%) was the most commonly injured bone of the ankle and the least common was the posterior malleoli (2.2%). Study of ankle fracture involves a careful examination, appropriate imaging, understanding of the fracture pattern, and technically favorable management.

Keywords Ankle fracture, General population, Fractures

INTRODUCTION:

Ankle fractures are commonly seen injuries in both the general population and in athletes. Common causes of ankle fracture are trauma (especially motor vehicle accidents), sports injuries (i.e., football players), and osteoporosis in the elderly (including postmenopausal women). Management of these fractures depends on the stability of the injury. Ankle fractures are often unstable. A stable fracture usually needs minimal splinting whereas unstable fractures may need open reduction and internal fixation [1].

Traumatic musculoskeletal injuries are a common problem and may result in short- or long-term disability [2, 3]. Ankle fractures are among the most common traumatic injuries requiring orthopaedic management [4]. Despite their high incidence, ankle fractures have been the subject of less empirical research in comparison to other fracture types. Prior investigations among patients following ankle fractures have reported substantial variability in the prevalence of negative patient outcomes. Some studies have reported that up to 87% of patients experience good to excellent

clinical recovery following ankle fracture, whereas other investigations have indicated that fewer than half of patients experience complete recovery and report ongoing problems with physical symptoms, psychological health, and performing social or recreational activities [5].

Ankle fractures have increased in incidence over the last 30 years, affecting one in every 800 people each year, typically young active males and geriatric osteoporotic females, and accounting for 9% of all fractures. Management of the fracture itself ranges from nonoperative treatment with immediate weight bearing to surgery and 12 weeks of non-weight bearing. Care of the patient includes greater considerations such as medical optimization, rehabilitation, and safe return to work and activity [6, 7].

MATERIALS AND METHODS:

The present study was carried out over a period of 5 years. Total number of incidence of all fractures of bone was recorded among the general population of 5 nearby villages of Ghoti, Nashik,

including of Dhamangaon, Mundegaon, Pimpalgaon, Waki and Kharbale. A total of 2653 patients were checked and recorded in the study having various types of fractures. Approval of the local ethical committee was taken before start of the study and informed consent was taken from each of the patient. Only the patients willing to participate were considered for the study. Patient having ankle fractures were studied in detail and all the relevant findings and case history were recorded. The data were arranged and analyzed.

RESULTS:

Causes:

Motor vehicle accident (MVA) was the most common cause of ankle fractures (67.34% of all study subjects). In young, active people, fractures were associated with vigorous activity, especially sports (8.2%). Other causes include falls, especially in elderly. Among the MVA cases 61.57% were motorcyclists and 3.1% were lorry drivers. (Table 1, Fig-1).

Table 1: Incidence of the various types of fractures among general population

Causes	Number of patients	Percentage
MVA	155	67.34%
Sport injury	35	15.15%
Industrial accident	22	9.09%
Others	19	8.22%
Total	231	

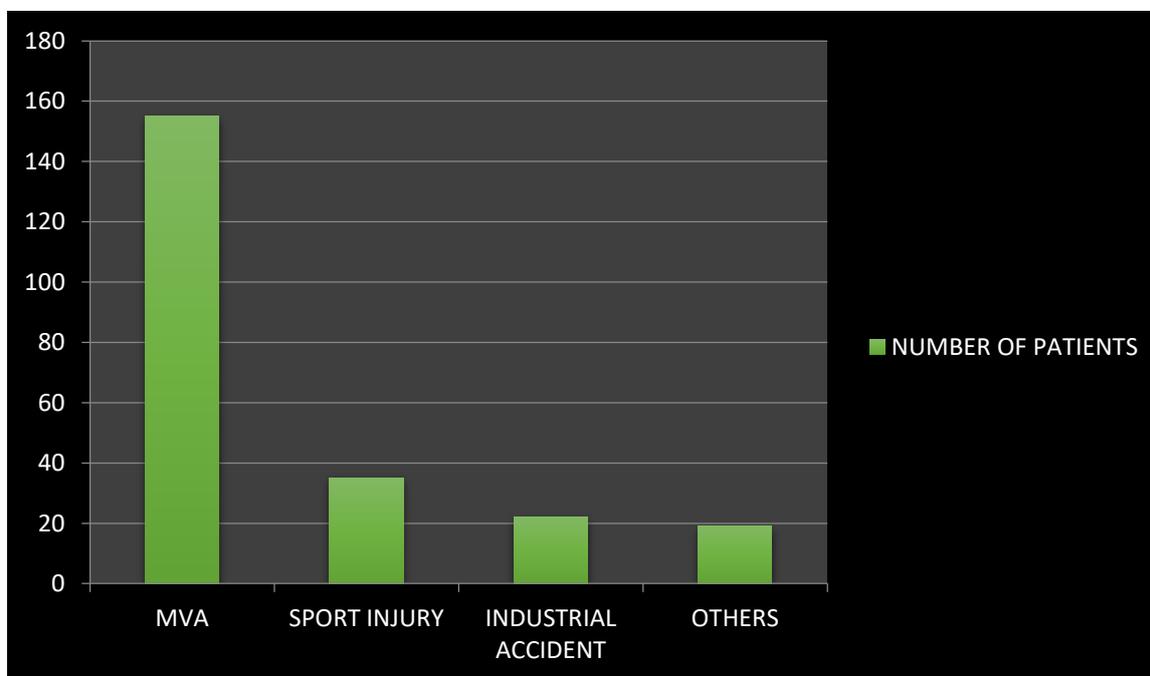


Fig 1: Incidence of the various types of fractures among general population

Pattern and Site of ankle fractures:

Among all fractures 231 (8.6%) were ankle fractures. Almost two-third of all ankle fractures cases were closed fractures (168 cases, 72.7%) and there were 63 cases of open ankle fractures (27.3%). The right side (56.2%) was affected slightly more than the left (43.8%). The medial malleoli (40.2%) was the most commonly injured bone of the ankle and the least common was the posterior malleoli (2.2%). Based on the Dennis- Weber classification, type-C was the most common (59.4%) fracture pattern that required operative treatment [4].

Ankle fractures are among the most common injuries treated by orthopaedic surgeons. Approximately 2% of the general population will sustain an ankle fracture during their life [8].

Ankle fractures are the second most common trauma presentation of the lower limb, with a yearly incidence of approximately 187 per 100,000. Predominantly affected are adults of working age, although there is an increasing incidence in elderly females. As such, optimizing the management of ankle fractures is of significant clinical importance to individual patients and to health services. One aspect in which there is little evidence-based consensus is the

DISCUSSION:

optimum timing for surgical fixation of closed ankle fractures. Traditional teaching at one time advocated surgery within 6-8 hours or else not for 4 days, to allow soft tissue edema to resolve. Relevant literature contains wide ranging definitions of 'early' surgery, from within 8 hours to within 4 days. As a result current practice varies widely [9, 10].

Fracture of one or both bones (the tibia and fibula) at the ankle, which may extend into the articular surface. There are numerous different patterns, best summarized by the Lauge-Hansen classification. This is detailed, but useful, as it clarifies the mechanism of injury, guides treatment, and, to some extent, indicates the possible prognosis. Some ankle fractures feature significant damage to the distal tibiofibular joint (the syndesmosis between these two bones), which it is essential to recognize when planning treatment. Basic fracture types under the Lauge-Hansen classification are[8].

- Supination-external rotation fractures
- Pronation-external rotation fractures
- Pronation-abduction fractures
- Supination-adduction fractures

Anatomy and Mechanism:

The ankle is a hinge joint with the tibia and fibula proximally and the talus distally. Ankle fractures classically refer to malleolar injuries: the distal fibula or lateral malleolus, the distal medial tibia or medial malleolus, and the posterior distal tibia or posterior malleolus. Fractures that involve multiple sides are referred to as bimalleolar or trimalleolar. The injury may also involve the deltoid ligament medially or the syndesmotic ligaments laterally. Over 60% of ankle fractures involve only the lateral malleolus.

Fractures of the lateral malleolus proximal to the joint line correspond to syndesmotic injuries. The commonly used Weber classification relies solely on the level of the lateral malleolar fracture relative to the ankle joint line. The mechanism of injury generally involves a twisting or bending across the joint, whether low-energy as from twisting off a curb or high-energy as from a motor vehicle accident. The most commonly used Lauge-Hansen classification scheme is based on the position of the foot at the time of injury (supination or pronation) and the direction of the deforming force, external rotation, adduction, or abduction [7].

Unfortunately, the patient with a fractured ankle is generally not able to state what position his foot was in at the time of the accident. Unlike the experimental situation, the radiologist must reconstruct this information from the specific location and appearance of the fractures. Lauge-Hansen's descriptions of the injury pattern, although precise, are

cumbersome to use in the analysis of the injury from the radiographic information [11].

In addition to the uncertainty surrounding the frequency of poor outcomes for patients following ankle fracture, a Cochrane systematic review found limited available evidence to inform specific rehabilitation protocols for the management of ankle fracture. This review called for additional well-designed and appropriately powered research to document patient outcomes following ankle fracture and to evaluate interventions. Advancing this research agenda is important, given that insufficient or suboptimal rehabilitation has been cited as a potential cause of long-term disability following ankle fracture. A limiting factor when evaluating the effectiveness of ankle fracture rehabilitation interventions is the absence of a suitable ankle fracture-specific, patient reported outcome measure with robust content foundation. The inclusion of patient-reported outcomes as primary measures has become increasingly common in investigations of people with musculoskeletal conditions. Most evident are measures of pain, physical function, and health-related quality of life. Patient-reported outcomes allow clinicians and researchers to better understand how a condition may impact various aspects of a patient's life from the perspective of the patient. This information can enhance patient-centered care by targeting interventions to priority problem areas indicated by the patient, and by evaluating whether these interventions have a meaningful impact from the perspective of the patient [5].

History:

The general goals of fracture management are anatomic reduction of the fracture and protection of the soft tissue envelope. Stable fractures, where the alignment of the ankle joint is preserved, rarely need surgery. Unstable fractures typically require closed reduction or open reduction and internal fixation, depending on the patient's co-morbidities and pre-injury functional status. There is an increasing trend toward operative management of unstable ankle fractures, but historically good long-term outcomes have been well documented with non-operative management.

Underlying diabetes, nicotine use, peripheral neuropathy, and peripheral vascular disease are all risk factors for poor fracture healing and wound complications [7].

- Ankle fractures are usually due to a twisting mechanism sustained as a result of a low-energy injury.
- The position of the ankle at the time of injury and subsequent direction of force generally dictates the fracture pattern, as described by

the Lauge Hansen classification system [12-14].

- On occasion, a diabetic patient presents with a history of little or no trauma, which should raise the suspicion of Charcot neuro arthropathy.
- A higher energy mechanism should raise the possibility of compartment syndrome of the leg or a more severe injury to the plafond: the pilon fracture.
- Other pertinent factors in the history include medical comorbidities such as diabetes, peripheral vascular disease and smoking, which can complicate wound and fracture healing [12-14].
- A social history should be taken to identify the patient's pre-injury level of mobility, home situation and regular activities as well as their future functional aspirations.

Imaging:

To characterize the initial fracture pattern and subsequent maintenance of adequate reduction, imaging should always include anterior-posterior, lateral, and mortise views. While the radiographic thresholds that define an unstable ankle fracture are beyond the scope of this article, for emergent treatment, the talus should be located directly underneath the plafond of the tibia on all views. With high-energy mechanisms or an unreliable exam, initial studies should include three views of the foot (anterior-posterior, lateral, and lateral oblique), and two views of the tibia/fibula (anterior posterior and lateral). Computed tomography may identify or better characterize injuries to the plafond and talus. Magnetic resonance imaging is rarely indicated in the acute setting [7].

Ankle fractures usually result from torsional forces and present typically with tenderness, swelling, deformity and inability to weight-bear. However, beware the non-displaced ankle fracture presenting post-injury with minimal swelling and no deformity. The history of the injury normally gives a good indication of the mechanism of fracture and can assist in decision making regarding management. The physical examination of the ankle must also involve a thorough assessment of the foot. The assessment looks at any open wounds, the condition of the skin, neurovascular status before and after any reductions and palpation for any bony or soft tissue tenderness. Physical examination revealing medial tenderness has been shown to have poor positive predictive value for significant deltoid injury. It is vital to assess for proximal fibular tenderness in order to rule out Maisonneuve fractures. Soft tissue palpation of all the ligamentous structures should be performed. These include the anterior talofibular ligament, the posterior talofibular ligament, the calcaneo fibular ligament, the

deltoid ligament complex and the anterior tibiofibular syndesmosis. The range of motion should be assessed actively and passively: dorsiflexion, plantar flexion, inversion and eversion. These should be compared bilaterally. Normal passive dorsiflexion is 10-15 degrees, plantar flexion 50-70 degrees, inversion 40 degrees and eversion is 10 degrees. Finally, there are some special assessment tests that can be performed but their sensitivity is questionable [15].

Examination:

- Initial examination should identify open injuries and any evidence of dislocation, both of which require urgent intervention. Dislocation with skin compromise necessitates immediate reduction on recognition to prevent skin necrosis.
- Palpation then proceeds in a logical sequence incorporating both medial and lateral sides, and including the whole length of the leg to the knee in order to avoid missing the high fibular (Maisonneuve) fracture. Note that the absence of medial-sided tenderness does not however, exclude a deltoid ligamentous injury and thus instability.
- The neurovascular status of the limb should be checked before and after reduction [14, 16].

Emergency treatment:

Emergency treatment begins with immediate clinical examination of the entire, unclothed lower limb, which enables assessment of the state of the soft tissues, the perfusion status, and possible nerve injuries. In cases of obvious malposition, immediate reduction is indicated; this is to be done by traction along the long axis under appropriate analgesia to minimize pain. It is unacceptable for a patient to be delivered to the hospital by the emergency medical services with an obviously dis - located joint without any attempt at reduction, regardless of the specialty qualifications of the physician in the emergency response team. In our experience, patients generally cannot be harmed to any significant extent either by a successfully executed reduction or by an unsuccessful attempt; on the other hand, if the joint is left in its dislocated state, the soft tissue injury may worsen irreversibly [16].

Treatment:

The management of all ankle fractures involves reduction (where displaced), and initial immobilization in a splint or cast. Once the fracture has been immobilised the decision regarding definitive treatment depends on two key features: tibio-talar congruence and stability. Good outcomes can be anticipated when the talus is held anatomically within the mortise until fracture healing. When this cannot be achieved with closed reduction, open reduction should be undertaken, so long as there is no medical

contraindication. Previous studies have demonstrated a significant increase in intra-articular contact stresses with minimal residual displacement of the talus [15, 16]. One study demonstrated that displacement of the fibula in a pronation/ external rotation fracture model increases contact stresses most with shortening of the fibula, followed by lateral translation, followed by external rotation [14, 16].

CONCLUSION:

Study of ankle fracture involves a careful examination, appropriate imaging, understanding of the fracture pattern, and technically favorable management. Future studies were needed to study the treatment modalities and its outcome of the ankle fractures.

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