

End-stage ankle osteoarthritis: exploring the precedent causes and time course of joint degeneration

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Introduction: End-stage ankle osteoarthritis (OA) is primarily post-traumatic, following injuries such as fractures, dislocations, and sprains. However, the timeline between initial injury and end-stage OA requiring surgical intervention remains poorly understood. This retrospective study aimed to identify injury patterns leading to post-traumatic osteoarthritis (PTOA) and determine the time from injury to definitive surgical treatment with ankle fusion (AF) or total ankle replacement (TAR).

Methods: A retrospective cohort study was conducted using medical records of patients who underwent AF or TAR for end-stage OA at a tertiary institution over a 20-year period (2000–2020). Patients were classified into post-traumatic, primary, or secondary OA categories. In PTOA cases, initial injury radiographs were reviewed and classified. The time from injury to surgical intervention was analyzed, and a multivariate regression analysis assessed factors influencing the progression to end-stage OA.

Results: A total of 491 ankles from 479 patients were included, of which 81.3% were categorized as PTOA. The most common injury was a rotational ankle fracture (47.1%), followed by an ankle sprain (27.6%) and a pilon fracture (15.3%). The mean time from injury to AF/TAR was 16.9 years, with pilon fractures progressing the fastest (8.1 years) and tibial shaft fractures the slowest (32.7 years). Factors significantly influencing time to surgery included injury type ($p < 0.00001$), age ($p < 0.00001$), smoking status ($p = 0.016$), and peripheral neuropathy ($p = 0.04$).

Conclusion: Post-traumatic osteoarthritis is the leading cause of end-stage ankle OA, with rotational ankle fractures and ankle sprains being the most common etiologies. High-energy injuries progress more rapidly, while lower-energy injuries contribute significantly due to their high prevalence. These findings may contribute to a better understanding of the epidemiology and risk factors of end-stage ankle OA.

Keywords: Ankle Joint; Ankle fractures; joint Instability.

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