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Article:
Cartilage Lesions and the Development of Osteoarthritis After Internal Fixation of Ankle Fractures: A Prospective Study
Sjoerd A. Stufkens, Markus Knupp, Monika Horisberger, Christoph Lampert, and Beat Hintermann

Introduction:
• Posttraumatic osteoarthritis is the most common etiology for ankle arthritis.
• Little is known about the relationship between cartilage damage at the time of injury and development of osteoarthritis at the ankle

Hypothesis:
• “We hypothesized that the more extensive the initial cartilage damage, the higher the chance of osteoarthritis developing later.”

Statement of Purpose:
• “In this follow-up study of a consecutive series of patients, we examined the correlation between the initial cartilage damage seen at arthroscopy performed directly after a displaced ankle fracture and the clinical and radiographic long-term results associated with that fracture.”

Methods:
• 288 patients in consecutive cohort treated with ORIF ankle fracture between June 1993 and November 1997
• 109 recruited for this follow-up study
  o No difference identified in demographic data
  o None that declined follow-up cited problems related to their ankle as the reason
• Mean follow-up: 12.9 years
• Inclusion criteria: Patients from original cohort that were available for follow-up
• Exclusion criteria: Systemic inflammatory disease, unable to complete questionnaires, malunion of ankle ORIF, pre-existing ankle arthritis
• Arthroscopy performed before ORIF ankle
  o Location and grade of cartilage injury identified and recorded
    ▪ Grade I – intact cartilage
    ▪ Grade II – injury to <50% of cartilage depth
    ▪ Grade III – injury to >50% of cartilage depth
    ▪ Grade IV – visible subchondral bone
• AOFAS scores completed for all patients
• Kannus arthritis score determined by blinded radiologist
Threshold assigned to outcome scores to determine clinical or radiographic signs of arthritis
  - AOFAS < 90 – clinical evidence of arthritis
  - Kannus <90 – radiographic evidence of arthritis

Odds ratio with confidence intervals calculated along with p-values.

Results:
At time of arthroscopy in initial 288 patients, cartilage lesion on:
  - Talus 65% of patients
  - Tibia 50% of patients
  - Fibula 39% of patients
  - None 19% of patients

At time of long-term follow-up (109 available for review):
  - Clinical osteoarthritis (AOFAS <90) in 39% of patients
  - Radiographic osteoarthritis (Kannus <90) in 43% of patients

Areas of damage Grade III/IV on initial x-ray that correlate to AOFAS <90 are:
  - Anterior Talus (OR 12.3)
  - Lateral Talus (OR 5.4)
  - Medial Malleolus (OR 5.2)

Area of damage Grade III/IV on initial x-ray that correlate to a Kannus <90 is:
  - Posterior Tibial Plafond (OR 4.7)

Discussion:
If cartilage damage was present at time of ankle fracture:
  - Odds of AOFAS <90 at long term follow-up 5:1
  - Odds of Kannus <90 at long term follow-up 3.5:1

No correlation between number of lesions and long-term outcome

Limitations:
  - No arthroscopy at the time of follow-up to characterize lesions.
  - Loss to follow-up of 179 patients
  - Assigned threshold for clinical and radiographic scores <90

Conclusions:
Cartilage damage at time of ankle fracture is an independent predictor of posttraumatic arthritis
Lesions >50% at anterior and lateral aspects of talus and medial malleolus have unfavorable clinical outcome
Lesions >50% at posterior aspect of the tibia have unfavorable radiographic outcome
Location of osteochondral injuries offers important information regarding prognosis

Why this article made an impact on me:
Prospective series of 288 consecutive ankle fractures
12.9 year follow-up on 109 of these patients
Attempt to predict which ankle fractures will and will not develop posttraumatic arthritis
Help understand the natural history of this very common injury
May contribute to treatment algorithm to improve long-term outcome
Raises some important questions:
o How can we recognize patients with a 'high risk' cartilage lesion?
o Should we be more aggressive in ankle arthroscopy at the time of ankle fracture fixation? If so, when?
o Why is osteoarthritis more likely to develop with cartilage lesions in the 'high risk' zones?