

COMPLICATIONS

Minor complications include epidermolysis, superficial infection, and peroneal tendonitis with painful hardware.

Major complications include nonunion, hardware failure, deep infection, and compartment syndrome.

30,000 Medicare patients, Koval: surgical complication rate of 2% i

Wound Breakdown and Infection

The overall rate of postoperative wound infection following surgical stabilization of unstable ankle fractures is difficult to determine because of various definitions used in the literature. Usually between 2 to 10%.

The risk of deep infection is increased in diabetic patients compared with patients without diabetes mellitus. The incidence of this complication in these patients may be 3 to 4 times that of nondiabetics.

[J Bone Joint Surg Am. 2008;90:1570]

Loss of Reduction and Fixation

A bigger problem with unstable fracture patterns that are treated nonoperatively. It may occur early when associated with poor bone stock. More commonly associated with nonoperative care of unstable fracture patterns.

Compartment Syndrome

This is a rare complication, but it may be associated with higher energy fracture patterns.

Arthritis Malreduction of the syndesmosis and Malunion

Radiographic markers of ankle malunion	
	Consider Reconstruction if:
Medial malunion/Instability	
Medial clear space ^{17,18}	>4 mm, or > superior space
Talar tilt ¹⁸	>5°
Syndesmosis	
Fibula overlap ¹⁸	<10 mm
Tibiofibular clear space ¹⁸	<5 mm
Talar shift ¹⁰	>1 mm
External rotation stress test ¹⁹	Compare with opposite side
CT scan of syndesmosis ²⁰	Incongruity
Fibula length	
Talocrural angle ²¹	Average = 83° ± 4° but compare with opposite side
Fibula shortening ²²	>2 mm
Fibula rotation	
CT fibula torsional angle ²³	>15°
Distal tibial malunion	
Tibial plafond angle ¹⁵	>10°

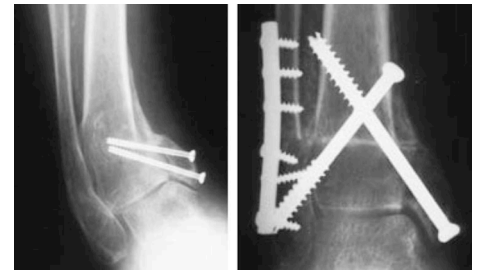
Treatment: [Foot Ankle Clin N Am 13 (2008) 737-751]

1. Lengthening of the fibula and internal rotation

Difficult to judge amount of lengthening. Consider comparing opposite ankle

2. Extra-articular open or closed

supramalleolar Osteotomy



Nonunion

This may be caused by failure to obtain an adequate reduction or by loss of reduction of the mortise. Malalignment following surgical treatment is secondary to failure to recognize an inadequate reduction intraoperatively or loss of that reduction secondary to failure of bone or fixation method. Inadequate reduction risk may be related to loss of normal landmarks secondary to extensive comminution. Certain fracture patterns should raise the suspicion of the surgeon as to associated injuries, such as tibial marginal articular impaction in supination adduction injuries. More common is failure to obtain fibular length. Shortening of the fibula laterally with varying degrees of malrotation will lead to characteristic medial widening, talar tilt, and varying degrees of arthritic. A fibular lengthening osteotomy with lateral reconstruction has been described. Ankle arthrodesis remains an option for the patients with a significant ankle fracture malunion and advanced arthrosis.

Malreduction of the tibiofibular syndesmosis may be obvious (widened tibial-fibular space) or subtle. Recent studies have shown plain radiographic evaluation of malreduction of the syndesmosis to be inaccurate. CT scanning of the distal tibial-fibular joint has shown this to be of greater incidence. Three reasons why the syndesmosis may be malreduced are malreduction of one or both malleoli, bony or soft tissue interposition, or malreduction of the fibula within the incisura. Persistent malreduction of the syndesmosis will lead to restricted **ankle** range of motion and arthrosis if not corrected. The best course of action is to reconstruct as soon as this problem is identified.

Nonunion of nonoperatively treated medial malleoli is a well-known complication. This may be because of several factors, including blood flow to the fragment, interposed soft tissue, or effects of synovial fluid on the fracture hematoma.

Nonunion fibula with IM nailing of the tibia

[International Orthopaedics 2012]:

this complication is increasing as

in concomitant fracture, only tibia is fixed. This incidence 4% as opposed to nonunion in rotational ankle injury [1%]. In 20% it may be asymptomatic.

For symptomatic nonunion of the fibula, plate fixation with or without



autologous bone grafting (36.9 %) resulted in complete resolution of symptoms and eventual bony union

Arthritis

The development of posttraumatic ankle arthrosis is rare following low-energy rotational or indirect ankle fracture. The most important factor influencing the development of arthritic change is the quality of the ankle mortise reduction. It is, however, likely that factors such as traumatic chondrocyte death and unrecognized osteochondral injury contribute to posttraumatic arthritis as well.

Painful Hardware

Implantation of orthopaedic hardware about the malleoli is frequently associated with irritation because of its subcutaneous location or the associated tendonitis that comes with the peroneal tendons rubbing over the implants. Persistent pain in the region of implanted orthopaedic hardware after radiographic evidence of fracture union commonly leads to implant removal.

Nerve Injury

The sural nerve is located posterior and crosses distally to the fibula but may be injured upon a posterolateral approach to the fibula and tibia. The superficial peroneal nerve crosses from the lateral to the anterior compartment approximately 7 cm proximal to the fibular tip.

Venous Thromboembolism

Ranges from 3% to 21%.

OUTCOMES

1. Phillips: randomized clinical trial to assess the optimal treatment methods for displaced, unstable **ankle fractures**. CR Vs ORIF. There was a 23% incidence of arthritic severe arthritic change in those treated nonoperatively, compared with 0% in those treated with surgery.
2. Egol et al. looked at 198 patients followed for a minimum of 1 year. Predictors of recovery included younger age (<40 years), female sex, healthier patients (ASA Class 1 and 2), and absence of diabetes mellitus.
3. Hoo [J Bone Joint Surg Am. 2009;91:1042-9]

The overall rate of short-term complications was low:

Rates of pulmonary embolism 0.34%

Mortality 1.07%

Wound infection 1.44

Amputation 0.16%

Revision ORIF 0.82%

Ankle fusion or ankle replacement 0.96% at 5 years.

