

Three Questions and Answer) About Navicular Fractures of the Foot

In this study, orthopedic surgeons from The OrthoCarolina Foot and Ankle Institute in North Carolina asked three questions about navicular stress fractures. Let's orient ourselves to the navicular bone, to stress fractures, and then we can tell you the answers to the three questions (and answers to the questions).

The navicular bone of the foot is one of the small bones on the mid-foot. The bone is located at the instep, the arch at the middle of the foot. One of the larger tendons of the foot, called the posterior tibial tendon, attaches to the navicular bone and continues under the foot and into the forefoot. This tendon is a tough band of tissue that helps hold up the arch of the foot.

Stress fractures are breaks in the bone that occur with repetitive motions, strains, or stresses. Navicular stress fractures are fairly uncommon. The person at greatest risk for this type of fracture is a high-level athlete engaged in activities that involve repeated push-off of the foot. Track and field runners head the list for this type of injury.

Any fracture can be further categorized as displaced (ends of the bone separate and possibly shift) or nondisplaced (no separation or shift after fracture). This distinction will be important in the results of this study.

The three questions posed by the authors of this study were:

- Does surgically repairing a navicular stress fracture help the fracture heal?
- Does a bony union (healed fracture) mean better clinical outcomes (motion, function)?
- Is the bone lucency (thinning) often seen on CT scans after surgery linked with results or outcomes in any way?

Who was in the study? Ten adults with navicular fractures whose medical records included X-rays, CT scans, and/or MRI scans before and after surgery. Patients ranged in age from 18 to 54 and included football players, basketball players, baseball players, one cross-country runner, and three nonathletes.

Fracture types ranged from incomplete, nondisplaced to complete, displaced, and complete, displaced. Bone grafts and screws were used in cases of displaced fractures. The surgical procedures were done by one of four orthopedic surgeons in adult (fellowship level) training.

Cross section cuts of the CT scans made it possible to rate the fractures as either healed (defined as more than 50 per cent of the fracture site closed) or not healed (referred to as a nonunion).

Results showed that 80 per cent (eight of the 10) fractures healed fully. The two nonunions were in older adults (ages 45-54) but age might not have been as much of a risk factor as the fact that the bone graft used was an allograft (from a bone bank) rather than autograft (using the patient's own bone).

Function tested higher in those patients who did have a full fracture healing (union). The lucency seen in six of the healed fractures did not seem to affect function or recovery. Comparing the results of these patients (treated surgically) with results from other studies in which patients were treated nonoperatively, there did not appear to be a faster recovery or faster return-to-sports for the operative group.

The authors acknowledge the small number of patients in their study creates some limitations in drawing strong conclusions, making firm suggestions. They couldn't say that surgery to hold together navicular stress fractures got the athletes back on the field any faster than without surgery.

But they did show that complete, displaced fractures are more likely to remain as nonunion fractures. The advantage of

surgical procedure is to prevent nondisplaced fractures from separating and becoming complete, displaced fracture that is likely to heal. The earlier navicular stress fractures are treated (with or without surgery), the better the results.

The authors think there is a chance that earlier treatment with surgical fixation has a chance of speeding up return-to-sport participation. But they say that further study is needed to prove this statistically.

Reference: Jeremy J. McCormick, MD, et al. Clinical and Computed Tomography Evaluation of Surgical Outcomes in Patients with Navicular Stress Fractures. In *The American Journal of Sports Medicine*. August 2011. Vol. 39. No. 8. Pp. 1741-1748.