

## The Obsession about the Scaphoid

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### Editorial

The scaphoid bone, no bigger than a cashew nut, is known as the high risk non-union representer in orthopedic trauma. Although the incidence of tibia and humerus nonunions among our patients is usually higher, it is the small bone that gets all the negative credits. Since correlation between symptoms and radiographic findings is often poor and only few patients without symptoms present to us for treatment, true natural history of scaphoid nonunion is largely unknown. For these reasons, it is still unclear whether surgery is able to change the natural history of scaphoid nonunion.

Non-operative treatment of scaphoid fractures will lead to union in approximately 90% of all fractures. When displaced scaphoid fractures are accurately diagnosed and treated surgically, union rates of conservatively treated scaphoid waist fractures approach 100%.

Although standard scaphoid series radiographs are still considered as gold standard first line diagnostics for scaphoid fractures, sensitivity of scaphoid X-rays is insufficiently to provide reliable information regarding the presence of a scaphoid fracture. About 20% of all fractures are still missed when only relying on conventional imaging techniques. There is proof that the missed and untreated fractures are at risk for developing nonunion and eventually symptomatic osteoarthritis.

Patients belonging to the risk population and exposed to the typical trauma mechanism usually responsible for scaphoid fractures, being forced extension of the wrist with axial loading of the hand, should be considered having a scaphoid fracture, until proven otherwise. Bone scans and MRI's are still popular as the second line diagnostic of choice, probably because of unmatched sensitivity for detection of scaphoid waist fractures. However, the bone scan is subsumed when considering its poor specificity and narrow diagnostic window for detection of occult fractures. Moreover, MRI is less accurate than CT scan for detection of displacement of scaphoid waist fractures. Besides that, CT scan has shown to have the highest accuracy and precision regarding the presence or absence of fracture union and is associated with low cost, high availability and high safety when applied and performed properly. A negative CT-scan is considered to be sufficient to refrain from treatment, but no proof for this in literature is available.

Among surgeons, the risk of developing a scaphoid nonunion is well known and usually, attributed to problematic vascularity of the proximal pole. Although there are many treatment options for scaphoid nonunion, it is often believed that restoration of proximal pole vascularization is essential, next to reconstruction of scaphoid geometry and carpal alignment in cases where vascularity of the proximal pole is questionable.

For this reason, vascularized bone grafting is often considered as the only solution for scaphoid nonunions with avascularity of the proximal pole, using either pedicled vascularized graft from the distal radius of free vascularized grafts.

Even with failure rates of up to 25% of these techniques, it is questionable whether restoration of the vascularity is responsible for achievement of union, or the rigid fixation of the graft itself? Moreover, many nonunited scaphoid waist fractures show loosening of the centrally placed screw after failed fixation, suggesting rotational instability. These findings contribute to the belief that not avascularity, but instability is responsible for troublesome healing of many scaphoid fractures and development of nonunion. Reports in literature regarding arthroscopy has shown that instability is ubiquitous in displaced waist fractures add weight to this idea. These findings contribute to our belief that treatment of unstable scaphoid fractures and nonunions with a central screw effectuating unpredictable compression and insufficient rotatory stability will be inadequate.

There are some reports that angular stable mini-plate fixation has shown to be a successful technique for treatment of chronic unstable scaphoid nonunions. Normal bone healing has been observed in these patients within 6 to 12 weeks, even in nonunions with an avascular proximal pole.

Therefore, if stability becomes the key factor for success in treatment of scaphoid fractures and nonunions, diagnostics should be focused on this item more prominently. Early dynamic sequential multiplanar CT may be helpful in determining stability; however, this technique has not yet been validated. Therefore, diagnostics regarding presence and characterization of scaphoid fractures and nonunions should focus more on stability than on vascularity. It is time for a paradigm shift.