Salvage Operations for Wrist Ligament Injuries with Secondary Arthrosis

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KEYWORDS

• SLAC wrist • Scapholunate • Lunotriquetral • Denervation • Four-corner arthrodesis
• Scaphoidectomy • Proximal row carpectomy

KEY POINTS

- Scapholunate advance collapse (SLAC) is a well-defined sequela of chronic scapholunate instability.
- The SLAC wrist has a predictable pattern of progression of arthrosis starting with the radioscaphoid interval and later involving the midcarpal capitolunate joint; typically, the radiolunate interval is spared.
- Wrist denervation is an established treatment of arthritis and has the advantage of simplicity and earlier recovery; denervation can also be performed in conjunction with reconstructive procedures.
- The 2 standard reconstructive options for SLAC are proximal row carpectomy and scaphoidectomy and 4-corner arthrodesis.
- Alternatives/modifications to the these traditional treatments include radial styloidectomy with and without partial wrist fusion, proximal row carpectomy with capitate resurfacing, 2-column carpal arthrodesis, and partial wrist fusion with triquetrectomy.

INTRODUCTION

The most frequently injured wrist ligament is the scapholunate interosseous ligament (SLIL), followed by the lunotriquetral interosseous ligament (LTIL). Although these ligaments may be injured in isolation, they may also represent part of a more complex ligamentous injury such as a perilunate dislocation. Wrist ligament injuries are difficult to treat successfully, and, in the case of the LTIL, the diagnosis alone can present challenges. Although the natural history of these injuries is not fully understood, untreated injuries or failed repairs often progress to carpal instability and subsequent arthrosis.

In the case of SLIL injuries, the progressive arthrosis of scapholunate ligament advanced collapse (SLAC) is well defined (Fig. 1).[1] Degenerative changes begin at the articulation of the radial styloid with the scaphoid (stage I), followed by involvement of the entire radioscaphoid articulation (stage II). In addition, in stage III the midcarpal (capitolunate) joint becomes involved. It is generally thought that the radiolunate joint is spared,[2] although some investigators recognize a stage IV SLAC wrist in which the radiolunate articulation is affected.[3] Other untreated ligamentous injuries, such as LTIL injuries or perilunate instability, can also progress to arthritis, although the pattern

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Fig. 1. Posteroanterior (PA) radiograph of the left wrist, showing a stage III SLAC wrist. Note the widened scapholunate interval, and arthrosis of the entire scaphoid fossa and capitolunate joint. As in this radiograph, the radiolunate joint is typically preserved.

of degenerative changes is not as predictable (Figs. 2 and 3).

In some cases, the instability and arthritis that occur as sequelae of ligamentous injuries are asymptomatic. In other cases the symptoms are mild enough that they can be managed to the patient's satisfaction with steroid injections or splinting. However, when these nonoperative modalities fail, surgical intervention is indicated. This article discusses definitive salvage operations such as intercarpal arthrodeses and proximal row carpectomy (PRC), as well as other alternatives, such as wrist denervation and radial styloidectomy, for treating the ligamentous unstable wrist with degenerative changes.

WRIST DENERVATION PROCEDURES

The goal of wrist denervation is to divide articular nerve branches that send afferent pain signals, without affecting motor function or cutaneous sensibility. Wrist denervation was first described by Wilhelm in 1966 for the treatment of degenerative wrist arthrosis. In Wilhelm's description, articular branches of the posterior interosseous nerve (PIN), superficial sensory branch of the radial nerve, the anterior interosseous nerve (AIN), the ulnar nerve, and the median nerve are divided (10 branches in total), resulting in total wrist joint denervation. Since his original description, several investigators have studied the effectiveness of total wrist denervation, showing generally good outcomes.[4–7] A recent study of 49 wrist denervations performed for degenerative arthrosis showed pain improvement in 79% of patients, along with improvement in grip strength at 6-year follow-up.[6] Advantages of wrist denervation are that it does not adversely affect grip strength or range of motion, and does not create problems for future salvage operations. One concern is the possibility of reducing wrist proprioception, potentially resulting in neuropathic arthropathy. However, in Buck-Gramcko's[5] study of 195 complete and partial wrist denervations, no evidence of Charcot joint was found. This finding is further supported by a recent study of the effect of AIN and PIN blockade on wrist kinesthesia, in which the investigators did not find any effect on wrist proprioception.[8]

In subsequent studies, partial wrist denervation by division of the PIN, or both the PIN and AIN,

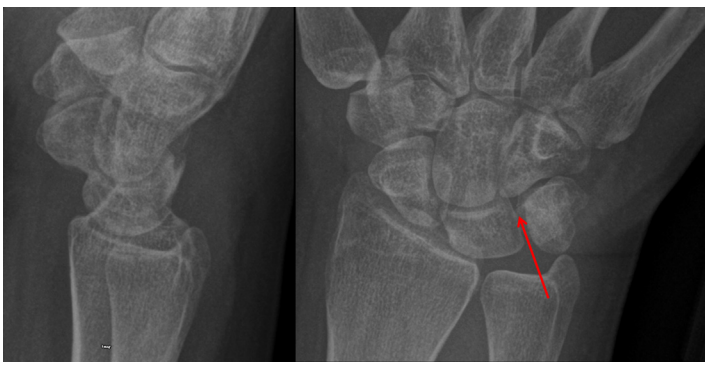

Fig. 2. Lateral (*left*) and PA (*right*) radiograph of the left wrist in a patient with a lunotriquetral ligament injury (and concomitant scapholunate injury). On lateral view, note the volar intercalated segment instability (VISI). On the PA view, note the disruption of the Gilula arc at the midcarpal joint, between the lunate and triquetrum (*red arrow*).