SYMPOSIUM ON ADVANCES IN THE MANAGEMENT OF
SCAPHOID PROBLEMS

Surgical treatment of scaphoid nonunion

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ABSTRACT
This study is a review of the current conceptions, indications, principles, and prognoses of the surgical treatments of scaphoid nonunion. The pros and cons of various operations are discussed.

Key Words: Scaphoid; Nonunion; Surgery

INTRODUCTION
Nonunion of the scaphoid is arbitrarily defined as failure of solid bony union of the scaphoid fracture after 6 months. However, even when surgery has been performed within 6 months, delayed union can be defined. Asymptomatic fibrous union of the scaphoid fracture sometimes makes defining nonunion complicated. The indications, surgical treatment methods, and clinical outcomes described by various authors are thus difficult to compare. The present study reviews relevant articles and discusses the basic concepts and principles for surgical management of scaphoid nonunion.

CLASSIFICATION OF SCAPHOID NONUNION
Herbert classified the forms of scaphoid nonunion into four main groups. Type D1 is fibrous union and D2 is pseudoarthrosis at the nonunion site. Type D3 (modified Herbert classification) is seen with fixed dorsal intercalated segment instability (DISI) deformity and a sclerotic edge of pseudoarthrosis. Type D4 is avascular necrosis with collapse of the proximal pole. With regard to D1 and D2, these morphological types did not seem to affect the choices of surgical treatment.

In addition, totally asymptomatic fibrous union of the scaphoid fracture was relatively more controversial regarding surgical intervention. Some authors suggest treating all cases with radiological nonunion, but others have argued against overtreatment in some relatively benign cases.

I believe that there is, in fact, a spectrum of stability between the scaphoid nonunion fragments. The most unstable one is pseudoarthrosis (Fig. 1), followed by fibrous tissue interposition (fibrous nonunion and fibrous union). The most stable type is strong fibrous union without deformity. When there is minimal motion at the scaphoid nonunion and no scaphoid deformity, the scaphoid functions in a solitary manner and may cause little degenerative change to the wrist as time goes on.

For practical purposes, I would classify scaphoid nonunion into two categories: asymptomatic and symptomatic. The commonest symptoms are wrist pain, decreased grip strength, and reduced range of