Midcarpal fusion is a reliable treatment for advanced carpal collapse following scaphoid nonunion or scapholunate dissociation. It remains, however, unclear if the alignment of the fused carpal bones influences the redirection of load towards the lunate. The objective of this study was to assess the actual loading conditions after midcarpal fusion in patients by evaluating the patterns of subchondral bone mineralization in the distal articular surface of the radius. Nine patients, who were treated by midcarpal fusion with complete excision of the scaphoid, were examined after an average of 22 months postoperatively by means of CT osteoabsorptiometry. All patients showed peak mineralization in the lunate fossa of the distal articular surface of the radius. Six patients with correct carpal alignment had one large density maximum in the lunate fossa and none in the scaphoid fossa. Patients with incomplete correction of the radial translocation of the capitate, incomplete excision of the scaphoid, or incomplete correction of the extension position of the lunate, showed a second density maximum in the scaphoid fossa. These findings emphasize that a correct carpal alignment is necessary to achieve a complete unloading of the degeneratively altered scaphoid fossa.