Clinical Application of Computed Tomography in Discography

Tae-Sub Chung

Introduction

Discography, the injection of contrast media into the nucleus pulposus, is a diagnostic technique used to evaluate cases of lower back pain, in which the results of other imaging studies are normal or conflicting. The diagnostic merits and applications of lumbar discography have always been controversial and this position is unchanged, even with the advent of computed tomography and magnetic resonance imaging [1–3]. Initially, many believed that MR imaging would eliminate the need for discography; however, with the recognition of multisegmental disc disease on MRI studies and the increased use of spinal fusion procedures, the need for this provocative and morphologic test has grown. Discography, by means of induced pain, is the only neuroradiological examination that presently allows a pathologic disc to be ascertained; it is a precious element in the identification of disc or discs causing the clinical symptoms. Induced pain is not to be confused with the pain provoked by discal distention with consequent stretching of nerve terminals: the latter presents the distinguishing feature of being dull, essentially mechanical and slight in magnitude [4].

CT discography is effected by exploiting the contrast injected directly into the disc during discography and successively performing a delayed CT scan. CT discography allows extremely precise anatomico-neuroradiological investigation of the disc, unequivocally demonstrating disc pathologies that are difficult to interpret with plain CT scans and sometimes even with MRI [4].

Indications

Uses of CT discography include the following: diagnosing a lateral disc herniation [5, 6]; differential diagnosis between fibrosis and recurrent herniation after surgery [7]; additional evidence in the case of erroneous intradiscal puncture.

1 Department of Diagnostic Radiology, Yonsei University Medical College, YongDong Severance Hospital, 146–92, Dogok-Dong, Kangnam-Ku, Seoul 135–270, Korea.
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(annulography) [8]; further diagnostic investigation in the case of discrepancy between clinical findings and neuroradiological examinations [4]; revealing internal disc interruption [8]; and determining the type of disc lesion as protrusion, extrusion, or sequestration [1].

It has been suggested that MRI may make lumbar discography obsolete [9]. This would be true if a normal T2-weighted image shows that the disc is normal by all discography parameters. However, discography remains the only pain-provocative test in situations of multiple level disc abnormalities or in instances of equivocal MRI imagings [10].

Technique

A mild analgesic is given to hospitalized patients, but no premedication is used when discography is performed as an outpatient procedure. With the patient in the lateral decubitus position, a posterolateral extradural approach from the asymptomatic or less symptomatic side is used. An 18-gauge Hustead needle is then positioned under fluoroscopic control until it rests against the posterolateral annulus. A 22-gauge Chiba needle is then passed through the Hustead needle into the center of the disc. After satisfactory needle placement, normal saline is injected into the disc for the test.

After the saline injection, water soluble contrast medium is injected into the disc. The volume, resistance, pain response, and radiographic appearance are noted. Usually 1.0 cc contrast medium is injected, attentively assessing the presence of pain response. The CT examination utilizing the intradiscal contrast injection is performed within 2 h after discography, to attenuate the elevated opacification of the contrast itself and allow for homogeneous diffusion inside the disc. Three or four thin slice scans are usually taken at the center of disc to avoid the artifacts due to partial volume effect. In the eventuality of herniated migration, contiguous slices may be performed pedicle to pedicle with sagittal and coronal reconstruction images. Use is made of both wide-window images, to study the diffusion of contrast in the canal and bony structures, and narrow-window images, to study the thecal sac and nonopaque scarring.