Using Provocative Discography and Computerized Tomography to Select Patients with Refractory Discogenic Low Back Pain for Lumbar Fusion Surgery

Mick J. Perez-Cruet MD, MS; Henry Tong MD; Mengqiao A Xi BS
Oakland University William Beaumont School of Medicine
Michigan Head and Spine Institute

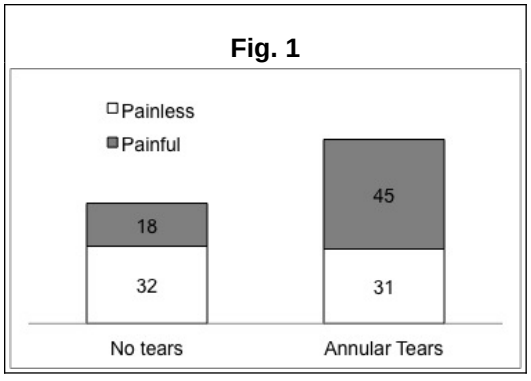
Introduction

Controversy remains over the use of provocative discography in conjunction with computerized tomography (CT) to locate symptomatic intervertebral discs in patients with chronic low back pain (LBP) (1, 2). This study explores the relationship between discogenic pain and disc morphology using discography and CT, respectively, and investigates the outcome-based efficacy of this method in identifying surgical candidates for lumbar interbody fusion.

Methods

43 consecutive patients with chronic refractory LBP underwent discography with subsequent CT on the injected discs; disc morphology and pain response were characterized. Concordant pain was defined as LBP of similar character and location with an intensity of 8/10 or greater. Fusion candidates were those who demonstrated positive level discography and concordant annular tears on CT at no more than 2 contiguous levels, and at least 1 negative control disc.

Fig. 1



Results

Concordant pain (87 of 128 injected disc, 68.0%) occurred significantly more often in discs with annular tears (63 of 87 injected disc, 72.0%) than those without (24 of 87 injected disc, 28%, $p<0.001$) (Fig. 1). Painless discs were independent of annulus status ($p=0.90$) (Figs 2, 3). 18 (42%) patients underwent minimally invasive interbody fusion. Visual analog scale (VAS), Oswestry Disability Index (ODI), and Short Form-36 (SF-36) scores demonstrated significant improvements at 3, 6 and 12 months postoperative time points compared with preoperative baseline (median follow-up 18 months) (Table 1).

Table 1

	Pre-Op	2 weeks	6 months	≥12 months
VAS	7.9±2.8	*4.8±2.4*	*4.5±3.1*	*4.0±2.7*
SF-36 Mental	39.8±9.3	43.6±8.4	*53.6±9.7*	*52.0±8.5*
SF-36 Physical	23.2±6.5	*31.3±6.5*	31.5±11.7	*34.2±10.7*
ODI	52.5±9.3	*36.6±11.5*	*32.2±18.3*	*28.3±16.9*

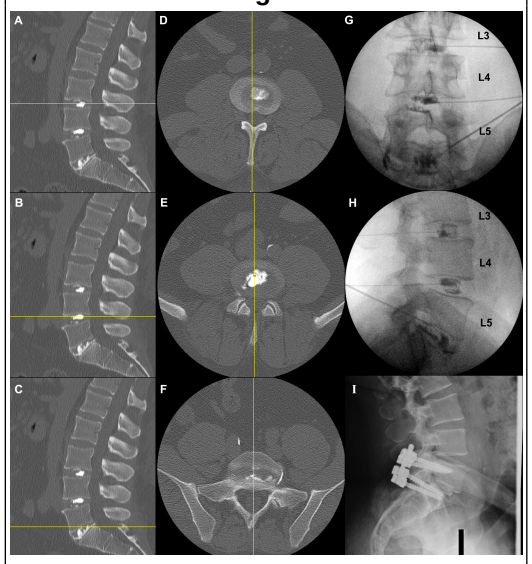
Conclusions

Lumbar discography with post-discography CT can be an effective method to evaluate patient with refractory discogenic LBP. Patients with one- or two-level high concordant pain scores with associated annular tears and negative control disc represent good surgical candidates for lumbar interbody fusion.

Learning Objectives

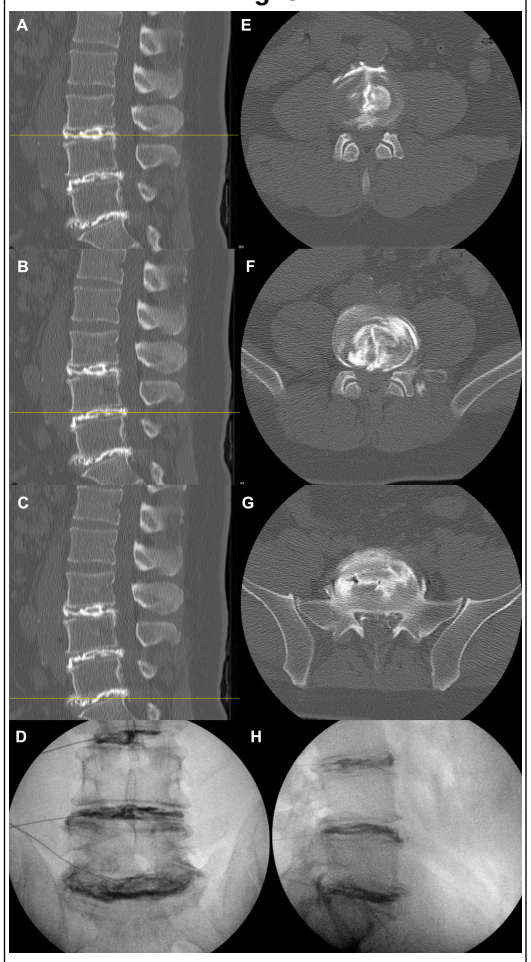
1.There is a close association between discogenic pain response and annulus fibrosus disruption based on discography and CT.
2.Discography in conjunction with CT helps identify symptomatic discs for lumbar fusion and produces favorable outcomes.

Fig. 2



Sagittal (A-C) and axial (D-F) CT views show morphologically intact discs at L3-4 (A, D) and L4-5 (B, E) with the radio-opaque dye contained within the nucleus pulposus, and structurally violated disc at L5-S1 (C, F) with egressive dye into the spinal canal on the posterolateral aspect. Coronal (G) and sagittal (H) intra-discography radiographs illustrate structurally normal discs at L3-4 and L4-5; these discs showed no concordant pain. The L5-S1 disc had a damaged annulus that permitted contrast extravasation anteriorly, posteriorly, and laterally; it was painful upon provocation.

Fig. 3



Sagittal (A-C) and axial (D-F) CT views show morphologically violated discs at L3-4 (A, D), L4-5 (B, E), and L5-S1 (C, F). Egressive radio-opaque dye into the spinal canal is seen at all 3 discs. Coronal (D) and sagittal (H) intra-discography radiographs illustrate structurally abnormal discs at all 3 levels, all of which showed concordant pain. Interbody fusion was not performed on this patient.

References

1. Tong H, Carson J, Haig A, et al, Magnetic Resonance Imaging of the Lumbar Spine in Asymptomatic Older Adults, J Back Musculoskelet Rehabil 19 (2006) 1-6.
2. Chen J, Ding Y, Lv R, et al, Correlation Between MR Imaging and Discography With Provocative Concordant Pain in Patients With Low Back Pain, Clin J Pain 27 (2011) 125-130.