Evaluation of lumbar discography as a modality to diagnose disc as a cause of low back pain

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ABSTRACT

Purpose to study the role of provocative discography along with disc morphology as a diagnostic modality to diagnose disc as a cause of low back pain.

Methods : Prospective observational study was conducted involving 34 patients who underwent procedure of discography as a diagnostic modality for chronic low back pain. Study was conducted between 2012 and 2014.

Results: In our study 25 patients had abnormal disc shape and 9 patients had normal shaped disc (p value < 0.0001). Of the 25 abnormal discs irregular shaped disc (38.23%), fissured disc (26.47%), and ruptured disc (8.82%). 25 patients showed positive provocative discography and 9 patients showed negative provocative discography (p value < 0.01). On an average 4ml dye was used.

Conclusions: Discography is still a viable option as a diagnostic modality to diagnose disc as a cause of low backache. When multiple level discs are involved, it helps to determine which level is the cause of pain.

KEYWORDS: Low back pain ; lumbar discography ; annular tear.

Introduction

Provocative discography is an imaging-guided procedure in which a contrast agent is injected into the nucleus pulposus of the intervertebral disc. It provides both anatomical and functional information about a disc suspected to be diseased. Following intradiscal contrast injection, disc morphology is usually assessed on radiographs or computed tomography (CT), or both. The functional evaluation consists of pain provocation and careful assessment of the patient's response to pain.

Low back pain is a very common clinical problem. Work has become less physical and sedentary due to technological advancement [1]. Sedentary lifestyle and lack of exercise are responsible to increase low back pain problem in the society. Low back pain can be caused by structure-specific etiologies including zygapophyseal joint abnormality, disc pathology, and sacroiliac joint arthropathy; and intervertebral disc disease. Currently, magnetic resonance (MR) imaging is widely regarded as the imaging modality of choice for investigating patients with suspected disc lesions. However, it is well known that many asymptomatic discs appear abnormal on MR imaging [2,3,4,5,6,7,8]. Discs that appear normal on MR imaging have also been shown to be abnormal on discography [9,10].

In early days of discography, it was performed to demonstrate disc morphology and to diagnose disc herniation in low back pain. However, this technique is no longer used for diagnosing disc herniation and result do not correlate well with morphology of intradiscal degeneration. Instead, provocative discography often referred as "disc stimulation". It is currently used to stimulate individual "painful discs" to determine whether they are sources of patient's spinal pain. In modern provocation discography, slow increase of intradiscal pressure by injecting contrast media into the nucleus pulposus can produce patient's accustomed pain if the disc is painful, while stimulation of normal disc does not produce any pain. Provocation discography has been recognized to be a very specific diagnostic test for discogenic pain.

In this study we intend to study the role of provocative discography along with disc morphology as a diagnostic modality to diagnose disc as a cause of low back pain.

Materials and methods

1. Method
This is prospective observational study involving 34 patients who underwent procedure of discography as a diagnostic modality for chronic low backache. Study was conducted between 2012 and 2014. Analysis of the data is done using p value and chi square test and the result will be expressed in terms of numbers and percentages.

2. Inclusion and exclusion criteria
An inclusion criteria was any patient between 20 years to 60 years age group, presenting with low backache with or without radioulopathy treated conservatively for 3 weeks and not relieved with the same. Exclusion criteria were 1) Patients with a known bleeding disorder and those on anticoagulation therapy 2) Pregnancy 3) Systemic infection or skin infection over the puncture site 4) allergy to the contrast agent 5) Previously operated disc 6) Solid bone fusion that does not allow access to the disc 7) Severe spinal cord compromise at disc level to be investigated.

All the patients with chronic low back pain were initially attended in OPD and given a trial of conservative treatment for 3 weeks or more. Patients who did not respond to conservative management were given option of discography and all those patients who met the inclusion criteria and were willing to get enrolled in the study were selected after taking a written and informed consent.

3. Surgical technique
All the procedures of discography were carried out as day care procedures. All the patients were evaluated for allergic reactions by injecting 0.1ml of Dye and 2% Lignocaine intradermally prior to the procedure. Patient is placed prone on regular table. On the basis of clinical examination the level to be injected is marked using metallic object under the image intensifier. Parts are scrubbed and painted. Local anesthesia is given using Lignocaine 2% at the desired level. Omnipaque dye is prefilled in 10cc disposable syringe and diluted with distilled water. Depending on patient size either no. 20 or 21 spinal needle is selected. Using paraspinal approach needle is inserted through the anesthetized site. Under image intensifier the position of the needle is checked in both AP and Lateral views. After confirming the position of the needle slowly the dye is injected into the disc and pain response of the patient is recorded (concordant or discordant). After injecting the dye into the disc, it is visualized under the image intensifier in both AP and Lateral positions, and disc morphology is noted down. If another level is to be studied same procedure is repeated.
4. Discography interpretation
The amount of contrast agent injected into the nucleus pulposus and resistance encountered during injection should be carefully recorded. The normal lumbar disc usually takes up to 1.5 ml of contrast agent. A degenerated lumbar disc will typically have a volume of more than 2 ml. The two major aspects to consider in the interpretation of discography are disc morphology and pain provocation.

Disc morphology was determined by evaluating the anteroposterior (AP) and lateral radiographs obtained after intradiscal contrast injection. A normal disc maintained a normal height on both AP and lateral radiographs. Injected contrast agent remained in the nucleus pulposus, and may be unilocular (“cottonball” or rectangular) or bilocular (“hamburger bun”) in shape.

In degenerated discs, discography showed a reduced disc height, and complex or multiple irregular fissures in the annulus fibrosis, with or without contrast leakage through annular tears. On discography, a single annular fissure was often seen. The nuclear material may migrate superiorly or inferiorly (giving a “candle drip” appearance).

When taking the disc morphology and pain provocation aspects together, the categories of a discography study were: Normal study. Abnormal but asymptomatic disc(s), abnormal disc(s) with discordant symptoms and abnormal disc(s) with concordant (partially or fully) symptoms.

Walker J et al [11] described discographic contrast imaging findings & corresponding interpretations. (Table 1)

Results
All the patients were included as per the inclusion and exclusion criteria. In this study, out of 34 patients, an eighteen were females (52.94%) and sixteen were males (47.05%). The mean of the patient was 41.17 years (range 20-60 years).10 patients (29.41%) presented with low back pain only and 24 patients (70.58%) presented with low back pain associated with radiculopathy. Out of 34 patients, twenty five patients (73.52%) had positive provocative discography and nine patients (26.47%) had negative provocative discography. No complications were encountered in our series.

In our study we encountered 13 irregular discs (grade 3, 38.23%) (Figure 3), 9 patients had normal disc (grade 0, 26.47%), 9 patients had fissured discs (grade 4, 26.47%), and 3 patients had ruptured disc (grade 5, 8.82%).

Complications
Chen et al [14] in 2011 concluded that Concurrent pain significantly correlated with type IV-V discs on discography. Grade IV-V disc degeneration on MR image, the presence of HIZ, and endplate abnormalities. Disc degeneration grades on MRI showed an association with discogenic grades.

Shin et al [15] in 2006 studied 21 patients with clinically suspected discogenic low back pain who underwent pressure controlled discography. They concluded that pressure controlled discography was useful to diagnose discogenic pain and an excellent guide in decision making for spinal operations.

In our study we had 25 patients (73.52%) who showed positive response or concurrent pain and 9 patients (26.47%) negative response or discordan pain i.e. 25 patients with 34 discs had positive response (p value < 0.01).

Conclusions
Discography is still a viable option as a diagnostic modality to diagnose disc as a cause of low backache. When performed by experienced surgeon it is a safe procedure with minimal complication rate. When multiple level discs are involved, it helps to determine which level is the cause of pain. No complications were encountered in our series.
Fissured | Degenerated disc with radial fissures leading to the outer edge of the annulus
Ruptured | Disc has complete radial fissure that allows injected fluid to escape. This can be any stage of degeneration
End plate fracture | Disruption of end plate

**Figures:**

1. **Figure 1** - Candle drip appearance - arrow showing some leakage of dye upwards suggestive of annular tear.

2. **Figure 2** - Pie chart of Disc shape percentages found in patients.

3. **Figure 3** - Discogram showed irregular shaped disc. a) AP view b) lateral view

**References:**


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