Discography, or provocative discography, is one of a number of procedures available to assess spinal pain. A literature review identified reports of the procedure as early as 1948. The procedure is diagnostic in nature and is performed by a provider knowledgeable in spinal anatomy as well as in radiological imaging and equipment.

Discography is the only means of directly assessing whether a patient’s disc is the cause of back or neck pain. It is a more sensitive test for internal disc disruption than magnetic resonance imaging (MRI). Disc abnormalities may be identified on computed tomography (CT) or MRI studies, but the procedure of discography is the only method available that can link the patient’s pain response directly to a disc abnormality.

Discography is performed using fluoroscopy. A positive pain response means that when the disc is injected with a low volume of contrast, the patient reports concordant pain (pain that is the same as the pain the patient normally experiences). Often, a postdiscogram CT scan is performed. The CT scan allows for a more thorough visualization, assessment, and identification of disc abnormalities.

It is important to note that many people suffer from asymptomatic lumbosacral disc degeneration. The most important aspect of discography lies in the patient’s clinical responses and not in radiographic assessment of the disc anatomy. Simply stated, the goal of discography is to identify whether pressurization of a disc produces pain that is concordant, or pain in the same distribution or area reported prior to the procedure. Patients may have pain that is more intense than normal with this procedure, but if it is in the normal distribution it is still considered concordant. A discordant response occurs when the patient reports pain in an area that is not his or her normal pain pattern. All patient responses during the procedure are carefully recorded.

**Indications for procedure**

Discography testing is beneficial in the preoperative evaluation of candidates for potential surgical procedures that include spinal fusion and/or extension of a prior fusion. It also is being used to identify candidates for artificial disc replacement. Provocative discography is a useful assessment tool in determining the specific site of pain generation in patients with multiple disc abnormalities or to exclude surgery as an option.

**Patient preparation**

Since discitis is a potential complication, it is a common practice to give each patient intravenous antibiotics 20 to 30 minutes before the procedure. Additionally, antibiotics may be added to the contrast that is injected intradiscally. Other possible complications from this procedure include bleeding, allergic reaction to medications, and dural puncture. If the patient has an allergy to contrast dye, normal saline may be used for disc pressurization.

Light sedation is often provided. Patient response is an integral part of the procedure, so care must be taken not to give sedation that will significantly alter the patient’s pain perception and/or response to disc pressurization. Midazolam, 1 to 2 mg, may be administered before the procedure, and a small amount of fentanyl may be given before inserting the first needle into the disc. Blood pressure, electrocardiogram, heart rate, and SaO₂ are monitored with initial sedation and throughout the procedure and recovery period.

**Description of procedure**

A high-resolution fluoroscope and fluoroscopic table with a moveable top are recommended. For lumbar discography, the patient is placed in a prone position. Pillows can be placed under the chest and upper abdomen to lessen the curve of the spine or to elevate the side for needle placement. In cases where the patient’s pain is one sided, or worse on one side, needles are placed from the opposite side in order to decrease the chance of a false positive.

A double prep system is commonly used. The betadine prep must be allowed to dry for 2 minutes for full effect and then followed by an alcohol scrub. The C-arm is usually rotated approximately 45 degrees from the midline, and a
Cephalad tilt is employed to line up the target route for needle placement. A single or double needle technique may be employed. Most commonly, a 22-gauge, 5 to 6 inch spinal needle is chosen, although it may be necessary to use a 7 to 8 inch needle. After introducer placement, the needle is incrementally advanced using either live or intermittent multiplanar fluoroscopy (Figure 1). The needle position can be adjusted by rotating the bevel.

A paraesthesia may occur during attempted needle placement. If a paraesthesia occurs, the needle is withdrawn slightly and rotated or readjusted before readvancement. When the needle enters the annulus, it feels as though it is passing through a rubber band. The patient often reports a deep or sharp pain as the needle passes through the annulus. This pain should be transient. The needle is normally advanced 1 to 2 cm to reach the center of the nucleus. The nucleus of the disc feels softer in comparison to the annular fibers.

Needle placement is confirmed via both anteroposterior and lateral views. The needle should be seen at or near the center of the disc on both views. The L5-S1 disc entry is more difficult and requires additional rotation of the C-arm. The actual puncture site for the L5-S1 needle may be above the L4-L5 site. Once proper needle placement at each level has been confirmed, disc pressurization may begin.

Most commonly, a syringe with a pressure manometer is used. The syringe and tubing has been prefilled with contrast dye containing 5 to 10 mg of cefazolin per milliliter of contrast. If the patient has an allergy to penicillin, 5 to 6 mg/mL of clindamycin may be given as the antibiotic of choice. Some practices do not include intradiscal antibiotic use. The injection should begin at the disc level considered to be the control and proceed to the disc expected to be least symptomatic.

The person performing the procedure signals the start. The contrast dye is administered slowly, and the proceduralist pays strict attention to the manometer reading. The fluoroscopy technician begins live fluoroscopy with the start signal and watches the fluoroscopy image while the nurse watches the patient’s face for a possible nonverbal pain perception response. The nurse also is responsible for recording the patient’s responses. When the fluoroscopy technician visualizes contrast dye flowing from the needle, he/she reports the sighting. The proceduralist verbalizes the manometer reading at that time, and the nurse records the reading as the opening pressure. At this point there is a switch to intermittent fluoroscopy to decrease radiation exposure. If no contrast dye is leaking from the disc, the injection continues until approximately 100 to 120 mm Hg is reached, or the injection is terminated due to the pain response.

Most normal (intact) lumbar discs will accept 1.5 to 3 mL of contrast dye, and the injection will result in the patient reporting the feeling of pressure or no feeling at all. The patient is asked to report the exact time pressure or pain is experienced. The manometer reading at that point also is recorded along with the peak pressure reached during disc pressurization. The patient is asked specific questions about the sensation experienced, and the information is recorded (Figure 2). The disc is filmed in both anteroposterior and lateral views.
lateral views, and the images are saved. For each level injected, the opening pressure, the pressure at which the patient feels pressure or pain, the peak pressure, and volume of contrast injected is recorded.

The site of pain or pressure also is reported along with the patient's pain rating using a 10-point pain scale. A score of zero means the patient felt nothing with injection, and 10 indicates extreme pain. It is important to also note whether there was an end point to the injection (intact disc) or contrast dye leakage from the disc. If the disc was reported to be very painful, an intradiscal injection of 0.5 mL of 1% lidocaine before proceeding to the next level may help decrease the incidence of false positive in further testing. This also aids in postprocedure pain management. However, if the patient is scheduled for a postdiscogram CT scan, an intradiscal injection for lidocaine should not be performed, as it will wash out part of the contrast dye.

The image of the nucleus is reported during procedure dictation after reviewing the fluoroscopic images. Annular tears of the discs are classified according to the extent of fissure or tearing. The classification grades range from 1 (tear or fissure involves only the inner third of the annulus) to 5 (tear or fissure extends completely through the annulus with extravasations of contrast from the nucleus into the epidural space).

Postprocedure
Upon completion of the procedure the patient is taken to the recovery room for observation for at least 1 hour. Full monitoring is employed. An ice pack is applied to the back, and additional intravenous fentanyl may be given. The patient is discharged when stable with a printed postdiscogram instruction handout. Patients are told to rest for 3 to 4 days following the procedure. Back pain, needle puncture site pain, and increased stiffness in the back may occur for up to 1 week. Patients are instructed to avoid prolonged sitting or standing and to apply ice to the area of pain as needed. They also are instructed to notify their provider of an increased temperature, chills, night sweats, pain in an unusual location, or significantly worsening pain. Patients may be given a 1-time prescription for pain medication and/or a muscle relaxant. A follow-up phone call is placed to all patients.

Discography report
The discography report is dictated immediately after the procedure so that no details are forgotten or confused. Detailed and accurate reporting of the pressure levels and patient responses are very important in determining the test results. Included within the report is the provider’s assessment of the patient’s affect, degree of cooperation, observed tolerance of pain, and any “pain behaviors” noted. It is important to note whether the provider thinks the patient’s response to pain is valid or exaggerated.

Conclusion
In past years, discography was deemed controversial and was not as widely accepted as it is today. While discography should never be the first procedure used for diagnosing back pain, it has proven valuable in its sensitivity for detecting degree of disc degeneration and disruption. Provocative discography is the only test that identifies an intravertebral disc as the specific generator of a patient’s reported pain. Current practice verifies that discography can, and does, provide information useful in determining the source of discogenic pain.

REFERENCE

SUGGESTED READING

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