Use of Fluoroscopy for Interlaminar Lumbar Epidural Injection: Is Confirmation with Epidurogram Necessary?

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Abstract: We compared the loss of resistance (LOR) technique and fluoroscopy with the LOR technique, fluoroscopy, and epidurography for interlaminar epidural injection. A total of 371 patients with symptomatic lumbosacral radiculopathy were enrolled; 17 had a history of allergy to iodinated contrast medium or seafood. Each patient was given an oral steroid before and after the procedure. A Tuohy needle was inserted into the epidural space using the LOR technique and fluoroscopy for guidance. After confirming that the needle was in the epidural space, 3 cc of nonionic contrast medium was injected and an epidurogram was performed. No patient with a history of allergy had an adverse reaction to the nonionic contrast medium. This study suggests that the routine use of an epidurogram, even in patients with a history of allergy to iodinated contrast, after preparation with oral steroids, is justified.

Key words: loss of resistance technique; fluoroscopy; epidurography; interlaminar epidural steroid injection; lumbosacral radiculopathy

Introduction

Epidural injection of steroids has become an accepted nonsurgical treatment of lumbar radiculopathy. Correct placement of the steroid solution in the epidural space is obviously important for an optimal result from this treatment. Controversy exists over the blind technique compared with fluoroscopy combined with an epidurogram. Some reports indicate that the chance of a false result with the blind technique in the hands of an expert could be as high as 30% [1].

Johnson and colleagues recommended epidurography in conjunction with fluoroscopy unless the patient had a history or reasonable suspicion of allergy to iodinated contrast agents [2]. The false positive indication of placement of the needle using the LOR technique has been attributed to the possible positioning of the needle in a fat layer overlying the ligamentum flavum [2]. Our study assessed the role of the epidurogram in addition to fluoroscopy in perfecting the accuracy of the interlaminar epidural steroid injection (LESI), even in patients with a history of allergy to iodinated contrast medium and/or seafood.

Materials and Methods

We acquired approval for this study from the Drexel University College of Medicine Institutional Review Board. We enrolled in the study 371 patients referred to our neurosurgical spine clinic from 3/1/2004 to11/30/2005 with a diagnosis of lumbar radiculopathy who required LESI. Symptomatic patients with lumbar radiculopathy who did not respond to medical treatment were included. Patients with a history of cauda equina syndrome requiring emergent surgical intervention, uncontrolled heart failure, uncontrolled diabetes, infection in the vicinity of the point of needle insertion, coagulopathy, systemic infection, motor deficit 3/5 or worse, or possible pregnancy were excluded. Patient demographic data are summarized in Table 1.

Each patient was placed on a fluoroscopy-compatible operating table in a prone position with flexion of the table. We used MAC and/or local anesthesia in our patients. After sterile preparation and draping the back of the patient, we inserted an 18-gauge Tuohy needle using

fluoroscopy and the LOR technique. After correct placement of the needle in the epidural space was ascertained by careful review of the anterior-posterior and lateral views, 3 ml of nonionic contrast medium was injected and the fluoroscopic views were repeated to adjust the positioning of the Tuohy needle. Hard copies of all of the fluoroscopic images were printed and divided into two groups: (A) images obtained with fluoroscopy only; (B) images obtained using fluoroscopy and the epidurogram.

The images from each group were studied separately; the viewer was blinded to the identity of the patients.

Results

We found that the incidence of “misconception of being in the epidural space” was 12.3% (39 patients) in group A. None of the patients who had a history of iodinated contrast allergy and who had taken an oral steroid before the procedure reacted adversely to the injection of nonionic contrast medium.

Discussion

Fluoroscopy both facilitated and expedited the precise insertion of the Tuohy needle at the planned site and interlaminar level, especially in postlaminectomy patients.

The advantages of the fluoroscopic technique are that it is precise and it lessens the chance of a wet tap and other complications [3] (Table 2).

The disadvantages of the fluoroscopic technique are that it has to be done in a surgicenter or operating room; it is costly and requires an image intensifier, a radiology technician, and nurses. The safety of a LESI is as important as its efficacy; therefore, meticulous attention should be paid to the indication for as well as the selection of the patient and the technique. In a review of the literature, we found no evidence that the use of nonionic contrast medium in patients allergic to iodine who had been properly prepared in advance with an oral steroid was considered an unsafe practice.

Conclusions

This study substantiates the necessity of using an epidurogram together with fluoroscopy, even in a patient with a history of allergy to iodinated contrast medium, to perfect the results, as long as the patient has been given an oral steroid before the procedure.

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Table 1. Study data

Cases, n	371
Mean age, years	52.7
Range of age, years	18–89
Sex	
Male, n (%)	134 (36)
Female, n (%)	237 (64%)
Time period for data collection	03/01/2004 – 11/30/2005

Table 2. Potential complications of lumbar epidural steroid injection

Related to needle placement	**Related to drug administration**
Meningitis	Suppression of pituitary-adrenal axis
Epidural hematoma and abscess	Hypercorticism
Nerve root injury	Cushing's syndrome
Dural puncture and headache	Osteoporosis
Cauda equina injury	Chemical meningitis due to steroid
Subdural injection	Avascular necrosis of bone
Transient blindness	Steroid myopathy
Intravascular injection	Epidural lipomatosis
Pneumocephalus	Weight gain
Retinal hemorrhage	Fluid retention
Acute retinal necrosis	Allergic reaction to iopamidol (Isovue 300)
Paraplegia (abscess, hematoma, injection into the artery of Adamkiewicz)	Arachnoiditis due to intrathecal steroid injection
Death or brain injury (due to intravascular injection of anesthetic and opioids or cardiopulmonary complications)	Hyperglycemia
Retinal hemorrhage (in coagulopathic patients)	Allergic reaction to steroid
Intracranial subdural hematoma	Hypersensitivity to steroid: hypertension and tachycardia