Glycerol Rhizotomy for Trigeminal Neuralgia

TO THE EDITOR: Modifications of various percutaneous techniques for the treatment of trigeminal neuralgia have often resulted in improved efficacy of treatment. For example, development of a thermistor-controlled angled electrode has improved selective ablation of the retrogasserian trigeminal nerve in patients undergoing thermal radiofrequency lesions.1

Häkanson initially described the technique for identification of the trigeminal cistern.2 He was also the first to report the results of percutaneous retrogasserian glycerol rhizotomy (PRGR) based on anatomical definition supplied by cisternography.2 We have verified the importance of cisternography prior to PRGR.3,4 The efficacy of PRGR, and the avoidance of complications, is dependent upon the preoperative selection of patients (those with typical tic douloureux only) and intraoperative anatomical definition, in contradistinction to radiofrequency rhizotomy, which is dependent upon physiological confirmation. For the following reasons our experience in more than 400 PRGR procedures does not permit us to support the conclusions of the study by Dr. Arias (Percutaneous retrogasserian glycerol rhizotomy for trigeminal neuralgia. A prospective study of 100 cases. J Neurosurg 65:32–36, July, 1986).

1. Spontaneous cerebrospinal fluid drainage occurs when the needle is placed in the subtemporal subarachnoid space (as happens in 10% of cases), and this can only be verified by contrast opacification.

2. Verification of placement of the spinal needle at the clival edge on lateral roentgenograms does not ensure intracisternal placement, since lateral deviation of 1 mm (confirmed by anteroposterior cisternography) may result in the needle being located subtemporally rather than in the cistern of Meckel’s cave.

3. Glycerol is a weak neurolytic substance with delayed effects, and immediate sensory phenomena are uncommon. With proper intracisternal placement of the glycerol, only half of our patients have referred pain in the first division of the fifth nerve (perhaps related to distention of the dura and subarachnoid space supplied by first-division trigeminal fibers) and occasionally in lower divisions of the face.

4. Regardless of the divisions of the trigeminal nerve affected by pain, the trigeminal cistern varies from 0.15 to 0.45 ml, with a median volume of 0.3 ml.4 Glycerol injected without definition of the trigeminal cistern may extravasate through the porus of Meckel’s cave into the subarachnoid space of the posterior fossa. Volumes of glycerol injected without due consideration of the patient’s individual cisternal volume will increase the risks of a neurolytic effect on the trigeminal nerve, and perhaps to other cranial nerves.

We believe that one of the advantages of PRGR is the elimination of reliance on physiological data, allowing PRGR to be performed under mild to moderate sedation, or even under brief general anesthesia in particularly apprehensive patients. We now use iohexol as our non-ionic contrast agent, thus considerably reducing the incidence of headache frequently associated with the use of metrizamide. Iohexol is much less expensive as well.

We believe that it is absolutely necessary to know the total volume of the trigeminal cistern in order to selectively treat specified trigeminal fibers, and that PRGR without trigeminal cisternography is certainly not safer.

Dr. Arias is to be congratulated on his encouraging early success rate (95% of patients were free of pain after one or more operations). The recurrence rate will increase with time. Since the goal of the operation is relief of pain coupled with reduced sensory deafferentation, glycerol continues to have distinct advantages over procedures specifically designed to ablate the trigeminal system. With each recurrence and succeeding injection, the degree of sensory loss increases. We have found no consistent intraoperative physiological sequelae to incremental injection of glycerol that would allow us to deduce proper intracisternal versus subdural or subtemporal glycerol placement. Neurosurgeons should be cautious in the usage of this procedure without continued anatomical verification of intracisternal needle placement and estimation of cistern size.

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References
RESPONSE: I appreciate the opportunity to reemphasize some aspects of my paper.

Spontaneous cerebrospinal fluid drainage is an important sign in any method of percutaneous trigeminal rhizotomy by the anterior route. It has also been described as a favorable prognostic factor in the outcome of patients treated with percutaneous retrogasserian glycerol rhizotomy (PRGR). I use three radiological projections (lateral, anteroposterior, and submentovertex), each with its own requirements, to verify the correct position of the needle tip. The location of the needle in the center of the foramen ovale in the submentovertex view is of great value in assessing the correct location in the cistern. This feature was described by Jefferson in his article on anterior percutaneous injection of phenol in glycerin into the trigeminal cistern, a technique that I consider to be the immediate predecessor of PRGR. Jefferson used only two radiological projections (lateral and submentovertex) and his results were satisfactory. The value of trigeminal cisternography in properly locating the needle could be assessed by comparing the technical failures between PRGR performed with and without cisternography. In my study there was no significant difference in results with these methods, although without cisternography there was a greater incidence of technical failure in Lunsford's series (10.7%) than in my study (4%).

I first knew of the facial sensory response to glycerol injection from the 1981 paper of Sweet et al. Their article appeared at about the same time as the original description of the PRGR technique by Håkanson. Since treating my first patient with this procedure, I have frequently observed the presence of that clinical feature. Later, Dr. Sweet corroborated that this clinical sign is commonly present in alert cooperative patients (personal communication, 1985). Obviously, it is not possible to detect this sign when the patient is drowsy or anesthetized. On the other hand, I have noticed that the fronto-orbital pain that sometimes appears during injection of metrizamide and/or glycerol is mainly caused by extravasation into the anterior basal subarachnoid spaces. I have never found extravasation to the posterior fossa, perhaps because I do not extend the patient's head and do not fill the cistern with metrizamide and/or glycerol.

I think that clinical control of the response of the patient who is alert during glycerol injection is of great value and must not be neglected. Even with the use of trigeminal cisternography, the tip of the needle can be accidentally placed outside the cistern during the injection of glycerol, a circumstance that cannot be detected without clinical control in the cooperating patient.

I notice that Dr. Lunsford has changed contrast agents because of "the incidence of headache frequently associated with the use of metrizamide." This is a feature that I noticed early in use of PRGR and was one of the reasons for planning the study that was presented in my paper. I am afraid that the ideal contrast agent will be difficult if not impossible to obtain.

In conclusion, PRGR is a procedure for percutaneously treating trigeminal neuralgia by the injection of a chemical substance (such as alcohol, boiling water, phenol in glycerin, or glycerol) into the trigeminal cistern. It is practically the same method as the one described by Jefferson, but uses glycerol instead of phenol in glycerin. As Jefferson stated: "Perhaps, by more precise techniques for the introduction of the needle it would be possible to avoid the immediate re-injections which were necessary in 18% of the present series. However, the aim has been to develop the simplest possible technique which was safe enough to have the widest possible application. In view of the success of the method to date in the relief of pain the radiological control described in the text is not currently being modified."2

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References

Omental Transplantation For Stroke and TIA's

TO THE EDITOR: A recent report by the international Extracranial-Intracranial (EC-IC) Bypass Study Group showed the EC-IC procedure to be ineffective in reducing the risk of ischemic stroke. This is a major clinical disappointment because of the frequency of the problem coupled with the dearth of therapeutic measures presently available for treatment of the condition. In his excellent accompanying editorial on the clinical trial, Plum asked "what other efforts of therapy should be made here and now?" He alluded to the slight clinical benefits of aspirin, antihypertensive agents, and the occasional judicious use of heparin, but stated that "beyond these slight achievements, further and more effective steps to counter this third largest cause of disability and death in the Western world await the results of fundamental laboratory research."

A surgical procedure to control cerebrovascular insufficiency and its sequelae is presently available for clinical trials and has undergone the fundamental laboratory research stressed by Dr. Plum. Laboratory studies reported for over a decade have shown that the omentum can bring a new source of blood to and exert