Fluoroscopy of foramen ovale as an aid to thermocoagulation of the Gasserian ganglion

Technical note

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The authors describe a fluoroscopic method of guiding percutaneous needle penetration of the foramen ovale. The advantages are simplicity, speed, accuracy, and comfortable patient positioning. Radiation exposure is minimized.

Key Words • fluoroscopy • foramen ovale • thermocoagulation • trigeminal nerve • tic douloureux

The anterior percutaneous approach1 is widely employed for injection3,4 and thermocoagulation2,5,8 of the Gasserian ganglion. Various radiographic methods3 have been employed to facilitate location of the foramen ovale, and placement of the tip of the penetrating needle within the trigeminal ganglion or rootlets. Some of these techniques are unnecessarily complex.3,4 Moreover, the position of the patient for the submentovertical projection, which has usually been employed,3,5 is needlessly uncomfortable.2 Fluoroscopic methods have been employed for guiding the needle,7 but they are not in general use.3 Most authors rely on conventional lateral and submentovertical radiographs.5,6

We will describe here a simple method of fluoroscopic control that uses the mobile C arm image intensifier unit. The advantages of this technique are simplicity, speed, accuracy, and comfortable patient positioning. An easily constructed canvas head sling, which facilitates the use of the image intensifier, is also described.

Technique

The patient lies on the operating table, in the supine position, with the head resting in the canvas head sling which may be mounted on any operating table with a detachable headrest (Fig. 1). Its main component is a piece of heavy canvas 12 × 9 in. in final dimensions, with an open-ended hem along either 9 in. dimension. The open hems are slipped over two parallel metal supports of ¾ in. tubular steel which project from the head end of the operating table about 8 in. apart. These are secured in the mountings for the operating table headrest and feature a right-angled offset which reduces the distance.
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Fig. 1. Left: Lateral view showing patient position, x-ray projection, and the canvas head sling mounted on the operating table. Right: View from the head of the operating table showing oblique head position in canvas sling.

between their parallel projecting portions. Slight additional neck extension may be achieved, if desired, by placing rolled towels beneath the patient’s shoulders.

The C arm mobile image intensifier unit* is then brought into position. The central ray of the x-ray beam is directed at an angle of approximately 45° to the orbitomeatal line (Fig. 1 left), and the patient’s head is turned obliquely away from the painful side so that the midsagittal plane makes an angle of 35° to 50° from true vertical (Fig. 1 right). The image intensifier is then turned on, the contrast adjusted and the field coned down to sharpen the bone landmarks. Final correction of the head position is made, so that clear visualization of the foramen ovale is obtained. The final position chosen should show the foramen magnum as approximately oval, neither too rounded nor too slit-like, so that the “petrous-needle angle” approaches zero. This increases the likelihood that the trajectory of the needle will pass through the trigeminal ganglion and rootlets.

When the head is not turned obliquely, the foramen ovale cannot be visualized in this projection (Fig. 2 left). In the oblique position, however, the foramen ovale can be seen lying medial to the anterior border of the coronoid process of the mandible and lateral to the lateral wall of the maxillary antrum (Figs. 2 right and 3).

The patient is then anesthetized with intravenous methohexital to prevent discomfort and movement while the needle is being placed. The 19-gauge insulated needle† is introduced through the skin at a point 2.5 or 3 cm lateral to the labial commissure and at a level midway between the labial commissure and the level of the alae nasi. The needle is directed toward a point on the zygoma 3 cm anterior to the external auditory meatus and toward the medial margin of the corneal limbus. The trajectory is checked by intermittent fluoroscopy with the operator’s hands removed from the field. The needle may be partially withdrawn and redirected if necessary, so that its tip ultimately lies in the

*Siemens Siremobile 2 manufactured by Siemens Aktiengesellschaft, Medical Engineering Group, Erlangen, Germany.

†Needles manufactured by Radionics, Inc., 76 Cambridge Street, Burlington, Massachusetts 01803.
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FIG. 2. Skull viewed from the angle of the x-ray projection employed in this procedure. Left: Anteroposterior position with nonvisualization of the foramen ovale. Right: Oblique position showing visualization of the foramen ovale with spinal needle inserted.

center of the foramen ovale. With intermittent fluoroscopic guidance, even an inexperienced operator can rapidly position the needle tip in the center of the foramen ovale.

A rubber-shod bulldog clamp is then applied to the shaft of the needle at the point of skin entry to prevent further penetration. The patient’s head is turned so that the mid-sagittal plane is perpendicular to the surface of the operating table and the C arm is angled and rotated to give a true lateral projection of the skull. Control of the needle tip position in relation to the clivus is provided by lateral fluoroscopic projection. Final needle tip position is determined by electrical stimulation and heating. The patient’s level of consciousness is depressed, before making a lesion, by intravenous injection of methohexital. Doxaprom is injected intravenously to hasten arousal for clinical reassessment.

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References

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