Controlled Small Volume Ventriculography

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At Kansas University Medical Center, stereotaxic ventricular visualization is carried out with the patient supine in the stereotaxic apparatus. The following method was developed to give reliable controlled filling of the 3rd ventricle with small volumes of air.

Method

Through a #18 Tuohy spinal needle, a #20 polyethylene catheter is introduced into the lumbar subarachnoid space. The patient is then placed supine in the stereotaxic machine and a frontal burr hole made. A ventricular catheter (Fig. 1) is inserted into the frontal horn of a lateral ventricle. Both catheters have female adaptors made from shortened #18 spinal needles and are kept closed to avoid cerebrospinal fluid leakage. By means of available sterile intravenous connector tubing, the spinal catheter is attached to the lower end of a sterile graduated closed plastic cylinder and the ventricular catheter and a manometer is attached to the top of the cylinder (Fig. 1). The cylinder is filled with sterile saline to the zero mark and mounted on the stereotaxic machine so that the level of the zero line coincides with the estimated vertical position of the posterior commissure. The spinal and ventricular tubes are opened and the ventricular pressure recorded. The cylinder is then lowered and 5 or 10 cc. of spinal fluid enters, displacing an equal amount of air from the cylinder into the ventricle. A 10 sec. Polaroid film is made and additional air displaced as needed. Filling proceeds from the anterior horns through the 3rd ventricle to the aqueduct and 4th ventricle. Care is taken to confine the air to the ventricular system. Depending on atrophy and ventricular size, 5 to 20 cc. is usually sufficient for filling (Fig. 2).

The stereotaxic location of the posterior commissure is determined on a lateral film. The fluid level in the cylinder is then set 1 cm. below this, so that the level of ventricular filling is maintained just below the posterior commissure. The cylinder thus functions to regulate and maintain ventricular filling at the desired level. Ventricular pressure is monitored during the procedure by the cylinder fluid level and manometer.

At the conclusion of the procedure, the cylinder could be raised, allowing the re-entering spinal fluid to displace most of the ventricular air back into the cylinder. However, this procedure is not recommended due to possible risk of encephalomyelitis. Instead, sterile saline should be used.

An alternative to the above procedure is to attach a 30 cc. syringe to each of the spinal and ventricular tubings and alternately remove lumbar fluid and inject ventricular air, eliminating the use of the regulating cylinder.

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Fig. 1. Diagram to show arrangement for controlled ventriculography. The ventricular catheter is made from #5 Bardic infant feeding tubing.
Results

The procedure was used in 54 cases with visualization of the anterior and posterior commissures in each case. There appears to be fewer side effects than with standard pneumoencephalography or ventriculography. Ventricular visualization is improved due to avoidance of x-ray confusion from surface air. Reliable graded ventricular filling is achieved with minimum volumes of air at normal or controllable ventricular pressures.

Summary

We have described a method for performing small volume ventriculography to delineate the 3rd ventricle.

References