manometer connected to the ventricle drainage. The continuous recording was necessary because the accurate value was unobtainable out of a sectional record on account of the pressure that fluctuated according to the various factors.

The decline of the pressure was recognized among half of the patients administered 0.5 g/kg and among 90% of those administered 1.0 g/kg body weight isosorbide. Therefore the 0.5 g/kg is considered to be the marginal amount. The dropping ratio differed with the amount of doses administered; the ratio was 52% with 1.0 g/kg and 75% with 1.5 g/kg. The time-course of the cerebral pressure decline could be divided into latent, dropping, lasting and returning stages and the average durations for these four stages were 23, 28, 76, 75 minutes respectively. With the orally administered isosorbide, the start of the pressure decline was rather late as compared with the intravenous mannitol solution but the lasting effect and the dropping ratio were the same.

Only a few cases showed rebound phenomena and were quite light at that. No change in serum electrolytes was observed both in single and long period (21 days) administrations. When administered for a long period of time, a light gastrointestinal disturbance such as the loss of appetite was recognized but no particular serious side effect was observed. Hematuria was recognized in one case but showed no kidney dysfunction.

117. Comparative Studies of Oral Hypertonic Osmotic Solutions

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Although several kinds of hypertonic solutions are useful in lowering chronic intracranial hypertension when given intravenously, they produce profound drop of the intracranial pressure followed by secondary rebound phenomenon. Therefore, there is a need for mild effective oral hypertonic osmotic solutions.

The purpose of this paper is to report comparative studies of the efficacy of oral glycerol, urea and isosorbide on 51 patients with brain tumors.

Glycerol of 3.0-4.5 gm. per Kg. was given to 13 patients; urea of 0.2-0.4 gm. per Kg. to 7 patients and isosorbide of 1.0-2.0 gm. per Kg. to 31 patients. There were all given orally within 30 minutes after every meals and changes in lowering cerebrospinal fluid pressure, effective period and secondary rebound phenomenon were observed.

Cerebrospinal fluid pressure of three patients to whom three different osmotic solutions were administered was also measured directly from the lateral ventricle

by means of strain gauze.

The results were as follows:

1) Oral glycerol and isosorbide solutions effectively reduced intracranial pressure and produced osmotic diuresis mildly. Their effectiveness appeared 30 to 60 minutes after oral administration and remained over 2 to 3 hour period. There were no remarkable secondary rebound phenomena.

However, glycerol was more difficult than isosorbide to be given orally because of its bitterness.

2) In urea maximal effectiveness occurred 2 to 3 hours after oral administration and it remained over 2 to 3 hour period. Its action was stronger than one of the other two osmotic agents, but it produced secondary rebound overshoot and gastric irritation. (We found it very difficult to give urea per os.)

3) In 2 patients with subfrontal tumors and one patient with a pituitary tumor, long-continued administration of isosorbide produced changes in serum electrolytes such as hyponatremia followed by hypokalemia.

From above-described results, we concluded that long term administration of isosorbide was possible and produced few side effects. It is also useful not only in in-clinic patients, but also in out-clinic patients for its mild efficacy.

118. The Clinical Evaluation of Steroid injected into the Ventricular System

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Steroid hormone, usually administered intravenously or intramuscularly, has become popular for treatment of cerebral edema. In this experiment with mongrel dogs, predonine was administered intraventricularly and its concentration in the brain tissue were studied in comparison with those on intravenous administration.

(I) Measurement of predonine in the brain tissue.

Dogs were injected with predonine intravenously (through the cephalic vein), intraarterially (through the carotid artery), intraventricularly (into the lateral ventricle through a burr-hole) or intracisternally (into the cisterna magna percutaneously). The animals were sacrificed with thiopental-sodium at various time intervals after administration of predonine. One gram of cerebral tissue was taken from various sites of the brain (cortex and white matter of hemisphere, thalamus, pons, and cerebellum). From each of the specimens, dichloromethane-soluble substance was extracted.

The extract was treated according to Silber-Poter's method for color development. Twenty-one hours after color development, absorbance of the colored