in UA and ICP seem to be depend on BP.

It is concluded that, at least in the model experiment, the change in UA mainly depends on the curvature of the membrane or wall of vessel at which the ultrasonic energy is reflected. Concerning the UA in living brain tissue, it is also possible to consider that the curvature of the vessel is a primary factor for UA and the BP of flow rate is a secondary.

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**r-4. Intra-operative Ultrasonic Examination of Intracranial Lesions using Needle-type Transducer**

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The use of ultrasonics for diagnosis of cerebral ailments, especially cerebral tumors, has made rapid progress since its effectiveness was reported by Dr. Tanaka and associates in 1952. The intra-operative ultrasonic examination, being conducted by applying a probe on the dura mater or directly to the surface of the brain after the bone flap has been turned up, is a very useful technique. We have carried out this examination on 171 patients with cerebral tumors, and in 165 cases we succeeded in detecting the tumor echo and diagnosing the correct location of the tumors. In this report, we describe about the Needle-type Transducer which we have developed intending to make correct diagnosis and accurate puncture of cystic tumor, brain abscess, intracerebral hemorrhage and displaced ventricle with a minimal danger of traumatic edema. This Needle-type Transducer, with lumen just like a ventricular needle, is consist of a stainless steel tube (3 mm. in diameter and 183 mm. in length) and a barium titanate transducer fixed at the tip of the tube. And the transducer is 2 mm. in diameter and designed for a frequency of 5 megacycles per second. This probe has a small side-opening at a distance of 9 mm. from the tip of it, and we can connect with a syringe at a distal end of the probe. In an operation, after the bone flap is turned up, the transducer is applied to the moistened dura mater by hand in several places and directions. After the recognition of the abnormal echo on Braun-tube Screen, the probe is inserted into the brain tissue. As the probe is inserted into the brain, we can observe the abnormal echo pattern to approach the transmitted pulse gradually. When the tip of the probe appears to reach the surface of the lesion, the abnormal echo overlaps to the transmitted pulse each other. Then, the contents can be drawn up into the syringe from the lesion. We used, during operation, this transducer in many cases of cystic brain tumors, brain abscesses, intracerebral hemorrhages and displaced lateral ventricles, and could get good results in all cases. In comparison with the transducer of 10 mm. in diameter, this Needle-
r-5. A Study of Ultrasonic Diagnosis in Cerebral Apoplexy

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In the patients at the acute stage of cerebral apoplexy, it is sometimes difficult to differentiate intracerebral hemorrhage and cerebral infarction even by the various supplemental diagnosis with detailed neurological examinations. It is necessary to make the exact localization of a hematoma and know the volume of it prior to operation in the surgical treatment of hypertensive intracerebral hemorrhage. In order to resolve these problems, we have made fundamental and clinical studies of ultrasonic diagnosis since 196. We discovered hematoma echo which is the reflective wave from intracerebral hematoma, so that we could discriminate intracerebral hemorrhage from cerebral infarction (Fig. 1.2). Among 141 cases of cerebral apoplexy there were 83 patients with hypertensive intracerebral hemorrhage, 61 (73%) of whom had the displacement of midline echo, 73 (88%) had hematoma echo and 74 (89%) had both. Of 44 cases with cerebral infarction, we detected the displacement of midline echo from 2 cases, simple echo from 5 cases and no abnormal echo from 38 cases (86%). Of 14 cases with subarachnoideal hemorrhage, the displacement of midline echo was discovered in 2 cases, while no cases produced hematoma echo. Intracerebral hemorrhage occupied 94% of the cases with the presence of the displacement of midline echo, occupying 22 (29%) of 76 cases with the absence of the displacement. Of these 22, 13 cases showed hematoma echo and were diagnosed correctly as intracerebral hemorrhage.

In supratentorial intracerebral hemorrhage only 2 cases (1.4%) did not show abnormal echo, but in infratentorial intracerebral hemorrhage 7 out of 10 cases did not show it, which displays it difficult to make a diagnosis of posterior fossa.

We have studied 28 cases which had left hospital in good condition after the operation of supratentorial intracerebral hemorrhage. With reference to the Scheinker classification in which internal capsule was used as boundary, we knew from these operated cases that 27 cases (96%) were of lateral type and one was of combined type. In order to define the type of hematoma and judge the surgical indication and the prognosis of a patient, we examined the brain by autopsy in a water tank. From the fact that hematoma echo could not be detected from near midline echo in lateral type cases, we were able to make a correct diagnosis in 7 of 8 cases.