Symposium E. Acute Head Injury

Chairman: Prof. Tatsuyuki Kudo
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S-E-1. Studies on Pathophysiology and Treatment of the Change in Hemodynamics at the Acute Head Injury with Special Reference to the Cerebral Cell Function

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I. Effect on cerebral and over-all hemodynamics in the acute head injury was studied.

1) Immediately after the injury, the blood flow of major organs was reduced, particularly the cerebral and renal blood flow was lowered in severe cases. However, the circulation-blood volume of the lung and portal system was markedly rised. Therefore, there might be a delay in circulating velocity and a tendency towards congestion in major organs.

2) The cardiac output was, on the other had, not decreased and apparently compensated the pathological condition of the hemodynamic following the head injury.

3) The reduction in the liver blood flow was comparatively mild and it may indicate that secondary shock is not frequently followed by the head injury.

4) The above mentioned changes in hemodynamics were independet on the specific areas of the brain.

II. The changes in hemodynamics usually return to normal value within 2 weeks with the exception of no improvement of cerebral metabolic rate of oxygen, even when the cerebral blood flow became normal. The latter phenomenon which may be due to the cell dysfunction following the lesion of the mitochondria of the brain cell was studied following the experimental head injury of the rabbit. The marked decrease in the respiratory control rate, ADP/O and O_2 -uptake was observed at 30 minutes following the head contusion and the decrease was not improved by O_2 -inhalation but by the administration of cytochrome-C, Predonisolon and Vitamin B₁ or hypothermic treatment.

Therefore, it is possible that the cell function is not responsible to O₂-inhalation when there is the primary lesion of the brain tissue due to the head injury.

S-E-2. Evalution of Serial Cerebral Angiography in the Investigation of the Hemodynamic Alterations in the Head Injury

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Our study of serial cerebral angiogram in head injury has been revealed to have many prominent advantages in research after the cerebral circulatory disturbances, especially regional circulatory alterations, caused by closed injury.

In the acute stage of head injury, the circulatory slowing of superficial veins is more intensive than deep drainage veins, while in the chronic stage the former is less measured than the latter.

Therefore, in order to get more precise information about the difference of the local circulatory slowing, we established the ratio of the visulization time of parietal vein (superficial vein) and internal cerebral vein (deep cerebral vein), and as a conclusion the ratio (parietal vein / internal cerebral vein) was calculated to be 1.31 in the acute stage and 0.95 in the chronic stage respectively.

Moreover, the notable findings obtained here on the seriograms, as for the hemodynamic transition in the cases with subdural hematoma are as follows:

i) decreased visualization of superficial veins on the side of the damaged cerebral hemisphere in contrast to relatively fair visualization on the contralateral intact side.

ii) increased visualization of superficial veins in the case after evacuation of the hematoma, which suggests the release from the pressure on the cerebral cortex.

An interesting case of epidural hematoma with extravasation of contrast material from ruptured vessel wall of a branch of a middle meningeal artery, which was verified through the seriogram taken earlier than two hours after head injury, is also reported.