

ON THE PROBLEM OF THE MECHANISM OF ACTION OF VAGO-SYMPATHETIC NOVOCAINE BLOCK IN BURN SHOCK

I. A. Kotov

From the Physiology Laboratory (Head - Active Member of the Academy of Medical Sciences of the USSR, Professor P. K. Anokhin) of the A. V. Vishnevsky Institute of Surgery of the Academy of Medical Sciences of the USSR (Director - Corresponding Member of the Academy of Medical Sciences of the USSR, Professor A. A. Vishnevsky) and the Hospital Surgical Clinic of the Pediatrics Department (Head - Professor A. V. Gulyaev) of the I. V. Stalin II Moscow Medical Institute, Moscow

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P. K. Anokhin)

During the last few years it has been shown in a number of investigations that novocaine causes a complex picture of functional changes when administered into an animal or human organism, by acting on the central nervous system [2, 3, 4, 6, 5, 11, 14].

It was also established that under the influence of a vago-sympathetic novocaine block the tonus of the cardio-vascular system is raised [8, 12], and after the block, during shock, the arterial pressure is raised [1, 5, 7, 10].

In the literature available to us we did not find any special investigations devoted to the problem of the mechanism of action of the vago-sympathetic novocaine block on arterial pressure in burn shock. Regarding such shock as a variation of traumatic shock, we decided to study the changes in the reflex reactions of arterial pressure after vago-sympathetic novocaine block in burn shock.

EXPERIMENTAL METHODS

The reflex reactions of the arterial pressure after blocking were the indicator of the functional state of the vasculomotor center.

Shock was produced by burning the rabbits with boiling water according to F. I. Kovshikov's method.

In order to discover the mechanism of action of the vago-sympathetic novocaine block, the reflex reactions of arterial pressure to stimulation of the proximal segment of the sciatic nerve and to pressure on the carotid artery were analyzed.

In order to study the changes of the reflex reactions of the arterial pressure in connection with stimulation of the central section of the sciatic nerve, the animal's sciatic nerve was exposed before administering the burns and picked up with a heavy ligature. After burning, when the arterial pressure fell to 60-90 mm of mercury, the nerve was bound and cut. The proximal end of the nerve was stimulated by an induction current (the distance between the coils was 15-40 cm) for 2-10 seconds.

Pressor, sometimes two-phased, reflex reactions of the arterial pressure were observed in response to stimulation of the sciatic nerve.

In experiments devoted to the discovery of changes in the reflex reactions of the arterial pressure in connection with lowered pressure in the carotid sinus, we studied changes in the reflex reactions of the arterial pressure after vago-sympathetic novocaine block in response to pressure on the carotid artery below its bifurcation. Dieffenbach's clamp was laid on the carotid artery for 6-20 seconds before and after vago-sympathetic novocaine block.

EXPERIMENTAL RESULTS

During the first 5-10 minutes after the block, the pressor (Fig. 1) and depressor reflex reactions, together with an increase in the general arterial pressure of the animals, increased in response to stimulation of the sciatic nerve.

The reflex reactions gradually decreased 5-10 minutes after the block and, as the general arterial pressure returned to the original level (before the block), they became the same as before the block.

After vago-sympathetic novocaine block, carried out during the low original arterial pressure (30-50 mm of mercury), reflex reactions to stimulation were absent, while the general arterial pressure decreased (Fig. 2).

On the basis of study of the changes in the reflex reactions of the arterial pressure to stimulation of the proximal end of the sciatic nerve after vago-sympathetic novocaine block during burn shock, the following was established:

1) During the first 5-10 minutes, reflex reactions to stimulation of the proximal end of the sciatic nerve, along with increased general arterial pressure, increase, decreasing later;

2) Along with a decrease in arterial pressure after the block, which was carried out at the original low arterial pressure (30-50 mm mercury), reaction of the arterial pressure to stimulation of the nerve is absent.

During the state of shock, a considerable decrease in the level of the reflex reactions of the arterial pressure to pressure on the carotid artery (from 17-23 to 3-12%) was observed.

After vago-sympathetic novocaine block, carried out at an arterial pressure above 70 mm of mercury, a considerable gradual increase in the reflex reactions was observed immediately (from 8-12 to 23-45%).

The reflex reactions of the arterial pressure in response to pressure on the carotid artery in these cases increased during the first 10-15 minutes after the block, together with an increase in the general arterial pressure. Then the reflex reactions decreased gradually and the general arterial pressure decreased simultaneously.

The interesting fact should be noted that reflex reactions to pressure on the carotid artery were absent and decreased, together with a decrease in the general arterial pressure after a second block, carried out at the original arterial pressure of less than 70 mm of mercury (Fig. 3). Changes in the reflex reactions occurred simultaneously with a decrease in the general arterial pressure.

Thus, changes should be noted in the reflex reactions of the arterial pressure after vago-sympathetic novocaine block, evidenced as the fact that at the original arterial pressure, exceeding 70 mm, along with an increase in the general arterial pressure, the reflex reactions of the arterial pressure first increased, then gradually decreased; at an arterial pressure of less than 70 mm, however, vago-sympathetic block caused a decrease in the reflex reactions with simultaneous decrease of the general arterial pressure.

Experiments showed that the decrease in arterial pressure after vago-sympathetic novocaine block is a phase of the vascular pressor reaction. As a rule, this reaction passed through two phases in its development. At the beginning of the application of the vago-sympathetic novocaine block (first phase), the arterial pressure quickly increased to a certain level. At this time, the reflex reactions to pressure on the carotid artery and to stimulation of the sciatic nerve increased.

On the basis of the results obtained it can be stated that an important role in the mechanism of action of the vago-sympathetic novocaine block belongs to changes in the functional state of the vasculomotor center.

Taking into account the phase differences in the excitability of the vasculo-motor center, the problem of the time at which vago-sympathetic novocaine block should be applied as a therapeutic measure should be decided individually in each instance, taking into account the extent to which the blood pressure falls in burn shock.

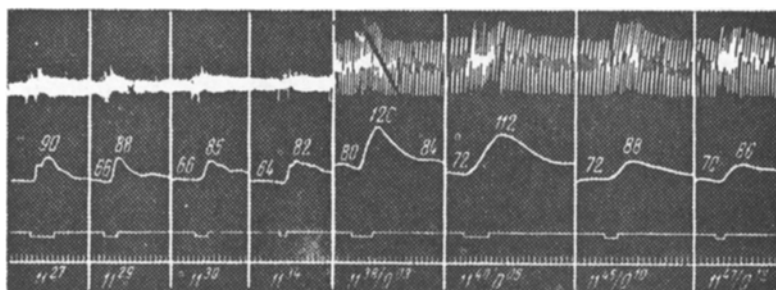


Fig. 1. Changes in the reflex reactions on stimulation of the proximal segment of the sciatic nerve (Experiment no. 87).
Curves (top to bottom): respiration, arterial pressure (in mm of mercury), indicator of stimulation, time indicator (2 seconds). The figures below the bottom line - duration of stimulation (denominator-duration of stimulation after vago-sympathetic block).

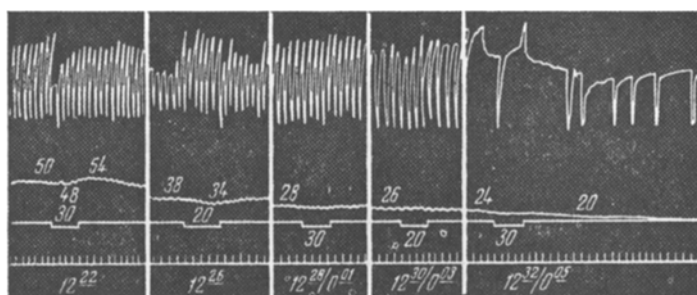


Fig. 2. Changes in the reflex reactions on stimulation of the proximal end of the sciatic nerve (Experiment no. 85)
Symbols the same as in Fig. 1.

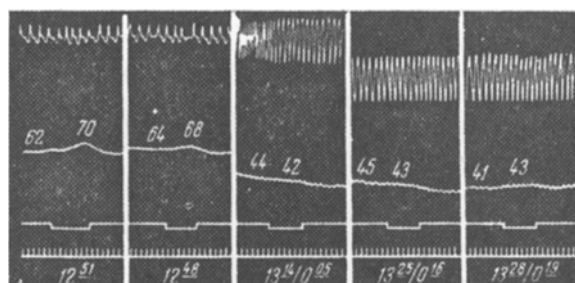


Fig. 3. Changes in the reflex reactions on pressure on the carotid artery (Experiment no. 69).
Symbols the same as in Fig. 1.

SUMMARY

It is shown in experiments on rabbits that vagosympathetic block in burn shock may elicit reflex changes in blood pressure when the sciatic nerve is stimulated and the carotid artery clamped according to the degree of blood pressure fall during shock.

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