CHANGE IN THE REFLEXES OF THE CHEMORECEPTORS OF THE INTESTINES AND SPLEEN UPON TRAUMATIC SHOCK

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(Received August 11, 1955. Presented by Academician A. D. Spezansky)

The character of the change in the reflexes of the mechanoreceptors and chemoreceptors of the carotid reflex area upon the infliction of trauma and development of traumatic shock has been studied in detail in the laboratories of A. N. Gordienko and I. R. Petrov [1, 2, 3].

M. G. Danilov [1] found in the torpid phase of the shock a weakening of the depressor reflex and then its distortion upon stimulation of the baroreceptors of the small intestine.

As is clear from the literature devoted to the question of interoception, the general property of the reflex reactions of the receptors of the internal organs (connected with the vessels) is a constant tonic influence of a pressor nature on the part of their receptors. In connection with this, of definite interest is the study of the reflexes of the chemoreceptors of the internal organs upon the infliction of trauma and development of traumatic shock, since the tonic influences of a pressor nature depend on the functional state of the reflex arcs, with their origins in the chemoreceptor apparatus of the internal organs. In the literature in our possession we have not found any information on this question.

In the present communication, study of the changes of the reflex influences of the chemoreceptors of the intestines and spleen in the process of development of traumatic shock is described.

EXPERIMENTAL METHODS

The study of the reflexes of the chemoreceptors of the intestines and spleen was conducted according to the method proposed and devised by V. N. Chernigovsky.

Traumatic shock was induced by a local lesion of the bones and soft tissues of the hind limbs of the dog. Reflex changes in blood and respiratory pressure on introduction of acetylcholine (0.8–1.0 ml, 10^{-4} g), nicotine (0.5–0.8 ml, 10^{-4} g) and in a number of experiments potassium chloride (1.0 ml, 5%) were recorded by the usual means.

The animals were subjected to hexanal anaesthesia (10% solution of hexanal gradually introduced in the period of preparation, until the necessary degree of narcosis was obtained).

EXPERIMENTAL RESULTS

The first series of experiments (12 experiments) was devoted to study of the reflex changes of the chemoreceptor of the intestines in the course of development of traumatic shock.

The experiments showed that while before the shock in the weakly anaesthetized dogs, introduction into the perfusate of acetylcholine, nicotine and potassium chloride produced a clearly marked reaction in the form of a distinct increase in the arterial pressure, an increase in the tonus of respiratory expiration, increased frequency of respiration, and slowing down of the perfusion, during the shock a reaction of such a type was absent.
The reaction upon introduction of the chemical stimuli applied by us was usually absent in the torpid phase of severe shock when the blood pressure equaled 40-60 mm Hg.

We considered it also necessary to clarify how the reflexes of the intestinal interceptrons change during the erectile phase of the shock. It was shown that introduction of the same chemical stimuli after insignificant trauma produced a sharper reaction as compared with the original one.

The above is vividly illustrated by Fig. 1 and also the record of Experiment No. 6 of November 21, 1955.

Fig. 1. Change of the reflexes of the intestinal chemoreceptors upon traumatic shock.
A) Reflexes before infliction of trauma; B) Reflexes after infliction of slight trauma; C) Reflexes during torpid phase of traumatic shock. Weak narcosis. Significance of tracings (from top to bottom): respiration, blood pressure, zero line, indication of stimulation, indication of time (2 seconds).

Dog—mongrel bitch, color black, average nourishment, weight 7.2 kg.
Original blood pressure = 123 mm Hg.

Blood pressure reflexes of the chemoreceptors of the intestines: to acetylcholine + 17 mm, to nicotine + 13 mm.

Infliction of slight trauma.
Blood pressure = 156 mm.
Blood pressure reflexes of the chemoreceptors to acetylcholine = 24 mm Hg, to nicotine = 15 mm.
During the torpid phase of the shock, blood pressure = 36 mm.

Pressor reaction of the chemoreceptors of the intestines to introduction of chemical stimuli is absent.

Analysis of the findings presented testifies to the phase character of the change in the intensity of the reflexes of the interceptrons of the intestines in the course of development of traumatic shock.

Taking into account the numerous data at the disposal of the laboratory of V. N. Chernigovsky, we confined ourselves to arranging two controlled experiments. In these experiments, it was established that for the interval of time, in the course of which the basic experiment lasted (50-70 minutes), the reflexes of the intestinal interceptrons did not undergo any essential changes.

It is necessary to note that generally the initial traumatization caused an increase in blood pressure in the animals which were not in deep narcosis.

In five experiments of the given series, we obtained traumatic shock in the animals which were in deep narcosis. Study of the reflexes in such animals is of special interest in connection with the fact that there are many communications from clinicians to the effect that in persons under deep narcosis, operational trauma is not accompanied by a sharp increase in blood pressure.

The findings of our experiments showed that blood pressure did not increase at the moment of trauma in the animals under deep narcosis. The introduction of the same doses of chemical stimuli in the same condition led to a rise in pressure not exceeding the magnitude of the original reaction. In these cases we observed an