LOCALIZATION OF THE CORTICAL REPRESENTATION OF THE SPLANCHNIC NERVE IN THE DOG

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Numerous investigations have been made of the representation of the visceral nerves in the cerebral cortex of the cat and monkey, but the topical localization of these systems in the dog has never been studied.

A role of considerable importance in the activity of the visceral analyzer belongs to the splanchnic nerve, which is a collector of afferent impulses from the abdominal organs. The cortical representation of this nerve has been studied by several authors [1, 3, 5, 6], but this work, too, was carried out on cats and monkeys and not on dogs. At the same time, the observations of V. N. Chernigovskii, É. Sh. Airapetyants, I. A. Bulygin, and others have given information concerning the activity of the interoceptive analyzer in dogs.

The object of the present investigation was to study the cortical localization of the representation of the splanchnic nerve in the dog.

EXPERIMENTAL METHOD

The investigation was carried out on 22 adult mongrel dogs weighing 8-17 kg, anesthetized with Nembutal (40 mg/kg). In some experiments chloralose was added in a dose of 35 mg/kg. The splanchnic nerve was dissected out extraperitoneally in the area between the semilunar ganglion and the diaphragm, divided, and its central end was fixed on silver electrodes. Stimulation was carried out by means of single rectangular impulses with a duration of 0,5 msec and an amplitude of 0.25-2 V. Silver ball electrodes were used to pick up the potentials from the cortex. Unipolar recording was used, and the potentials were fed into the input of an ac amplifier and recorded on the screen of a two-channel oscillograph.

EXPERIMENTAL RESULTS

Experiments on cats and monkeys have shown that the zones of representation of the splanchnic nerve are situated in the specific projection areas of somatic sensation. Our investigations have shown that in dogs these zones are likewise bilateral and situated in Areas 1 and 2 of general somato-visceral sensation.

In dogs the first zone of representation of the splanchnic nerve is situated on both sides of the postcruciate sulcus, occupying an oval area measuring 4-5 x 7 mm. The latent period of the reaction at the focus of maximal activity is 12-13 msec and the amplitude of the positive phase of the potential 150-200 μV.

The second zone of cortical representation of the splanchnic nerve is situated in the middle part of the anterior ectosylvian gyrus. The potentials in this region were extensively overlapped by the zones of representation of the brachial and sciatic nerves. The amplitude of the waves of the positive phase reached 250 μV. The latent period in the focus of maximal activity varied between 8 and 10 msec.

As several investigators [1, 2] have reported, with an increase in the intensity of the stimulus applied to the nerve, an increase in the amplitude of the primary response is observed. An increase in the strength of the stimulus

was accompanied by a distinct increase in the amplitude of the responses. When the voltage of the stimulating current reached 2.5-3.0 V, no further increase in the amplitude of the primary response took place.

The evoked potentials recorded in the second somatovisceral zone were usually more stable and less liable to change as a result of increased depth of anesthesia.

The data relating to the localization of the representation of the splanchnic nerve in the first zone which we obtained differ slightly from those described by Amassian [3]. We found that the zone was situated more medially, and we showed that it included areas bordering on the postcruciate sulcus. In his paper, Amassian describes, on the basis of a few observations on dogs, a more lateral situation of the zone, lying laterally to this sulcus. Furthermore, we recorded potentials over a wider zone, including the area described by Amassian.

In dogs, in experiments conducted under deep anesthesia, the ratio between the area of the two zones in which primary responses were recorded an the total surface area of the cortex was smaller than the corresponding ratio obtained in experiments on cats. This is evidently attributable to the fact that in animals at a higher level of the phylogenetic series, the relative area of cortex occupied by the primary projection zones is smaller, on account of the greater development of the association zones [4].

Finally, it must be pointed out that the individual variations in the structure of the brain in dogs are more clearly expressed in dogs than in cats, although they did not result in any significant changes in the localization of the projection zones of the splanchnic nerve within the limits of this particular cortical field.

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