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Morphology, topography and cytoarchitectonics of the pterygopalatine ganglion in Egyptian spiny mouse (*Acomys cahirinus,* Desmarest)

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*Using the thiocholine method of Koelle and Friedenwald and histological techniques the pterygopalatine ganglion in Egyptian spiny mouse (*Acomys cahirinus*, Desmarest) was studied. The ganglion was found to be a single irregular cluster of neurocytes, situated on the medial surface of the maxillary nerve. The ganglion is composed of oval, elliptical and sometimes fusiform ganglionic neurones in compact arrangement without a thick connective-tissue capsule.*

key words: parasympathetic ganglia, pterygopalatine ganglion, Egyptian spiny mouse

INTRODUCTION

The parasympathetic cephalic ganglia have been studied in many species of mammals. Previous histochemical investigations showed that the pterygopalatine ganglion of *Rodents* has a different structure in the morphological aspect in various species [5, 6, 12–14].

Observations of some families of rodents indicate certain relations between the morphological features and topography of the parasympathetic head ganglia and taxonomic position of animal species [6, 13, 14]. The present study relates to the family of rodents — *Murida*e, and the species — *Acomys*, where the pterygopalatine ganglions have not so far been investigated. We hope that our results will be important comparative data for investigations of the autonomic nerve system of vertebrates.

MATERIAL AND METHODS

The reported investigations were carried out on 20 adult Egyptian spiny mice (*Acomys cahirinus,* Desmarest) of both sexes. The animals were killed by decapitation under ether anaesthesia. Ten animals were used for histochemical studies. The maxillary nerve and Harderian gland were exposed. The material was rinsed in a physiological solution and fixed for 30 min in 10% solution of neutral formalin. Further procedures followed the thiocholine method [11] adapted for macromorphological investigations [3]. From the remaining animals tissues were taken for histological studies, fixed in 4% neutral formaldehyde, embedded in historesin, cut in 5–7 μm sections and Nissl's violet stained.

RESULTS

As macromorphological investigations have shown, the pterygopalatine ganglion in Egyptian spiny mouse is a single, elongated and irregular structure about 2.5 mm long. It is closely connected with the medial surface of the maxillary nerve (Fig. 1A). We did not observe differences in the morphology of pterygopalatine ganglion between sexes. In both sexes two forms of investigated structure were found. The first form had a wider nasal part of the ganglion, about 0.5 mm, and the caudal part was narrower, about 0.2 mm. Numerous delicate postgan-

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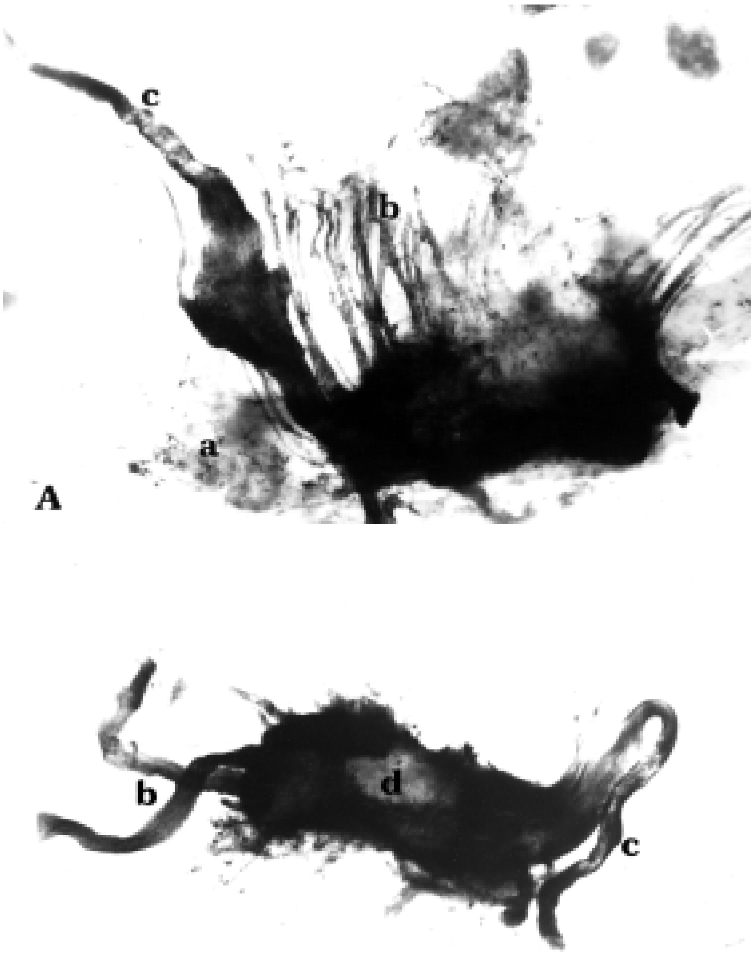

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Figure 1. Pterygopalatine ganglion in Egyptian spiny mouse. Thiocholine method (× 20). **A.** Left side; **B.** Isolated right ganglion; a — maxillary nerve, b — postganglionic fibres, c — petrosal major nerve, d — pterygopalatine nerve.

glionic fibres left the dorsal part of the ganglion and were observed on the medial surface of the Harderian gland (Fig. 1A). The second form had an irregular and elliptical shape, about 0.5 mm wide. In the middle part of the ganglion the pterygopalatine nerve was observed. Two thick intensively-stained postaganglionic bundles left the nasal part of the ganglion (Fig. 1B). The petrosal major nerve was observed at the caudal end of the investigated structure (Fig. 1A, B).

Analysis of histological sections has shown that the pterygopalatine ganglion of Egyptian spiny mouse is built of numerous neurocytes distributed along its full length. It is a compact agglomeration of cells with a small number of nerve fibres among them. The cells had an elliptical, oval and sometimes fusiform shape. The diameter of neurocytes varied from 16 to 49 μm. The shape of the cross-sections is different in the various parts of the ganglion. The nasal part with half-moon shape, about 120 neurocytes, is closely connected with the maxillary nerve (Fig. 2A). The middle part and caudal part had an oval shape with about 80 neurocytes at the cross-section (Fig. 2B). The pterygopalatine nerve is surrounded by five layers of neurocytes in the nasal part, where there is the larger aggregation of nerve cells (Fig. 2A), whereas it is visible on the surface of the ganglion in the caudal part (Fig. 1B, 2B). A small branch of the maxillary artery was observed under the ganglion (Fig. 2A, B).

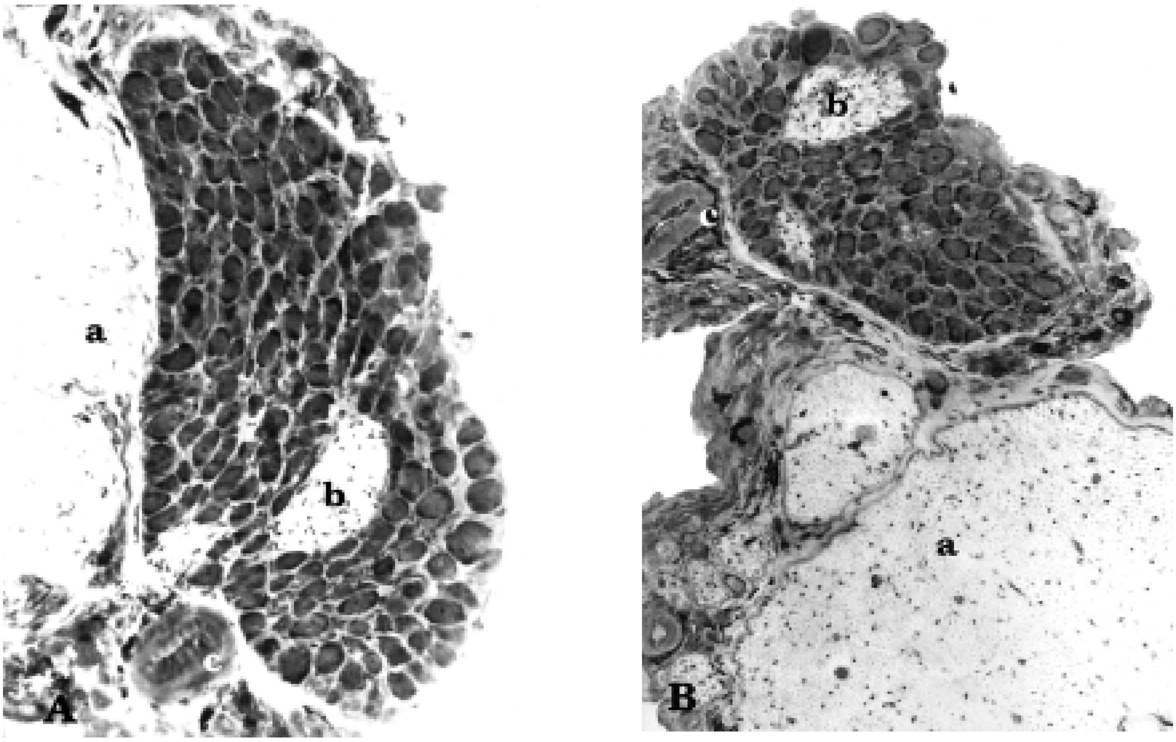

Figure 2. Cross-section of the pterygopalatine ganglion in Egyptian spiny mouse. Nissl's violet (× 200). **A.** Nasal part, right side; **B.** Caudal part, left side; a — maxillary nerve, b — pterygopalatine nerve, c — branch of maxillary artery.

DISCUSSION

The pterygopalatine ganglion is a different structure in form and nomenclature in various groups of vertebrates. The comparative anatomy investigations show that the aggregations of neurocytes, which are adequate to the counterpart of pterygopalatine ganglion in reptiles, are known as a palatine ganglion, spheno-ethmoidal ganglion and infraorbital ganglion [1]. The palatine ganglion is connected with the palatine branch of the facial nerve. The spheno-ethmoidal ganglion is localised in the connection between the palatine and ophthalmic nerves. The infraorbital ganglion, found only in *Ctenosaura pectinata*, is connected with the maxillary branch of the trigeminal nerve [19].

During dissection of the trigeminal nerve, macroscopic observations of the pterygopalatine ganglion were performed in birds. A similar locality and two aggregations of cells, described as ethmoidal ganglion and spheno-palatine ganglion, were found in hen [24]. The terminology, *pterygopalatine ganglion*, was adapted during the histochemical investigations of this structure in hen, goose and pigeon, where many different in size agglomerations of nerve cells were found [5, 10]. They were observed in the connection between the facial and ophthalmic nerves and on the surface of the Harderian gland. All these aggregations of cells were described as the pterygopalatine ganglion in hen, goose and Japanese quail, but in pigeon the superior and inferior pterygopalatine ganglion were found [5, 7, 8, 18].

In mammals only the pterygopalatine ganglion in guinea pig is similar to this structure in birds, where it consists of many small aggregations of neurocytes connected with the Harderian gland [4]. Moreover, dispersed pterygopalatine ganglion was observed in goat, sheep, pig and bovine [9, 20]. In most of the investigated mammals, the pterygopalatine ganglion was a single elongated structure and sometimes some additional small aggregations of neurocytes were observed [6, 13, 14, 16, 18, 21, 22, 25]. Pterygopalatine ganglion in mammals can be localised on the medial surface of the Harderian gland [4], but in most investigated species it is connected with the dorsal and medial surface of the maxillary nerve [6, 9, 12–14, 16, 17, 21]. In *Primates* the pterygopalatine ganglion is below the maxillary nerve and is connected with the pterygopaltine nerve [2, 22, 23, 25]. The morphology and topography of the pterygopalatine ganglion of Egyptian spiny mouse is similar in general aspect to the other species of small mammals but its cellular structure showed regularly distributed neurocytes along its full length, in contrast to the investigated structures in rodents [14, 15].

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