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Original Article

The fetal pterygopalatine ganglion in man

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ABSTRACT

The pterygopalatine ganglion lies deep in the pterygopalatine fossa, being morphologically attached to the maxillary division of the trigeminal nerve and functionally belonging to the facial nerve. The topographical relations of this deeply located ganglion are rather difficult to study and the specific morphology, in fetal life and adults, is lacking in references.

To study the macroscopic appearance and the topographical relations of the fetal pterygopalatine ganglion five fetuses with crown-rump length (CRL) longer than 25 cm. were used. Drawn ganglia from the dissected specimens were submitted to silver staining with the Bielschowsky technique (on blocks).

In the last trimester of the fetal life the pterygopalatine ganglion is configured and its topographical relations reproduce those described in adults. Structurally, the microscopic study revealed a constituted autonomic ganglion, with the preganglionic fibers entering the ganglionic core and configuring an intraganglionic plexus intermingled with eccentric neurocytes of 6–12 microns size. ***Neuroanatomy; 2006; 5: 40–41.***

Key words [pterygopalatine ganglion] [fetus] [silver stain] [human]

Introduction

The pterygopalatine ganglion derives from preotic myelencephalic crest cells and may receive contributions from the ganglia of the trigeminal and facial nerves [1].

There is no available information on the pterygopalatine ganglion morphology and structure in human fetuses.

In adults the pterygopalatine ganglion is morphologically attached to the maxillary nerve, in the pterygopalatine fossa. Lying infero-medially to the maxillary nerve, it fills the sphenopalatine foramen in variable degree and is crossed anteriorly by the maxillary artery. Preganglionic parasympathetic fibers from the lacrimal nucleus in pons are brought to the pterygopalatine ganglion via the greater petrosal nerve and the Vidian nerve (*nervus canalis pterygoidei*). Postganglionic fibers distribute to glands and blood vessels. The glandular territory is represented by the lacrimal gland [2] and mucosal glands of the palate [1], nasal cavity and paranasal sinuses [3] and pharynx [4]. The vascular territory is represented by the cerebral arteries [5-7] and arteries of the face [8], thus the ganglion is involved in migraines and facial pain.

Materials and Methods

The macroscopic study of the fetal pterygopalatine ganglion was accomplished by dissections on 5 human fetuses with crown-rump lengths between 25 cm and 37 cm. The fetuses resulted from spontaneous abortions and didn't present any macroscopic malformation. Dissections of the pterygopalatine fossa were facilitated by the removal of the zygomatic bone, orbit contents and greater wing of the sphenoid bone. Evidenced pterygopalatine ganglia were drawn for silver staining with Bielschowsky method performed on blocks.

Results

In the last trimester of the fetal life, the pterygopalatine ganglion is macroscopically configured and its topographical relations are similar to those described in adults. It occupies the pterygopalatine fossa, postero-superior to the maxillary bone. It is inferior to the maxillary nerve to which is attached with two pterygopalatine nerves, the proximal one seeming continued distal to the ganglion as the greater palatine nerve. The ganglion is crossed anterior by the maxillary artery that enters the pterygopalatine fossa after giving off the infraorbital artery (Figure 1).

The fetal pterygopalatine ganglion has an oval shape with a characteristic appearance of a bunch of neurocytes eccentrically disposed to a stem of preganglionic fibers that enter the ganglion posteriorly (Figure 2). These preganglionic fibers spread among the neurocytes to configure a well-represented intraganglionic network that disperse the signal towards clusters of neurocytes of average 6 – 12 microns size (Figure 3). No distinction could be made between subtypes of neurons. Moreover, cellular divisions could not be distinguished in microscopy, so it seems that the neuroblast differentiation occurred in post-mitotic stages.

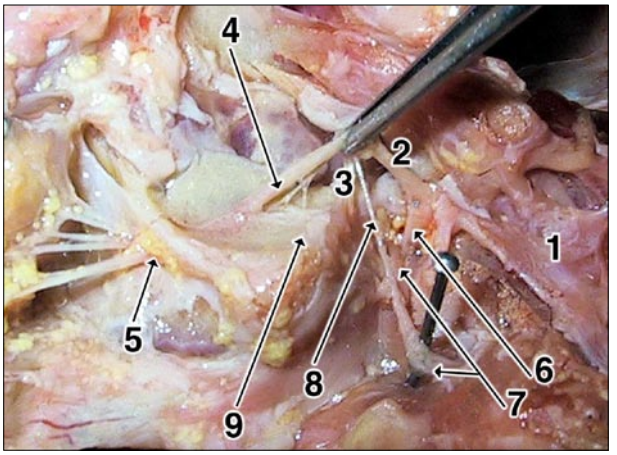

Figure 1. Human fetus (32 cm of CRL), fresh specimen, dissection. Color version of figure is available online. *(**1:** trigeminal ganglion; **2:** maxillary nerve; **3:** superior posterior alveolar nerves; **4:** infraorbital nerve; **5:** infraorbital foramen; **6:** pterygopalatine ganglion; **7:** maxilary artery; **8:** infraorbital artery; **9:** maxillary bone)*

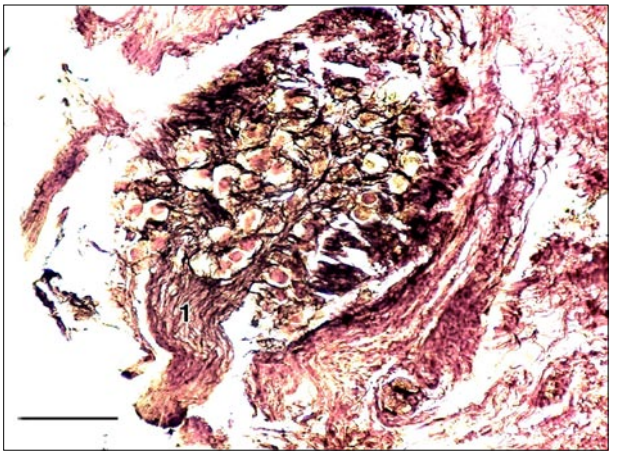

Figure 2. Human fetal pterygopalatine ganglion, silver stain (Bielschowsky method on blocks), 27 cm of CRL fetus. Preganglionic fibers *(**1**)* enter the ganglionic core and distribute to the peripheral clusters of neurons. Color version of figure is available online. *(**Scale bar:** 100 microns)*

Discussion

Considering the existing data in literature it seems that the present study is a pilot study of the morphology and topography of human pterygopalatine ganglion.

The pterygopalatine ganglion is morphologically configured in the last trimester of fetal life and its topographical relations prefigure those existing in adult. During this period the structure of the ganglion is established to ensure the nervous signal transmission.

In conclusion, the human fetal specimens appear suitable for further studies that can be performed in adequate conditions on the pterygopalatine ganglion, for surgical training or for fundamental research.

Acknowledgements

The study is devoted to the author's wife and son.

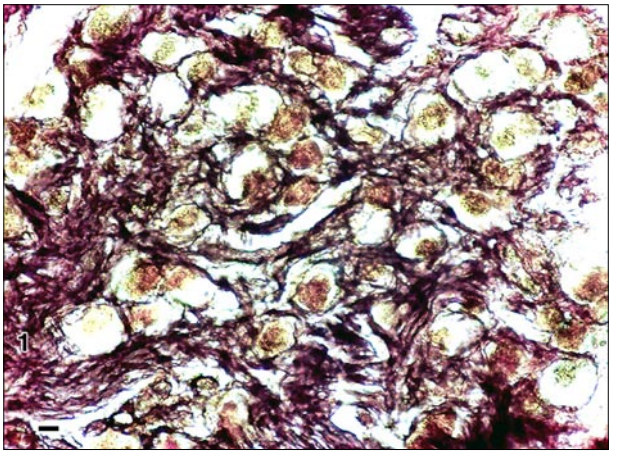

Figure 3. Human fetal pterygopalatine ganglion, silver stain (Bielschowsky method on blocks), 27 cm of CRL fetus. Preganglionic fibers *(**1**)* configure an intraganglionic network intermingled with young neurons. Color version of figure is available online. *(**Scale bar:** 10 microns)*

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