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HYPOTHALAMIC VASCULARIZATION IN THE GOATS AS REVEALED BY VASCULAR CORROSION CAST

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ABSTRACT

The heads of ten adult goats of both sexes were used to study the hypothalamic blood supply .It was found that the hypothalamus is supplied by branches of cranial cerebral , cranial communicating arteries, caudal communicating as well as from tiny branches of ophthalmic artery. The blood supply of mammillary body branches from the caudal cerebral, communicating and last branches of basilar artery. The hypothalamus is rather small in comparison to the rest of brain. Its blood supply is extremely rich , feeding from many branches of cranial cerebral arteries that forms the circle of willis. This indicates that the hypothalamus has very high activity.

INTRODUCTION

The hypothalamus is a region of brain that controls an immense number of body functions. It is located on the middle of the base of the brain and encapsulates the ventral portion of the third ventricle. the lower part of the hypothalamus attached with the pituitary stalk by the tuber cinereum (1).

The blood supply of the hypothalamus and pituitary gland are entirely separated while their functions are linked, thus numerous methods have been used to study the blood supply of two regions together so far, the blood supply to the hypothalamus and hypophysis are well as their connection (2), The injection of Indian ink or Berlin blue into blood vessels supplying this parts was performed and,they studies macroscopically by cutting in thick or thin slices, The arterial supply and venous drainage of rat preoptic region, nucleus supraopticus and the hypothalamus , was demonstrated by using Indian ink with double perfusion technique (3,4,5).

The capillaries in the median eminence and neural portion of the neurohypophysis stalk, is in contact with termination for nerve fibers of the hypothalamo-hypophyial tract. These plexus connect to the sinusoid or secondary plexus in the anterior pituitary via aseries of portal trunks (6,7). The hypothalamo-hypophysial vessels run from the median eminence of the hypothalamus along the sides of pars tuberalis to the anterior pole of the pars distalis (8).

MATERIALS AND METHODS

The heads of fourteen adult goats *Caprus hircus* regardless of their sex, were used in this study. A corrosion cast method was applied to the materials. The vessels were washed with 0.9% saline solution that injected via common carotid arteries . The heads were obtained and followed by the injected by a modified, red pigmented ,Polymerized Cold Cure Denture base compounds which prepared by solved 20% powder monomethyl-methacrylate in 80% liquid Methyl methacrylate minomer(Dental Supplies LTD .Surrey GU22,England) were used a 25 ml automatic vaccinating syringe(Hauptner-Muto,Germany).(9) They were kept at a room temperature for 24 hourse for polymerization, They were corrosion casted in 30% KOH for 24-48 hours,washed with tap water, and photographed (10).

RESULTS

It was found from present study the hypothalamus of the goats were includes the preoptic area, optic tract , optic chiasma , mammillary bodies , tuber cinereum and infundibulum to which the stalk of hypophysis is attached.

The arteries supplying the hypothalamus in goat are all derived from the circle of willis which is formed by the common carotid artery and the most cranial branches of the basilar artery as well as the anastomotic branches (Fig-1) .The preoptic region of hypothalamus (Anterior part) was found to be supplied by branches of the anterior cerebral arteries and anterior communicating artery (Fig- 2).These arteries course dorsally and laterally to enter the brain and ramify into many branches to supply the anterior part of the hypothalamus . The optic chiasma was supplied by three main branches. The first one is from prechiasmal branches of the ophthalmic arteries, the second branch from superior chiasmal arteries which are branches of the anterior communicating artery, These arteries pass forward over the dorsal surface of the optic chiasma, they join with tiny prechiasmal branches from the ophthalmic arteries , The third branch is from the superior hypophyseal arteries which are branches of the common carotid artery, they also were give small branches to join with prechiasmal branches from ophthalmic arteries (Fig -3).

The mammillary body is highly vascular of the posterior cerebral arteries connecting between the basilar artery and the posterior communicating arteries , the major parts of mammillary nuclei are supplied by posterior mammillary arteries (Fig-4) .whic hare branches from the distal portion of the basilar artery and posterior cerebral arteries.

The blood supply of the tuber region and infundibulum is observed as circuminfundibular anastomosis (Fig-5) deriving from three branches from the circle of willis. They are the superior hypophysial arteries from the common carotid arteries and the tiny branches of ophthalmic arteries.

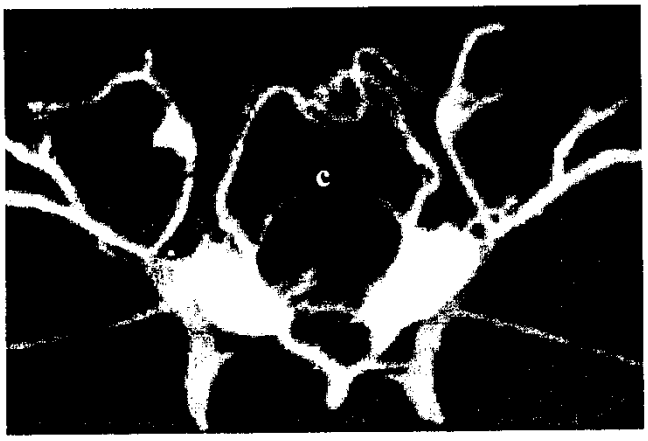


Fig (1): Hypothalamic vascular cast in goat shows:
(A) Basilar artery , (B)Common carotid artery , (C) Circle of willis

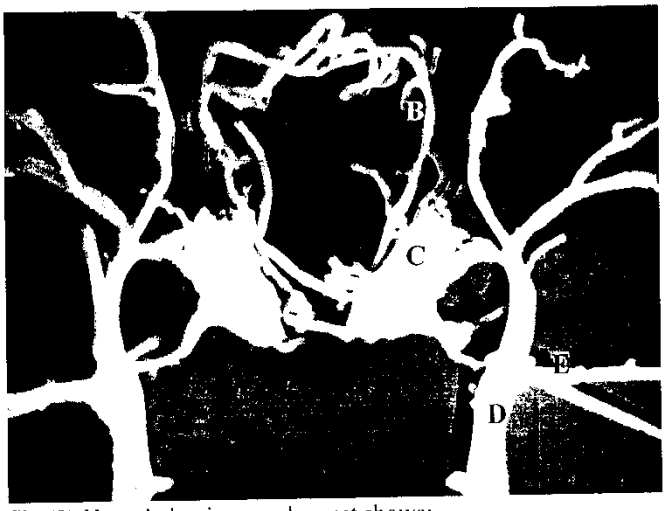
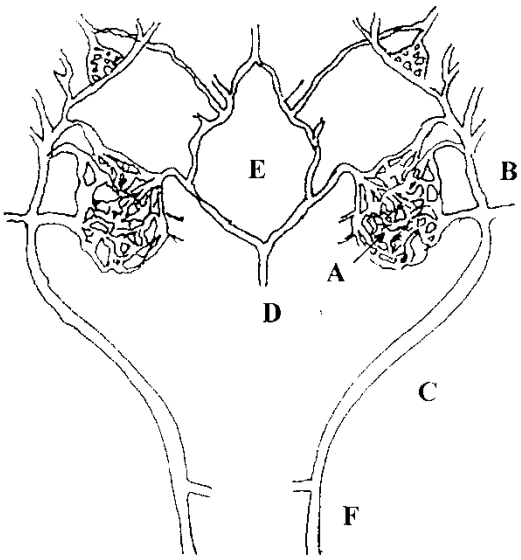


Fig (2):Hypothalamic vascular cast shows:
(A)Anterior communicating artery , (B)Anterior cerebral artery (C) Carotid retia , (D) External carotidartery , (E) Ophthalmic artery



Fig(3): Schematic representation of blood vessels distributing in the goat shows: (A)Carotid retia , (B) internal maxillary artery , (C) External carotid artery , (D) Basilar artery , (E) Circle of willis (F) Common carotid artery

Fig (4):Micrograph of vascular cast of blood vessels distributing in the Goat mammilary body , (A) posterior cerebral artery , (B) Mammilary body. X10

Fig(5): Vascular cast of circulatory flow of hypothalamic region in sheep (A) Ophthalmic artery , (B) Internal maxillary artery

DISCUSSION

The distribution of the major cerebral arteries in goats are similar to those in man (4,11,12) and rat (4,5,13) .The goat cerebral arterial circle is formed by the anterior cerebral arteries, posterior communicating arteries, posterior cerebral arteries and common carotid arteries, that are similar to those in rat but different from man that the arterial circle formed by the anterior cerebral , posterior cerebral and posterior communicating arteries . The anterior communicating artery is present in goat as in man (11,12) but is absent in the rat ,Opossum and Armadillo (14),in addition ,there is corresponding ophthalmic artery in rat as found in goat and man
(12) as well as in dog and cat (12,15).

The source of blood supply as well as the distributions of arterial blood in hypothalamus of goat are principally similar to those reported in human (16) ,rats (5,13) ,dog and cat (17) even though different studying methods were used . It has also been show in this study that the median eminence in the goat was nourished by the internal and eternal capillaries pleix .These vascular plexi are also illustrated in the rat (4,18) and Rabbit (13) . It is demonstrated in this study that the internal capillary plexus 0f median eminence forms numerous capillary loops protruding into the infundibular recess of the third ventricle. The Subependymal capillary networks located dorsally to these loops are derived from the arterioles which are branches of the hypophysial arteries.

التغذية الدموية للمنطقة تحت المهادية في الماعز باستخدام تقنية القالب التاكلي

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الخلاصة

استخدمت عشرة رؤوس ماعز بالغة من كلا الجنسين لدراسة التوزيع الدموي للمنطقة تحت المهادية,تجهز منطقة تحت المهاد بفروع من الشريان المخي الامامي وتفرعات الشرايين الموصلةالخلفية ,أضافة الى فروع صغيرة من الشريان العيني ,تضمنت التغذية الدمويةللجسم الحلمي فروع من الشريان المخي الخلفي والشرايين الموصلة والفرع الانتهائي للشريان القاعدي. تعد منطقة تحت المهادصغيرة الحجم مقارنة بقاعدة الدماغ الا انها تجهز باوعية دموية غزيرة تتضمن تفرعات الشرايين المخية الامامية التي تكون دائرة ويلز مما يدل على الفعالية العالية لهذه المنطقة.

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