The Microsurgical Anatomy of the Gyrus Rectus Area and its Neurosurgical Implications.

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Introduction

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Surgical approaches to the frontal basal region as those applied to the anterior communicating artery (AntCommA) aneurysms can lead to post-operative deficits such as memory impairment, executive function disturbances and personality changes1-4. Some of such disturbances may be caused by an aneurysm rupture itself followed by vasospasm or direct injury to the brain parenquima3,4. This is especially true when we consider that many AnCommA aneurysm surgery cases are performed with a variable coagulation degree followed by the gyrus rectus aspiration (GR) in order to provide an appropriate exposure to the vessels. The knowledge concerning the pathways around the gyrus rectus is important to avoid destroying some fiber tracts with its inherent post-operative disturbances.

Methods

Twenty-four adult brains were examined under magnification ranging from 6x to 40x. The surface in all fresh brains and the white matter fiber tract dissections in the frozen specimens, the measurements among the gyrus rectus and those related structures were carried out. Twelve specimens were filled with colored latex to allow a careful study of its arterial and venous relationship with the gyrus rectus. This study was approved by the local ethics committee.

Learning Objectives

The relation of the Gyrus Rectus with the areas implicated with The cognitive impairment during Acoa Aneurysm dissection.

Results

The results were divided into five parts: osseus, nervous, gyrus rectus anatomy, arterial and venous vasculature in order to provide additional information regarding the vascularization in this area; each relationship with the neighborhood structures was described.

Conclusions

In conclusion, the differentiation between the AnCommA aneurysm primary lesion after bleeding, vasospasm or isquemic related problems and the lesions caused by the surgical treatment itself are very difficult to be accomplished. However, it must be emphasized in this context that a damage to the ventral circuits can be avoided after the anatomical knowledge of this region. The neurosurgeon must search for a detailed 3D view anatomical knowledge of the brain and its relations with the neighborhood structures to offer the best possible treatment.

It is judicious to have a comprehensible surgical approach and exposure plan which offer adequate response to the most frequent postoperative complications that may potentially cause additional morbidity for the patient when dealing with the GR pathologies.

Table. Measurements of the gyrus rectus region at the level of the olfactory stria division.

Measures	Mean value	Range
Lateral surface or OS depth	9.5 mm	6–12 mm
Medial surface from BS to IRS	5.2 mm	3–6 mm
BS width	6.1 mm	4–15 mm
GR length	47.5 mm	38–58 mm
Distance from the BS to NA in the lateral part of the GR	8.3 mm	5–12 mm
Distance from the BS to NA in the middle part of the GR	5 mm	5 mm
Distance of the most anterior part of the NA to the posterior pole of the GR.	3.5 mm	2–5 mm
Distance from the BS to the projection of the anterior comissure in the middle part of the GR	8 mm	5–10 mm
Distance of the projection of the VR on the BS from the stria division	21.3 mm	14–34 mm

OS, olfactory sulcus; BS, basal surface; IRS, inferior rostral sulcus; GR, gyrus rectus; NA, nucleus accumbens; VR, ventricle recess.

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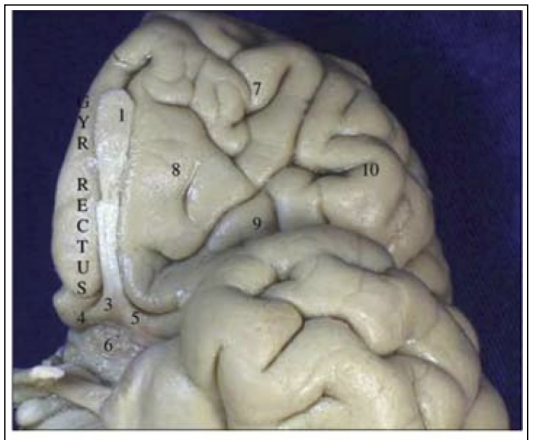

Fig 1. The olfactory nerve is divided in the olfactory bulb (1), olfactory tract (2), olfactory trigone (3) and medial (4) and a lateral (5) olfactory stria in front of the anterior perforated substance (6) in a frontal lobe basal view. The orbital surface is lateral to the olfactory tract, it is divided in the anterior orbital gyri (7), the medial orbital gyri (8), the posterior orbital gyrus (9) and lateral orbital gyri (10).

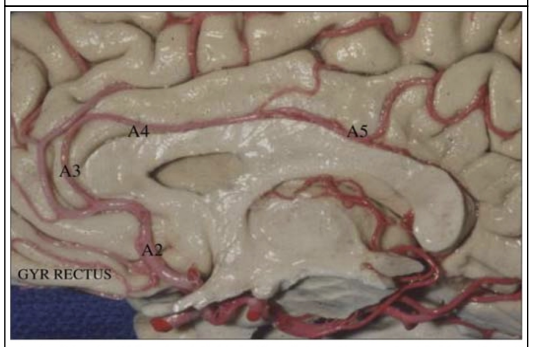

Fig 3. Medial surface of the right cerebral hemisphere, there are the gyrus rectus (GYR RECTUS) and the distal part of the anterior cerebral artery, the part beginning at the anterior communicating artery, is divided in four segments (A2, A3, A4 and A5).

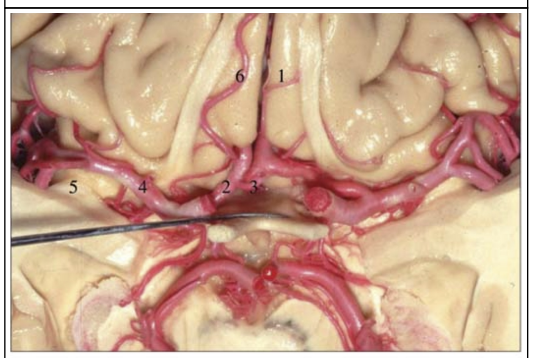

Fig 2. Basal surface of gyrus rectus (1), the anterior cerebral artery (2), the anterior communicating artery (3), the middle cerebral artery (4), the limen insula (5), the frontopolar artery (6).