Corpus callosum

The band of white matter connecting the two cerebral hemispheres.

see also corpus callosum abnormality.

see Splenium.

The corpus callosum (from Latin: “tough body”), also known as the colossal commissure, is a wide, flat bundle of neural fibers beneath the cortex in the eutherian brain at the longitudinal fissure. It connects the left and right cerebral hemispheres and facilitates interhemispheric communication. It is the largest white matter structure in the brain, consisting of 200–250 million contralateral axonal projections.

Importance

It is particularly important, because various tumors and vascular lesions can be located in and around the corpus callosum, and it is a route through which pass several surgical approaches. Performing accurate surgery in this region and avoiding damage to normal structures require that the neurosurgeon have adequate knowledge of the anatomy of the intricate blood supply to this area.

see callosotomy

Callosal disconnection syndrome, or split-brain, is an example of a disconnection syndrome from damage to the corpus callosum between the two hemispheres of the brain. Disconnection syndrome can also lead to aphasia, left-sided apraxia, and tactile aphasia, among other symptoms.

Arterial supply

The pericallosal and posterior pericallosal arteries were found to be the main sources of blood supply
to the corpus callosum. In 80% of the specimens, the anterior communicating artery gave rise to either a subcallosal artery or a median callosal artery, each of which made a substantial contribution to the blood supply of the corpus callosum 1).

see Pericallosal pial plexus.

Short callosal arteries were present in 58 hemispheres (96.6%) and supplied the superficial surface of the corpus callosum along its midline and were a primary arterial source to this structure. Long callosal arteries were found in 28 hemispheres (46.6%) and contributed to the pial plexus. The cingulocallosal arteries were present in all hemispheres and supplied the corpus callosum, cingulate gyrus, and also contributed to the pericallosal pial plexus. The recurrent cingulocallosal arteries were present in 17 hemispheres (28.3%) and also contributed to the pericallosal pial plexus. The median callosal artery, an anatomical variation, was present in 10 brains (33.3%). This vessel supplied the corpus callosum and the cingulate gyrus 2).

Corpus callosum and epilepsies

Epilepsies are reported in up to two thirds of patients with complete or partial CC agenesis (AgCC). However, AgCC per se is not indicative for seizure disorders. Moreover, additional malformations of cortical development (MCD) are causal. Microstructural CC abnormalities are detected by advanced imaging techniques, are part of diffuse white matter disturbances and are related to cognitive deficits. The etiological significance remains unexplained. However, they are also found in non-epileptic benign and transient disorders. In drug-resistant epilepsies with violent drops to the floor (“drop seizures”) callosotomy may be beneficial in seizure reduction. Since the EEG after callosotomy exhibits a single seizure focus in up to 50% of patients, consecutive resective surgical methods might be successful.

CC is part of cerebral white matter and anomalies cannot act per se as seizure onset zone. Imaging techniques demonstrate additional lesions in patients with epilepsies. CC is the major pathway for seizure generalization. Therefore, callosotomy is used to prevent generalized drop seizures 3).

Corpus callosum lesion

Corpus callosum lesion.

Agenesis of the corpus callosum

Agenesis of the corpus callosum.

Corpus callosum dysgenesis

Corpus callosum dysgenesis.

Arteriovenous malformation of the corpus callosum

Arteriovenous malformation of the corpus callosum.


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