Microsurgical Anatomy of the Cerebral Arteries

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The Circle of Willis

Sources

• Rhoton, Microsurgical Anatomy
• Yasargil, Operative Microsurgery

Circle of Willis

ICA = internal carotid artery
ACA = anterior cerebral artery
MCA = middle cerebral artery
AComA = anterior comm. artery
PComA = posterior comm. artery
Basilar = basilar artery
PCA = posterior cerebral artery
SCA = superior cerebellar artery
ICA
ACA (A1)
ACA (A2)
AComA
ACA (A1)
ICA

Frontal Lobe
Optic Chiasm
Optic Nerve
Olfactory Tract
Optic Nerve
Pituitary Gland
Optic Nerve
PComA
ICA
PCA
Ocellar Nerve

Circle of Willis

Circle of Willis: Variations

ACA (A1)
ICA

PComA
ICA
PCA

Pituitary Gland
Optic Nerve
Oculomotor Nerve
Basilar
Midbrain
Circle of Willis: Most common aneurysm location

The Internal Carotid Artery

ICA Branches

ICA Segments

OphA = Ophthalmic Artery
SupHypA = Sup. Hypophyseal Artery
PComA = Post. Comm. Artery
AChorA = Ant. Choroidal Artery
ICA Segments

PetSeg = Petrous Segment
CavSeg = Cavernous Segment
ClinSeg = Clinoidal Segment
OphSeg = Ophthalmic Segment
ComSeg = Communicating Segment
ChorSeg = Choroidal Segment

SupraClinSeg = Supraclinoid segment

ICA Segments

Cavernous Sinus

Anterior Clinoid Process
Foramen Ovale
Foramen Spinsum
Foramen Lacerum
Carotid Canal

Cavernous Sinus

Cavernous ICA Segment

CN III
CN IV
CN VI
CN V
ACP
1. Ophthalmic Segment
2. Communicating Segment
3. Choroidal Segment

Ophthalmic Segment Aneurysm

Post. Comm. & Ant. Choroidal Artery Aneurysms
Posterior Carotid Wall Aneurysm

The Middle Cerebral Artery

MCA Segments

MCA Segments
MCA Perforators

MCA Aneurysms

MCA Aneurysm

The Anterior Cerebral Artery
ACOM Artery

ACOM Artery Aneurysm

Distal ACA Aneurysm

Vertebral & Basilar Artery
V-B Arterial System

PComA = posterior comm. Artery
PCA = posterior cerebral artery
SCA = superior cerebellar artery
AICA = ant. inf. cerebellar artery
PICA = post. inf. cerebellar artery
Basilar = basilar artery
Vertebral = vertebral artery

V-B Artery Aneurysms

V-B Artery Aneurysms

Basilar Apex
Basilar Apex Perforators

Midbrain

CN III

P1

Clivus

PCA Branches

Parietal-occipital artery

Calcarine Artery

PCA Segments

ICA

PComA

P1

P2A

P2P

P3

P4

Cerebellar Arteries

Upper complex
- SCA
- Midbrain
- CN III, IV, V

Middle complex
- AICA
- Pons
- CN VI, VII, VIII

Lower complex
- PICA
- Medulla
- CN IX, X, XI, XII
Superior Cerebellar Artery

Midbrain

CN III
CN IV
CN V

Anterior Inferior Cerebellar Artery

CN VI
CN VII
CN VIII

Posterior Inferior Cerebellar Artery

1. Anterior medullary segment
2. Lateral medullary segment
3. Tonsillomedullary segment
4. Telovelotonsillar segment
5. Cortical segment
V-B System Aneurysms

SCA Aneurysms

Basilar Apex Aneurysms

AICA Aneurysms
PICA Aneurysms

Basilar Apex Aneurysms

Basilar Apex Aneurysm

Basilar Apex Aneurysm
Basilar Apex Aneurysm

Post-op Angio

Unclippable MCA Aneurysm

4 year post-coil (2012)

Immediate post-coil (2008)

Indirect Aneurysm Treatment

Aneurysm trapping + Bypass