ORIGINAL RESEARCH PAPER
VOLUME-6 | ISSUE-6 | JUNE-2017 | ISSN No 2277 - 8179 | IF : 4.176 | IC Value : 78.46
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

BLOOD SUPPLY OF FUNCTIONAL AREAS OF SUPERO LATERAL SURFACE OF CEREBRAL CORTEX OF BRAIN.

Anatomy

Dr. S. Sundari M. S. (Anatomy), Professor, (Retired), Institute of Anatomy, Madurai Medical College, Madurai- 20.

Dr. M. Sampath Kumar M.D., Assistant Professor, Institute of Anatomy, Madurai Medical College, Madurai- 20.

Dr. J. Jaya Rani M.S., Assistant Professor, Institute of Anatomy, Madurai Medical College, Madurai- 20.

ABSTRACT

Supero Lateral Surface of cerebral cortex is supplied by the M4 segment of middle cerebral artery. Segmental approach is to describe the middle cerebral artery are M1, M2, M3, M4. Blood supply to functional lobes is by M4. It passes all the convex surface of cerebral hemisphere.
Aside from the frontal pole and posterior rim using functional approach to Anatomy of Middle cerebral artery arises as a single trunk of 14-16 mm in length and diameter of 3-6 mm and majority it divides and supplied by superior and inferior division. More than one functional areas are supplied by the branch of middle cerebral artery. In the middle cerebral artery divides into three division as superior, middle and inferior . One artery is more connections are noted in branch of middle cerebral artery. Orbito frontal branch arises from the stem of M1 and supplies brocas.
Motor speech area and frontal eye field. This occurs in three divisions of middle cerebral artery. M1 segment is 30 mm. Lumen size is 6 mm. In the superior division free communication are noted in the 3 branches of middle cerebral artery .
In three division the angle of supply is also varying as superior is acute angle middle is as right angle . Inferior is acute.

KEYWORDS:

Blood supply to supero lateral surface of cerebral cortex, Content of submerged cortex, Content of Insula, Cortical branch of cerebral cortex, Largest terminal branch of internal carotid artery.

INTRODUCTION:
In Brain 3 surfaces are supero lateral, medial surface, inferior surface are present. Functional lobes of supero lateral surface are Frontal lobe, Parietal lobe, Temporal lobe , Occipital lobe & submerged cortex.

Blood supply is by middle cerebral to the following functional areas:
1. Primary motor area - 4
2. Premotor
3. Supplementary motor area – 6
4. Motor speech area
5. Functional eye field -8
6. Pre frontal area
7. Sensory area
8. Secondary sensory area
9. Sensory associated area
10. Auditary area
11. Auditary association area
12. Primary visual area

1. Affarentfibres from pre motor and supplimentary motor area are passing through association fibres.
2. Primary motor area controls highly skilled movements of opposite half of the body.
3. Supplimentary motor area programmly the sequential motor function.
4. Lesion causes unable to perform motor function, Loss of co-ordination in the movement of 2 limbs. Lesion of primary motor and supplementary motor area result in spastic paralysis with exaggerated deep tendon reflex.
5. Lesion of motor speech area 44 & 45 produces inability to speak what person think – motor afhasia.
6. Lesion of premotor cortex 6 – writing centre.
7. Frontal eye field area controls the conjugate movement of eye ball present in posterior part of middle frontal gyrus.
8. Prefrontal controls depth of feeling and understanding.
9. Sensory area is granular cortex.Sensory area 1,2,3, Secondary sensory area &Sensory associated area are present.
10. Primary visual area
11. Secondary visual area, Occipital eye field area are present. Auditory area , Auditory associated area are present. Thrombosis of middle cerebral artery produces spastic hemiplegia and hemisensory loss except leg of the opposite side. If the left middle cerebral artery is involves there will be Aphasia.

EFFECT OF LESION IN SUPERIOR DIVISION:

1. Motor aphasia lesion of Brocas area.
2. Loss of conjugate movement of eyeball due to lesion in frontal eye field.
3. Contra lateral hemiplegia due to lesion in motor area.
4. Except the leg area for sensory cortex.
5. Asterognesis due to sensory association cortex.

EFFECT OF LESION IN INFERIOR DIVISION:
1. Auditary loss (partial) and auditory receptive and associative cortex due to lesion of anterior temporal and posterior temporal branch.
2. Wernicks aphasia auditory and visual aphasia is due to lesion of posterior parietal branch.

Circulus arteriosus or cicle of willisis an arterial arcade situated in the base of the brain in interpeduncular fossa. It is formed by anterior, middle and posterior cerebral artery. Perforating arteries which supply anterior limb of internal capsule. Central branches are 6 in numbers antero medial is the largest branches medial striate or recurrent artery of Heubner. Antero lateral are 2 groups. Largest isLenticulostraiate or charcot"s artery of cerebral haemorrhage. Postero lateral &postero medial are present. Thrombosis of lateral striate of middle cerebral artery causes motor & sensory loss of most of

- Opposite side of body except lower limb.
- Hemiplegea is a common condition of upper motor Neuron paralysis.

Cerebro vascular disease causes cerebral haemorrhage, Thrombosis and embolism. Spastic Hemisplegia of opposite side loss of ssensation of opposite side occurs. If retro lentiform part of internal capsule involves formation of hemiplegia.

Middle cerebral artery is described as M1, M2, M3, M4 segments.

The M4 describes the branches of the middle cerebral artery that passes nearly all the convex surface of the cerebral hemisphere aside from the frontal pole and posterior rim using the functional branching approach to Anatomy, the middle cerebral artery generally arises as a single trunk of 14-16 mm length and a diameter of approximately 3 mm to 6 mm majority of cases supplied by superior & inferior division.

METHOD OF STUDY
M1 SEGMENT
1. Branches

2. Number
3. Gyrus to which enter any other artery to the same gyrus if so size of lumen of both.
4. Size of lumen
5. Its comparison with other terminal branches for all functional areas.
6. Termination of M1 segment and number of division are noted.
7. Artery supply to the Broca's area.
8. Artery supply to the frontal eye field.
9. Artery to motor area.
10. Artery to SensorY area.
11. Artery to wernick's area.
12. Artery supply to the sensory association cortex
13. Auditory cortex.
14. Central branch or the lenticulo striate branch.

OBSERVATION:

1. Ortibito frontal shows dichotomous pattern which has not been observed in any specimen & this division has not been reported previously.
2. One functional area supplied by more than one artery

- Orbito frontal supplying motor speech area in addition to frontopolar. So more supply to the brocas area.
- Three divisions are noted.
- Orbito frontal supplies brocas and frontopolar is connected with orbito frontal.
- This denotes liberal blood supply to the functional area.

Superior division 1:

1. Superior division of angular artery supplies visual association cortex & posterior parietal which supply sensory association cortex.

Superior division 2:

1. There is liberal blood supply to motor and sensory area by the four connections of pre rolandic and rolandic branch.
2. Angular artery supplied visual association cortex and connected with posterior temporal branch by the superior division is connected with inferior division.

Inter Connections:

1. Angular artery is connected with pre rolandic artery.
2. 2 connection between frontopolar and prefrontal branch.
3. There is communication between the angular artery and pre rolandic branch.
4. In all cases size of lumen is same from origin to Termination.
5. There is free communication between 6 branches of superior division. All lumen size are same of 3 mm.
6. There is connection between the posterior temporal and angular artery. Lumen size are same as 3 mm.
7. There is connection between anterior and posterior parietal branch.
8. In three divisions first branch is acute . Second is right angle and third is acute angle of origin.
9. M1 segment length normal 14-16 mm and has 2 divisions.

CONCLUSION:

1. Superior division infarcts lead to contralateral deficits with involvement of upper extremity.
2. Inferior division infarcts leads to Wernicke's aphasia.
3. Main trunk occlusion of either side yields contralateral hemiplegia.
4. Trunk occlusion causes global aphasia.
5. Partial hemiparesis occurs in middle cerebral artery infarts.
6. Hemianopsia occurs in middle cerebral artery infarct.
7. Middle cerebral artery stroke indicate a larger lesion affecting deep and superficial branch.
8. Inter corrections show liberal blood supply to functional lobes.
9. By the liberal blood supply infaction is minimal.
10. Three division of middle cerebral artery length is 30 mm.
11. There are liberal blood supply to functional lobes lume size is same.

REFERENCE:

1. Cortical Venous Filling on Dynamic Computed Tomographic Angiography A Novel Predictor of Clinical Outcome in Patients With Acute Middle Cerebral Artery Stroke. IR Van Den Wijngaard MJH Wermer, J Boiten, A Algra… - stroke, 2016
2. Damage to the left precentral gyrus is associated with apraxia of speech in acute stroke R Itabashi, Y Nishio, Y Kataoka, Y Yazawa, E Furui – Stroke 2016.
3. CT in the recognition of hyperdense middle cerebral artery sign (HMCAS) in patients with acute cerebral ischaemia; correlation with DWI –MRI sequences and clinical. A Romano, F Biraschi, F Tavanti, M Beccia, F Dilisi – La radiologia -2015
4. Hemicraniectomy in older patients with extensive middle – cerebral – artery stroke E Juttler, A Unterberg, J Woizik, J Bosel – England journal of 2014
5. Importance of cerebral artery recanalization in patients with stroke awith and without neurological improvement after intravenous thrombolysis. TV Kharitonova, TP Melo, G Andersen, JA Egido – stroke 2013.
6. Middle cerebral artery intraplaque hemorrhage: prevalence and clinical relevance WH Xu, ML Li S Gao, J Ni M Yao, LXZhou… Annals of ..2012.