AN ANATOMIC STUDY OF CIRCLE OF WILLIS AND ITS VARIATIONS IN HUMAN CADavers - A SHORT REVIEW.

INTRODUCTION:
Thomas Willis, an English anatomist as well as a physician first described the presence of a circular arterial anastomosis at the base of the brain in the interpeduncular fossa, and hence the arterial circle is commonly termed as “circle of willis”. It is formed by the internal carotid artery which is interconnected via the anterior cerebral arteries on both sides (right and left) and an anterior communicating artery which connects the right and the left anterior cerebral arteries. The carotid system is connected to the posterior cerebral arteries of the vertebral system by two posterior communicating arteries (right and left).

The classical form of circle of willis, which is complete, of symmetrical normal calibre and polygonal in shape. There is considerable individual variation in the pattern and calibre of vessels. About 60% of circle display ‘anomalies’. Ozaki et al (1977) described variations of the circle of willis and classified it as follows:

TYPE 1: Fenestration of the anterior communicating artery which included –
- ‘V’ shaped,
- ‘Y’ shaped,
- ‘H’ shaped,
- ‘N’ shaped,
- Double, triple and plexiform.

TYPE 2: ‘X’ shaped of anterior cerebral arteries

TYPE 3: Median anterior cerebral artery.

TYPE 4: Asymmetrical proximal segments of ACA.

TYPE 5: Accessory middle cerebral artery.

TYPE 6: Early duplication of middle cerebral artery.

TYPE 7: String-like posterior communicating arteries.

TYPE 8: Asymmetry of PCoAs.

TYPE 9: Primitive PCoAs and

TYPE 10: Asymmetry of vertebral arteries.

REVIEW OF LITERATURE:
The literature related to the circle of willis goes back to the 16th century.
Cassero(1616) was the first to construct an accurate figure of the circle of Willis. Windle (1887), showed in a study that out of 200 specimens, the anterior cerebral arteries were normal in 181 cases. In 9 cases a third branch was found and was named as Arteria Cerebralis Anterior Media.

Fawcett & Blackford (1905), in a study on 700 specimens found the circle of Willis complete in 673 specimens (96.1%). He found the doubling of the ACA was rare, occurring in only 2 cases.

Vare & Bansal (1970) did a study on 175 specimens and they observed that only 47 specimens had the typical picture of circle of Willis. The commonest anomaly was the origin of the PCA from the internal carotid artery.

Kamath S (1981) studied a 100 circle of Willis and found that abnormally narrow diameter was found in 25 vessels of 24 circles and was most frequently seen in the PCA followed by PCoA.

REFERENCES:

CONCLUSION:
The posterior part of the circle is more anomalous than the anterior part and the PCoA is the most anomalous segment when compared to all the segments of the arterial circle.

The study of normal as well as variations of the circle of Willis is very important for us to understand the location of the lesion, the knowledge of which may be of considerable help to the neurosurgeons who perform different vascular surgery of brain.