

Diseases of the Cerebrovascular System and its Pathologies

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ABSTRACT:-

One of the most significant contributors to human mortality and morbidity is a group of conditions known as cerebrovascular disorders (CVD), also known as stroke. It is estimated that the incidence of cardiovascular disease in western countries ranges from 500 to 800 cases per 100,000 people each and every year. Although accurate data of this kind are not readily available for India, there are studies that indicate the incidence rate ranges from 13 to 33 cases per 100,000 people every year. Taking into account the overall population of India, the problem may be more significant quantitatively than it is in the majority of other countries, despite the fact that these figures are undoubtedly lower when compared to the countries of the west. The fact that this is a widespread issue in our neuropathology material is what initially sparked my interest in the topic. In the combined material from the biopsy and the autopsy, cardiovascular diseases come in third behind neoplasms and infections. In my presentation, I have ruled out vascular syndromes that are caused by trauma and those that are related to other intracranial disorders, such as those that are caused by infections, tumours, and other similar conditions.

Keywords: Cerebrovascular diseases, neuropathology, embryologic, atherosclerosis, embolism, thrombosis.

INTRODUCTION: -

One of the main causes of human mortality and morbidity is cerebralvascular disorders (CVD), also known as stroke. According to reports, there are 500 to 800 new cases of CVD per 100,000 people per year in western nations. There aren't any exact numbers of this kind for India, however some studies claim that the incidence there ranges from 13 to 33 per 100,000 people each year. [1] Although these numbers are undoubtedly lower when compared to western nations, given India's overall population, the issue may perhaps be more severe than in most other nations. Because this is a frequent issue in our neuropathology material, I am personally interested in the topic. CVD are only after neoplasms and infections in the combined biopsy and autopsy material. In my presentation, I have excluded vascular syndromes brought on by trauma and those that develop later as a result of other intracranial issues, such as those that complicate infections, tumours, etc.

The classification of distinct disease entities as part of the study of CVD also includes the factors that either directly or indirectly contribute to the pathogenesis of these disorders. We have researched several elements of distinct CVD types during the past 25 years, as well as

some of the contributing components. However, I must admit right away that given the size of the issue, our efforts are in fact quite meagre.

We investigated them in regular autopsy as a part of a collaborative project funded by the Indian Council of Medical Research in light of the documented relevance of anatomical anomalies and some structural abnormalities of the circle of Willis (CW) in the aetiology of saccular or berry aneurysms. [2] Patients with saccular aneurysms of the cerebral arteries have a significant incidence of anomalous CW, according to reports. In the 404 brains evaluated in two centres, we discovered 153 abnormal CW, or 38%, which is comparable to the numbers from other nations. Even greater numbers have reportedly been obtained [5], and it has been claimed that because these are so typical, they need to be viewed as normal variation as opposed to aberrations. On the basis of embryologic growth and the persistence of some foetal characteristics as the CW develops into its typical adult structure, the majority of these anomalies can be explained.

DISCUSSION:-

Medial defect: Medial defect is another feature of the intracranial arteries' anatomy that has attracted a lot of interest in the development of berry aneurysms (MD). The tunica medium is lacking in a brief stretch of an otherwise healthy artery in this disease. The deficiency is more prevalent at or close to the locations of branching. Seven artery connections from each of 30 CW were examined using step serial slices and the elastic tissue and haematoxylin and eosin stains. In all cases and in 43% of the 210 arterial intersections examined, MD was found at least once. Similar outcomes were also attained at the Delhi centre.

Aneurysm and subarachnoid haemorrhage: In the course of this investigation, we performed 181 consecutive brain autopsy and found 3 (1.6%) berry aneurysms. In a later investigation with a bigger sample size, 2023 brains contained 43 (2.12%) berry aneurysms. [6] These numbers are lower than what has been reported from western nations. [7, 8] Since anomalous CW and MD are equally prevalent in our material as they are in the West, the lower incidence of aneurysms suggests that there is no causative relationship. However, it must be highlighted that because autopsies are only performed in a limited number of patients, our autopsy data on aneurysms does not reflect its true incidence in the public or in clinical practise. Aneurysms were shown to be the cause of subarachnoid haemorrhage (SAH) in 18 to 54% of cases, with an average prevalence of 36.7%, according to a collaborative study [2] of clinical data from six centres. The investigators believed that if all investigations had been made uniformly available, the number could have been greater. The incidence of aneurysms as a cause of SAH is not significantly different, despite the fact that the study was unable to determine if the incidence of SAH in India is the same as that in the West or Japan.

Atherosclerosis: The two main risk factors for stroke are atherosclerosis and high blood pressure. The most common cause of thrombotic infarctions of the brain is atherosclerosis,

which can be found in the internal carotid and vertebral arteries as well as the intracranial arteries. Our knowledge of atherosclerosis and extracranial artery blockage in the neck is quite restricted as a result of some restrictions. However, a considerable number of cases of cerebral thrombosis are associated with these arteries, as is well-documented in the literature. [9] Although the aetio-pathogenesis of atherosclerosis is a broad topic beyond the scope of this talk, the experimental work conducted in our lab is mentioned very briefly. [10] The primary intracranial arteries and extracranial parts of the internal carotid arteries of adult rhesus monkeys fed a high fat, high cholesterol diet for seven months underwent morphological alterations indicative of atherosclerosis, hyperlipidaemia, and increased tissue lipids. However, the lesions were not serious enough to result in any ischemic lesions in the brain or considerable constriction of the lumina of the afflicted arteries. Although there are few conclusions to be drawn from this small, short-term study, it does support the notion that hypercholesterolemia plays a part in cerebral atherosclerosis.

The incidence, degree, and distribution of atherosclerosis were examined in common medical autopsies for the collaborative study mentioned earlier [2]. By cutting cross sections at 22 different locations, the CW in 185 cases was evaluated. The lumen's degree of narrowing was measured and rated on a scale of 1 to 4. In 84 patients, atherosclerosis was discovered. The subject with the lowest result was a 12-year-old boy, who received a 4. Incidence rose with age, and atherosclerosis was present in 61 out of 83 instances in people above the age of 40. Atherosclerosis was seen in each of the 20 guys older than 60.

Hypertension: As hypertension is believed to hasten the atherosclerotic process, atherosclerosis and hypertension are strongly connected. Therefore, it is not usually simple to ascertain each one's independent contribution to stroke. However, it is widely acknowledged that hypertension is the primary factor contributing to intracerebral haemorrhage (ICH). In the autopsy material, we have made an effort to find indications of hypertension in various types of strokes. Left ventricular hypertrophy and vascular alterations in the kidneys and brain at postmortem have also been investigated for the diagnosis of hypertension, in addition to recorded blood pressure, ECG, and retinal changes during life. [6] Given the prevalence of hypertension, a chance relationship is never easy to rule out. Our findings that hypertension is present in all cases of pontine haemorrhages and in 70% of ganglionic haemorrhages clearly suggest a causative connection. The same cannot be said for cerebral artery infarctions and ruptured saccular aneurysms, though. In our sample, 44% of the former and 52% of the latter had hypertension.

Stroke in the young: In our investigation of CVD, we found that 36.8% of the cases were in people under the age of 40. [6] This is comparable to other Indian employees' experiences [11], but it contrasts sharply with that in western nations, where fewer than 2% of all stroke cases involve patients under the age of 40. [12] However, it should be highlighted that a direct comparison between our results and the reports on clinical material was not possible. Our patients with cerebral embolism related to rheumatic heart disease, infective

endocarditis, cerebral venous thrombosis (CVT), and hypertensive ICH secondary to chronic renal illness make up a significant component of our patient population. These illnesses typically affect younger people; they are more common in poorer nations and are linked to increased mortality.

Cerebral embolism: In 63 (70.8%) of the 89 cases of cerebral infarction brought on by embolism, the source of the embolus was found to be in the heart. The main causes of emboli were rheumatic heart disease, myocardial infarction, and infectious endocarditis with or without pre-existing heart disease. The neck's arteries could also be a source of embolism, although they weren't thoroughly examined. Occlusion of the proper intracranial artery is more easily visible in cases of cerebral infarction caused by embolism than it is in cases of thrombosis. Multiple infarcts are more likely to occur in an embolism, and the carotid circulation is more frequently affected than the vertebro-basilar circulation. In contrast to thrombosis, which has an average age of 47.4, embolism has a median age of 42.5 years. The average age would be even lower if myocardial infarction instances were omitted. The importance of infectious endocarditis in healthy heart valves cannot be overstated. In our autopsy data, about 50% of infective endocarditis patients occurred in normal valves[13], and the majority of these cases are most likely iatrogenic. According to our experience, there are a few uncommon causes of embolism that might impact the central nervous system, including fat embolism, tumour embolism, and spinal cord cartilage embolism. [15]

CONCLUSION:-

In our autopsy data, aseptic cerebral venous thrombosis (CVT) made up over 10% of CVD. The bulk of these cases involved puerperium and pregnancy. It is commonly known that India has far higher rates of CVT associated to pregnancy than other nations. [16] The prevalence of CVT unrelated to pregnancy is less well known. Children's CVT has been linked to dehydration in the past. Adult cases of CVT have been reported both alone and in conjunction with a variety of extracranial diseases. [16] The situation has improved since the development of modern imaging tools because these cases were previously difficult to diagnose in life. Colonic TB, chronic ulcerative colitis, and chronic diarrhoea were each present in one of the 13 such patients in our collection. The remaining 10 instances had no other diseases. Following tubectomy, CVT occurred in two patients.

Some CVD issues in India are comparable to those in western nations and may be reduced with the help of interventions like lowering blood pressure, etc. Many CVDs that are caused by infections can be prevented. Therefore, preventative interventions are required, which should be more economical than treating CVD at a tertiary care facility.

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