Original Research Article

Study of patho-physiology of vertebro- basilar insufficiency in Jharkhand population: A retrospective study

Rohit Kumar Jha[1], Satya Prakash Ranjan[2*]

[1]ENT Specialist, [2]Senior Specialist and HOD,Department of ENT, Gandhi Nagar Hospital CCL, Ranachi, Jharkhand, INDIA.
Email: rohitjhangh1@gmail.com

Abstract

Background: Vertebro- basilar insufficiency is quite common phenomena due to erect posture, rotation of head and neck against gravity. Moreover as age advances degeneration of Vertebral bodies will compress the Vertebro basilar blood vessels. **Method:** 58 adults patients aged between 35 to 60 years having clinical manifestation of Vertebro basilar insufficiency were studied. Doppler ultrasonography, MRI, MRA, was carried out. Blood examination CBC, RBS, C-reactive protein, lipid profile, ESR was investigated. **Results:** 21(36-2%) had vertigo, nausea, 15(25.8%) had headache, Neck ache, 7(12%) had tinnitus, hearing loss, 6(10.3%) had drop attack, 2(3.44%) had dysarthria, 3(5.17%) had confusion, 4(6.89%) had visual problems. 46(79.3%) had unilateral lesion of Vertebral artery, 12(20.6%) had bilateral lesion. Associated risk factors were 17(29.3%) had DM, 13(22.4%) had HTN, 8(13.7%) were smokers, 9(15.5%) were alcoholic, 11(18.9%) were obese. The radiological parameters in both right and left side recorded. **Conclusion:** Majority of Vertebro-basilar artery pathology was unilateral. Hence individual evaluation of radiological, hematological is required to diagnose and treat efficiently.

Key Words: Vertebro-basilar, insufficiency, Doppler, ultra-sonography, MRI, MRA, SDM, HTN.

Address for Correspondence:
Dr. Rohit Kumar Jha MBBS, MS(ENT), Flat No A/604. Koyla Vihar. Kanke Road, Ranchi -834008 (Jharkhand)
Email: rohitjhangh1@gmail.com

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INTRODUCTION

Vertebro basilar arterial system constitutes the posterior circulation of the brain, supplies brainstem, cerebellum and occipital lobes of the cerebrum, shows high incidences of clinical manifestations. Anomalies of Vertebro basilar system may precipitate the development of cerebro vascular diseases, like aneurysm, stroke followed by vertigo imbalance gate, headache, tinnitus, hearing loss, drop attack, visual problems. Variations in the blood flow are quite common but the amount of blood reaches the basilar artery remains constant due to the contralateral large Vertebrol artery[1]. Vertebrol artery hypoplasia or asymetry is frequently associated with posterior circulation stroke[2,3]. Occlusions of Internal carotid artery, which is the principle source of blood supply is through Vertebro basillary system can cause insufficiency in the posterior circulation of brain. Which results into Vertebro basilar is ischemia, Insufficiency in the blood flow of Vertebrol artery also considered to be the one of the risk factors of pontine infarction. Moreover anatomical variations also aggravate the insufficiency of Vertebro-basilar blood flow. Radiological and blood examination will be helpful to diagnose and treat accordingly.

MATERIAL AND METHODS

58 patients aged between 35 to 60 years regularly visiting to Gandhi Nagar Hospital CCL. Ranchi-834008(Jharkhand) having problems of Vertebro-basilar insufficiency were studied.-

Inclusion criteria- The patients having clinical symptoms of Vertebro- basilar insufficiency (VBI). Such

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as vertigo ,drop attacks, tinnitus and ataxia were included in the study.

Exclusion criteria – The patients having trauma, fracture of base of skull, or cervical Vertebro, stroke, degeneration of spinal cord, immune compromised, grade IV malnutritious patients were excluded from the study.

Method- The patients having clinical sign of VBI, were confirmed by Doppler ultrasonography and MRI magnetic resonance angiography (MRA) blood examinations to rule out DM, C- reactive protein ESR, CBC RA, lipid profile was also invested. The radiological parameter of Vertebral artery was carried out by droppler ultrasonography. The blood velocity of Vertebral arteries assessed between 3rd and 4th cervical Vertebro with a Doppler angle 45-65 MRA was carried out using 2d cine phase device on 1.5 T-machine for quantitative evaluation of blood flow. Flow encoding was in a caudal to cranial direction and sequence parameters, imaging plane and pixel intensities were adjusted as described by kato etal 4. Pulsality index was defined as the difference between peak systolic and minimum diastolic velocities divided by the mean velocity during cardiac cycle5. Resistance Index is a measure of pulsatile blood flow that reflects the resistance to blood flow due to micro vascular bed distal to the measurement site6. The duration of study was March 2019 to August 2019.

Statistical analysis- Clinical manifestation associated radiological findings; Diseases were classified with percentage. SPSS soft ware was used for statistical analysis. The ratio of male and female was 2:1

OBSERVATION AND RESULTS

Table-1 – Clinical manifestation of patho-physiological study was-21(36-2%) had vertigo, nausea, 15(25.8%) had headache, neck ache, 7(12%) had tinnitus, hearing loss, 6(10.3%) had drop attack, 2(3.44%) had dysarthria, 3(5.17%) had confusion, 4(6.89%) had visual problems.

Table 1: Clinical manifestation of patho-physiological study of Vertebro basilar artery (No of patients 58)

Sl.No	Particular	No. of patients	Percentage
1	Vertigo, Nausea	21	36.2
2	Headache, Neck ache	15	25.8
3	Tinnitus, hearing loss	07	12
4	Drop attack	06	10.3
5	Dysarthria	02	3.44
6	Confusion	03	5.17
7	Visual problems	04	6.89

Table-2 – Lesion of Vertebro basilar artery 46(79.3%) had unilateral lesion of Vertebral artery, 12(20.6%) had bilateral lesion.

Table 2: Radiological study of Patho- physiology of lesion Vertebro basilar artery (No of patients 58)

Sl.No	Particular	No. of patients	Percentage
1	Unilateral lesion of Vertebrol artery	46	79.3
2	Bilateral lesion of Vertebrol artery	12	2.6

Table-3- Associated risk factors were 17(29.3%) had DM, 13(22.4%) had HTN, 8(13.7%) were smokers, 9(15.5%) were alcoholic, 11(18.9%) were obese. The radiological parameters in both right and left side recorded.

Table 3: Associated risk factors in the study of patho-physiology Vertebro basilar artery (No of patients 58)

Sl.No	Particular	No. of patients	Percentage
1	Diabetic mellitus	17	29.3
2	Hyper tension	13	22.4
3	Smoking	08	13.7
4	Alcoholic	09	15.5
5	Obesity	11	18.9

(DM= Diabetes mellitus, HTN=Hypertension)

Table-4- The radiological parameters in right and left mean values- (a) Peak systolic flow velocity- right side 39.26 (SD±11.80) left sides 43.22(SD±14.50) (b) Resistance Index right side 0.69(SD±0.11), left side -0.67(SD±0.08) (c) Flow- right side-76.41(SD±39.21) left side 88.21(SD±38.89) (d) diameter of the artery – right side-3.28(SD±0.40) left 3.32(SD±0.50) (e) pulsality Index- right side- 1.07(SD±0.48) left -1.16(SD±0.55) (f). Mean velocity right side-12.20(SD±7.19) left 14.22(SD±3.52)

Table 4: Radiological parameters in Vertebro basilar pathology (No of patients 58)

Sl.No	Particular	Right side (mean value)	Left side (mean value)
1	a-Peak Systolic flow velocity	39.26 (SD±11.80)	43.22(SD±14.50)
	b-resistance Index	0.69(SD±0.11)	0.67(SD±0.08)
	c- flow	76.41(SD±39.21)	88.21(SD±38.89)
	d-diameters	3.28(SD±0.40)	3.32(SD±0.50)
	e- plurality index	1.07(SD±0.48)	1.16(SD±0.55)
	f-mean velocity	12.20(SD±7.19)	14.22(SD±3.52)

DISCUSSION

In The present study of VBI in Jharkhand Population, 21(36-2%) had vertigo, nausea, 15(25.8%) had headache, neck ache, 7(12%) had tinnitus, hearing loss, 6(10.3%) had drop attack, 2(3.44%) had dysarthria, 3(5.17%) had confusion, 4(6.89%) had visual problems.(Table-1) 46(79.3%) had unilateral lesion of Vertebral artery, 12(20.6%) had bilateral lesion of Vertebral artery (Table-2). Associated risk factors were 17(29.3%) had DM, 13(22.4%) had HTN, 8(13.7%) were smokers, 9(15.5%) were alcoholic, 11(18.9%) were obese (Table-3). The radiological parameters in right and left mean values- (a) Peak systolic flow velocity- right side 39.26 (SD±11.80) left sides 43.22(SD±14.50) (b) Resistance Index right side 0.69(SD±0.11), left side -0.67(SD±0.08) (c) Flow- right side-76.41(SD±39.21) left side 88.21(SD±38.89) (d) diameter of the artery – right side-3.28(SD±0.40) left 3.32(SD±0.50) (e) pulsality Index- right side-1.07(SD±0.48) left -1.16(SD±0.55) (f) Mean velocity right side-12.20(SD±7.19) left 14.22(SD±3.52)(Table-4). These finding were more or less in agreement with previous studies [7'8'9]. The most frequent cause of patho-physiology of VBI is the haemodymic changes that lead development of VBI is atherosclerosis other common cause are embolism, fibro muscular dysplasia, cogulopathies, drug abuse are the frequent cause10. The epidemiology of VBI, prevalence of atherosclerosis and blockage of Vertebro –basilar circulation is reported in adults, more frequently in men than woman at or after 4th decade of life[11]. Moreover alcohol, smoking, obesity, D M are the aggravating risk factors.[12] Dizziness, vertigo, headache, vomit, diplopia, blindness, ataxia, imbalance and weakness of both sides of body are the most common symptoms. It is also reported that lower limbs associated to imbalance and ataxia, palsy of occulomotor nerve, dysfunction of oro-pharynx are most prevalent symptoms of VBI. Mental confusion, headache, tinnitus, hearing loss, while paresthsia, dysarthria and less frequent symptoms. Dizziness or even chronic imbalance was mainly observed in D M patients having VBI. The possible symptoms of the diseases secondary to the lateral modularly syndrome is also known as Wallenberg syndrome. It is characterized by stroke in the Vertebrol artery. Symptoms include difficulty in swallowing, hoarsens, dizziness, nausea, vomiting nystagmus, imbalance and gait incoordination[10]. Patho- physiology of VBI also includes labyrinthic symptoms. The vestibular system supplied by 1-very small penetrating vessel coming from the basilar artery, supplying vestibular nuclei and 2- internal auditory artery (80-85%) (IAA), original either from post.inferior anterior cerebellar artery or vascular loop from in cerebellar artery (PICA) which is a branch of Vertebrol artery (15.20%). The IAA irrigates vestibulo- cochlear nerve and posterior labyrinth13,14. When these are blocked there would be ataxia, tinnitus, hearing loss, vertigo and dizziness

SUMMARY AND CONCLUSION

The present study of patho- physiology of VBI would be quite useful to ENT surgeon. VBI patients should be suspected for risk factor for ischemia and vestibular symptoms. Each diagnostic test offers different pros and cons. Thus each patient should be treated individually to avoid possible sequels.

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