PREVALENCE AND PATTERN OF CEREBRAL VARIATIONS DURING ENDOVASCULAR DIAGNOSTIC ANGIOGRAPHY IN SAUDI PATIENTS IN MAKKAH CITY, SAUDI ARABIA IN 2022

Mohammed Hamed Ahmed Alshamrani[1*], Faisal Khader alharthi[1], Hatim Ebrahim Alqurashi[1], Nada Hameed Alluqmani[1], Huda Ahmed seed Saleh[1], Mohammed Abdulraman Bin Abdullah Bawazir[1], Maram Battah Alshammari[2], Amani Mirizeq Hamed Alharbi[2], Suha Ezzat Sharaf Sharaf[2], Taghreed Marzouk Ghazna[3], Bader Mesfer Abdullah Alasiri[4], Anas Mohammed Idris[5], Amin Amir Mohmmed Turkestni[4], Fahad Omran Altayyari[6], Sultan Abdullah Amri Al-Mahlabadi[7,] Ahmed Saud Abdalaziz Alsaedi[8]

Abstract:

Background:

Recent neuron interventional and neurosurgical technologies require an understanding of lesions and adjacent structures. also the cerebral Variations during endovascular diagnostic angiography, angiography plays a larger diagnostic role for patients with a lot of diseases like lower GI bleeding when endoscopy and other imaging modalities are not able to satisfactorily locate the site and etiology of bleeding. Most important, diagnostic during endovascular diagnostic angiography today is most often a precursor to Trans catheter therapy, which has become an important weapon in the armamentarium for the treatment of acute GI bleeding, also to clarify the clinical benefits of rotational 3D digital subtraction angiography (DSA)**,** although no specific pattern for this entity exists, multiple infarcts of various ages in more than one vascular territory should raise this suspicion. The next step in the imaging of patients with suspected vasculitis is the demonstration of the underlying vascular pathology.

Aim of the study: To evaluate the prevalence and pattern of cerebral Variations during endovascular diagnostic angiography in Saudi patients in Makkah City, Saudi Arabia in 2022.

Method: Data was collected a Retrospective Observational study from patients database who endovascular diagnostic angiography between January 2019 and December 2022 at the Radiology Department, The present study was conducted at a tertiary referral hospital , Makkah, Saudi Arabia. Demographic details and clinical data of the patients such as age, gender, etiology, clinical presentation, endovascular diagnostic angiography . Our total participants were (200**).**

Results: the age majority of the study groups were in the age more than (80) years were (41.0%), regarding the gender many of the respondents were male (58.0 %). Regarding the Marital status, the majority of the respondents had Married were (48.0%), regarding the income The majority of them had an income from below 5000 SR were (37.0%) .

Conclusion: Endovascular diagnostic angiographies are important for the diagnosis of cerebral vasculitis, especially if supplemented by multiplanar, high-resolution contrast-enhanced weighted the images. In cerebral endovascular diagnostic angiography diagnose vascular stenosis as vessel wall contrast enhancement is mostly invisible, large brain arteries the demonstration of contrast enhancement in the wall of stenotic vessels may be the most sensitive test for an inflammatory disease.

Keywords: Prevalence, pattern, cerebral, endovascular, diagnostic, angiography, Saudi patients, tertiary referral, hospital, Makkah City.

[1*]Pharmacy technician, King Faisal hospital in Makkah, Saudi Arabia.
[2]Pharmacist, King Faisal Hospital in Makkah, Saudi Arabia.
[3]Pharmacist Assistant, Maternity and Children hospital in Makkah, Saudi Arabia.
[4]Pharmacy Technician, King Abdullah Medical City in Makkah, Saudi Arabia.
[5]Pharmacist, King Abdullah Medical City in Makkah, Saudi Arabia.
[6]Pharmacy Technician, Altalaa PHC, Saudi Arabia.
[7]Pharmacy technician, Khulais Hospital, Makkah, Saudi Arabia.
[8]Pharmacy-technician, health center abushuayb

***Corresponding Author:-**Mohammed Hamed Ahmed Alshamrani
[*]Pharmacy technician, King Faisal hospital in Makkah, Saudi Arabia.

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Introduction

Background

cerebral Variations during endovascular diagnostic angiography has for decades been of inestimable value in the diagnosis and evaluation of diseases of the CNS, particularly for vascular lesions such as aneurysms, arteriovenous malformations (AVMs) and fistulas (AVFs), CNS vasculitis, and atherosclerotic vascular disease.(1) It has been nothing less than essential in the evaluation and treatment planning of these diseases, and it has furthered our understanding of the nature of these disease processes. However, catheter angiography remains an invasive procedure, albeit "minimally" so, involving the "unnatural" placement of catheters in very important and sometimes sensitive arteries.(2) There is no way to entirely eliminate risk to these arteries and to the brain from this procedure, and the angiographer ponders primum non nocere when describing risk of stroke or death to the patient during the informed consent process,(3) the ongoing question: In the setting of constantly improving, utterly noninvasive CT angiography (CTA) and MR angiography (MRA) capabilities, is diagnostic cerebral angiography a brutish test of the past. (4) Acute and chronic inflammatory diseases of the central nervous system (CNS) frequently cause severe neurological deficits or death. The infectious or auto immunological attack may be directed against various targets such as brain linings, oligodendrocytes, neurons or blood vessels.(5) These changes occur in the course of generalized disorders or are restricted to the CNS. Early diagnosis and differential diagnosis is important as treatment depends on the etiology of the inflammatory disorder and may greatly improve the clinical course.(6) Whereas in cerebral manifestations of systemic disorders the diagnosis usually depends on the identification of the underlying disease by blood tests or body biopsies, the diagnosis of an isolated CNS manifestation is far more demanding (7). Specific signs are frequently absent in blood samples. The diagnosis often requires invasive tests to gain access to CNS tissue, its linings, vessels or the CSF(8). Apart from lumbar puncture, these procedures carry a significant risk of complications (9)

In parallel with these advancements in cerebral angiography, CT and MRI burst onto the scene, producing the marvel of "direct" tumor and other brain lesion imaging.(10) Subsequently, along came CTA and MRA, and the cervical and intracranial vasculature could then be visualized with only the small risk of contrast material-related allergy or nephropathy.(11) Now, barriers to patients receiving MRA or CTA seem nonexistent, and legions of surgeons operate on many cervico cerebrovascular lesions based on MRA or CTA findings alone. MDCT angiography (12) takes only seconds, has sub millimeter spatial resolution, and can even be performed in dynamic fashion (13). There are now many variants of MRA(14), MR venography (MRV)(15), and even time-resolved MRA for the evaluation of shunting vascular lesions (16).

The idiopathic disease is inherently common in East Asian countries such as Japan and Korea and relatively less common in the Middle East and Western countries. RNF 213 is the most common susceptible gene and is often reported with the p.Arg4810Lys founder variant in East Asian patients.(17) what advantage does cerebral angiography have over by the endovascular diagnostic angiography, perhaps a better question is "Is the incremental spatial and time resolution and vessel selectivity of cerebral angiography worth its inherent risk of complications?" We think the answer frequently is "yes." With regard to accuracy and breadth of diagnostic information offered, conventional angiography is un matched. The spatial resolution (0.2 mm) and temporal resolution (0.25 second) of catheter cerebral angiography remain incomparable. CT may be approaching this for some applications, with potentially 0.4-mm spatial resolution and 0.5-second temporal resolution, whereas MR remains a little further away with regard to temporal resolution (e.g., 2 seconds). However, conventional angiography remains the clear winner in these measures of performance.(18)

Review of literatures

Kathuveetil, et al (2020), described 4 types of anastomotic networks in moyamoya. Leptomeningeal and durocortical as the superficial meningeal networks and sub ependymal and inner-interstriatal networks and the inner thalamic as the deep parenchymal networks .(19) Suzuki and Takaku, listed 6 stages of moyamoya that describes the different patterns of disease progression: Grade I = narrowing of the carotid fork; Grade II = initiation of moyamoya collaterals; Grade III = Partial stenosis of the ACA and MCA with intensification of moyamoya collaterals; Grade IV = advanced steno occlusive changes in the ICA with small portion of ECA collaterals; Grade V= predominant ECA collaterals with further reductions in ICA collaterals; Grade VI = absence of the ACA and MCA with complete disappearance of ICA moyamoya collaterals.(20) .

More recently, 3D reconstructed angiography systems, which are based on rotational digital angiography with or without a subtraction technique, have been developed (21)

In Saudi Arabia, moyamoya syndrome constitutes a major risk for stroke in children reflecting commonly an underlying hematological disorder like sickle cell disease.(22) Intracranial atherosclerosis is an important etiology for ischemic stroke that contributes to collaterals formation, where well-developed collaterals precludes the severity of cerebral ischemia and represents a prognostic role in moderate and severe stenosis.(23)

Robert, et al.(2018) report that more number of moyamoya patients are currently being recognized due to advances in medical imaging. This includes factors for predicting disease severity, impending hemorrhages, clinical outcomes and potential complications through magnetic resonance angiography or conventional cerebral angiography.(24) Since Oushy, et al (2020) introduced electrolytic ally detachable platinum coils for the endovascular treatment of cerebral aneurysms, these coils have become an important treatment choice for cerebral aneurysms.(25) As expected, the technology has spread rapidly worldwide. This treatment method requires high-spatial-resolution and spatially directed DSA to evaluate the vascular anatomic structures adjoining the cerebral aneurysm . Three-dimensional images, reconstructed with the data from MR angiography or CT, can provide clinically useful information to the operator (26) A wide spectrum of immunological and infectious diseases has been reported as possible causes of medium vessel arteritis. It appears to be more prevalent in older patients and is not or is only rarely associated with a varicella-zoster infection. Medium brain vessel involvement has been reported with pan arteritis nodosa(27), lupus erythematous, Behçet's disease(28) , Crohn's diseases and the Sneddon's syndrome (29).

Rationale

know more about the cerebral during endovascular diagnostic angiography is needed more than when we're reporting complication rates of the procedure in the 1970s and 1980s, but it remains the reference standard in the diagnosis and evaluation of cerebral Variations during endovascular diagnostic angiography such as intracranial aneurysms, AVMs, AVFs, CNS vasculitis, and even atherosclerotic occlusive disease. Endovascular inter ventionalists need the artifact-free spatial resolution and avoidance of overlap of adjacent vascular structures in planning coil embolization of intracranial aneurysms and, of course, require a diagnostic angiogram before any endovascular intervention. Cerebral Variations during endovascular diagnostic angiography Indus targeting and judgment of any post therapy AVM residual frequently remain better evaluated with catheter angiography. CNS vasculitis commonly involves the third- and fourth-order branches of the cerebral circulation, and these diminutive vessels are still best resolved with catheter angiography.

Aim of the study

To evaluate the prevalence and pattern of cerebral Variations during endovascular diagnostic angiography in Saudi patients in tertiary referral hospital Makkah City, Saudi Arabia in 2022 .

Specific objective

- To evaluate the prevalence and pattern of cerebral Variations during endovascular diagnostic angiography in Saudi patients in Makkah City, Saudi Arabia in 2022

Methodology

Study setting:

The present study was conducted at a tertiary referral hospital Saudi Arabia.

Study Population

The study population consists of Saudi in tertiary referral hospital, aged 40- More than 80 years attending to tertiary referral hospital in Makkah City, Saudi Arabia.

Study Design

A Retrospective Observational study from patients database who endovascular diagnostic angiography between January 2019 and December 2022 at the Radiology Department, systematic random sampling technique

Inclusion criteria:

- Patients aged 40 years
- Take some sort of prescribed medications.

2.5 Exclusion Criteria

- Patients more than 80 years
- Referral or consultation from outside the hospital

Sample size:

Using EPI info version 24 (50), the study sample size has been determined based on the following assumptions :

Since there is not an official release, e.g., by the "Central Department of Statistics and Information" in Saudi, of the exact census of Makkah City residents falling within the study's age category, a source population size of the same of has be assumed. (Definitely, the true population of such category is greater , also to be most conservative, the least number needed for a reasonably large sample size that allows generalizability of the study result.

A given estimate that patients with expected frequency of having awareness of PMS = 15%. Tolerable error 5%. Confidence level = 95%. Design effect (for cluster surveys-DEFF) =1. Accordingly, a sample size (n) would be (200). In order to account for non-response and achieve more generalizable results, the investigator has be increase the sample size up to 200.

Sampling Technique:

Makkah City Regarding health care center selection, there are three health care sectors inside Makkah Al-Mukarramah. By using simple random sample technique (by using randomizer.org), Regarding patients' selection, the total number from medical record This study has been conducted at tertiary referral hospital, Saudi Arabia is a lot of patients per month and the sample size is 200. The data collection period is 20 days (four weeks minus weekends). Every day there are nearly 85 patients attending in tertiary referral hospital in both section (male and female sections). To collect data from sample size, the researcher needs nearly 18 patients per day to collect desired sample size. The researcher has been selecting every 4th patient to cover the sample size during data collection period .

Sampling method:

Makkah city the total number of patients attending tertiary referral hospital in one month is a lot of patients . Based on this information sample size was calculated using a website (raosoft.com). The resulted estimated sample size is 200 patients. The confidence interval is 95% and margin of error is 5%. The estimated prevalence used is 50% to calculate maximum sample size.

Data collection method:

We retrospective analyzed data from 200 patients female and male patients; age from 40 years to more than 80 age. with cerebral Variations during endovascular diagnostic angiography from January 2019 and December 2022 at the Radiology Department

Data Collection Technique

The researcher has visit the tertiary referral hospital the researcher has filled the questionnaires through the interview with patients who are attending patients attending health care center Makkah City met the inclusion criteria .

Data Entry and Analysis

Data has been collected and coded and then entered to a MS program with adequate backup. Descriptive statistics, e.g., number, proportions, cumulative proportions, mean and standard deviation, etc. has been displayed, as appropriate. Analytically, a parametric technique, e.g., t-test, has been attempted, as applicable, especially analyzing normally distributed variables. Otherwise, a non-parametric alternative, e.g., Man Whitney U test and χ^2 test of independence, has been used, as necessary. The Statistical Package for Social Sciences (SPSS) software for MS-version-24 will be used for the analysis. All tests has been conducted at level of significance a=0.05; results with p-values<0.05 has been considered "statistically significant".

Pilot Study

A pilot study has been done on 10 medical record Saudi patients who meet the study's eligibility criteria. The pilot study has been mainly help examine both the instrument's content validity and construct validity issues, alongside with other needed information.

Ethical Considerations

Necessary approval has been the Research Ethics Committee of the tertiary referral hospital in Makkah, shall be obtained prior to the study .

A written consent has been obtained both from tertiary referral hospital, Makkah region administration. The aim of the study has been explained to them. about the results has been sent to these organizations .Data has been treated confidentially and has been used only for the purpose of research .

Budget : Self-funded.

Table (1) Distribution of the Baseline demographic data of the sample of pharmacists providing care in the outpatient setting through telemedicine model (n=200)

	N	**%**
Age		
40-60	60	30
60-80	58	29
More than 80	82	41
Gender		
Female	84	42
Male	116	58
Marital status		
Single	38	19
Married	96	48
Divorced	32	16
Widowed	34	17
Education		
Illiterate	48	24
Primary	44	22
Preparatory	32	16
Secondary	40	20
University	36	18
Level of Income		
Below 5000 SR	74	37
5000 – 10000 SR	58	29
10,000 – 20,000 SR	38	19
Above 20,000 SR	30	15

Regarding the age majority of the study groups were in the age more than (80) years were (41.0%) followed by age 40-60 years were(30.0%)but the 60-80 years were (29.0%), regarding the gender many of the respondents were male (58.0 %) while female were (42.0%). Regarding the Marital status, the majority of the respondents had Married were (48.0%) followed by single were (19.0%), Regarding the education status, the majority of the respondents had Illiterate degree were (24.0%) followed by primary were(22.0%), regarding the income The majority of them had an income from below 5000 SR were (37.0%) followed by 5000-10000 SR were (29.0%) .

Table (2) description presence of chronic disease, duration of chronic disease , number and type of drugs among the patients

	N	**%**
Hypertension		
Acute	74	37
Chronic	126	63
Smoking status		
Yes	134	67
No	66	33
Migraine headaches		
Yes	60	30
No	140	70
Peripartum		
Yes	44	22
No	156	78
Serotonergic drugs		
Yes	38	19
No	162	81
Acute ischemia		
Yes	58	29
No	142	71
Acute hemorrhage		
Yes	22	11
No	178	89
PRES		
Yes	18	9
No	182	91

Abbreviation: posterior reversible encephalopathy syndrome

Regarding the majority of the study heave who suffer from chronic Hypertension were (63.0%) but acute hypertension were(37.0%). also the study showed regarding the Smoking status most of participant yes smoked were (67.0%) followed by no smoked were (33.0 %). Regarding the Migraine headaches the majority of the Participants no Migraine headaches were (30.0%). Regarding the Peripartum the majority of the Participants answer no were (78.0%) followed by yes were (30.0%). Regarding Serotonergic drugs the majority of the Participants no were (81.0%) followed by Yes were (19.0%), regarding Acute ischemia the majority of the Participants answer no were (71.0%) but yes were (29.0%), regarding posterior reversible encephalopathy syndrome the majority of the Participants No were (91.0%) followed by yes were (9.0%).

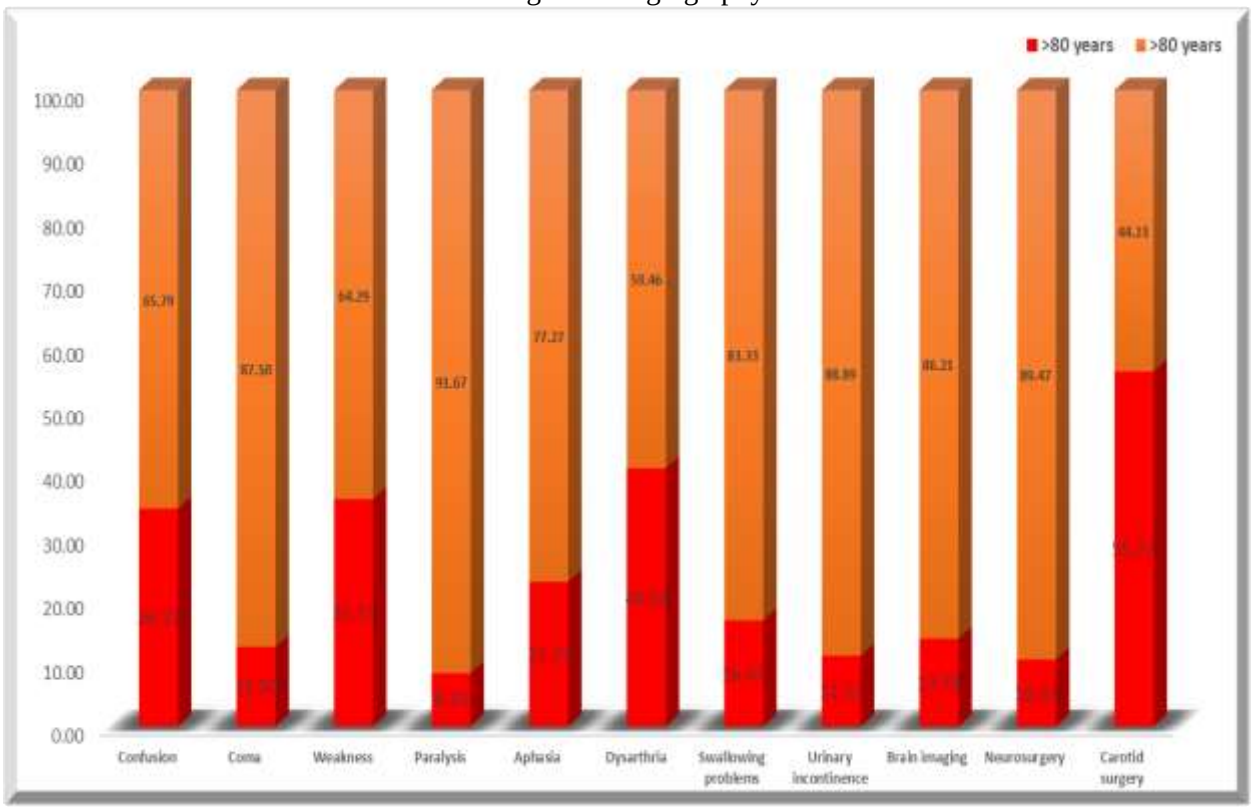
Table(3). Clinical State at Time of Maximum Impairment and cerebral Variations during endovascular diagnostic angiography

	Age Group			**Chi-square**
	< 80 years	**>80 years**	**Total Sample**	

	N	%	N	%	N	%	X^2	P-value
Confusion	13	34.21	25	65.79	38	19	3.789	0.05*
Coma	5	12.50	35	87.50	40	20	22.500	0.000*
Weakness	25	35.71	45	64.29	70	35	5.714	0.017*
Paralysis	2	8.33	22	91.67	24	12	16.667	0.000*
Aphasia	10	22.73	34	77.27	44	22	13.091	0.000*
Dysarthria	30	40.54	44	59.46	74	37	2.649	0.104
Swallowing problems	16	16.67	80	83.33	96	48	42.667	0.000*
Urinary incontinence	4	11.11	32	88.89	36	18	21.778	0.000*
Brain imaging	8	13.79	50	86.21	58	29	30.414	0.000*
Neurosurgery	8	10.53	68	89.47	76	38	47.368	0.000*
Carotid surgery	29	55.77	23	44.23	52	26	0.692	0.405

Table 3 show regarding Clinical State at Time of Maximum Impairment and cerebral Variations during endovascular diagnostic angiography, show regarding the Confusion heave a significant relation between confusion and age while P-value <0.05 and X^2 3.789, the study results show the majority of participant in >80 years were(65.79%) and < 80 years were(34.21%) while total sample were(19.0%), regarding the Coma heave a significant relation between the coma and age while P-value =0.000 and X^2 22.500, the study results show the majority of participant in >80 years were(87.50%) and < 80 years were(12.50%) while total sample were(20.0%), regarding the Weakness heave a significant relation between the Weakness and age while P-value =0.017 and X^2 5.714, the study results show the majority of participant in >80 years were(64.29%) and < 80 years were(35.71%) while total sample were(35.0%), regarding the Paralysis heave a significant relation between the Paralysis and age while P-value =0.000 and X^2 16.667, the study results show the majority of participant in >80 years were(91.67%) and < 80 years were(8.33%) while total sample were(12.0%) , regarding the Aphasia heave a significant relation between the Aphasia and age while P-value =0.000 and X^2 13.091, the study results show the majority of participant in >80 years were(77.27%) and < 80 years were(22.73%) while total sample were(22.0%). Regarding the dysarthria heave no significant relation between the dysarthria and age while P-value =0.104 and X^2 2.649, the study results show the majority of participant in >80 years were(59.46%) and < 80 years were(40.54%) while total sample were(37.0%), regarding the Swallowing problems heave a significant relation between the Swallowing problems a and age while P-value =0.000 and X^2 42.667, the study results show the majority of participant in >80 years were(83.33%) and < 80 years were(16.67%) while total sample were(48.0%), regarding the Urinary incontinence heave a significant relation between the Urinary incontinence and age while P-value =0.000 and X^2 21.778, the study results show the majority of participant in >80 years were(88.89%) and < 80 years were(11.11%) while total sample were(18.0%), regarding the Brain imaging heave a significant relation between the Brain imaging and age while P-value =0.000 and X^2 30.414, the study results show the majority of participant in >80 years were(86.21%) and < 80 years were(13.79%) while total sample were(29.0%), regarding the Neurosurgery heave no significant relation between the Neurosurgery and age while P-value =0.000 and X^2 47.368, the study results show the majority of participant in >80 years were(89.47%) and < 80 years were(10.53%) while total sample were(38.0%), regarding the Carotid surgery heave no significant relation between the Carotid surgery and age while P-value =0.405 and X^2 0.692, the study results show the majority of participant in <80 years were(55.77%) and >80 years were(44.23%) while total sample were(26.0%)

Figure 1. Clinical State at Time of Maximum Impairment and cerebral Variations during endovascular diagnostic angiography



Discussion

In this study, aim to evaluate the prevalence and pattern of cerebral Variations during endovascular diagnostic angiography in Saudi patients in Makkah City, Saudi Arabia in 2022

More number of Prevalence and pattern of cerebral Variations during endovascular diagnostic angiography in Saudi patients recognized due to advances in medical imaging. This includes factors for predicting disease severity, impending hemorrhages, clinical outcomes and potential complications through endovascular diagnostic angiography angiography or conventional cerebral angiography.(30) Zhang et al in 2017 reported that infarction was very common in elderly (40.2%), many patients presented with Suzuki stage 4 or 5 (51.2%), posterior cerebral artery was involved in 22 (25.3%) and postoperative infarction or hemorrhages was 6.9%.(31)

In our study, the age majority of the study groups were in the age more than (80) years were (41.0%) followed by age 40-60 years were(30.0%)but the 60-80 years were (29.0%), regarding the gender many of the respondents were male (58.0 %) while female were (42.0%). Regarding the Marital status, the majority of the respondents had Married were (48.0%) followed by single were (19.0%), Regarding the education status, the majority of the respondents had Illiterate degree were (24.0%) followed by primary were(22.0%), regarding the income The majority of them had an income from below 5000 SR were (37.0%) followed by 5000-10000 SR were (29.0%) (See table 1)

in our study presence of chronic disease, duration of chronic disease , number and type of drugs among the patients show the majority of the study heave who suffer from chronic Hypertension were (63.0%) but acute hypertension were(37.0%). also the study showed regarding the Smoking status most of participant yes smoked were (67.0%) followed by no smoked were (33.0 %). Regarding the Migraine headaches the majority of the Participants no Migraine headaches were (30.0%). Regarding the Peripartum the majority of the Participants answer no were (78.0%) followed by yes were (30.0%). Regarding Serotonergic drugs the majority of the Participants no were (81.0%) followed by Yes were (19.0%), regarding Acute ischemia the majority of the Participants answer no were (71.0%) but yes were (29.0%), regarding posterior reversible encephalopathy syndrome the majority of the Participants No were (91.0%) followed by yes were (9.0%). (See table 2)

Another study Infection is an important cause of pattern of cerebral Variations, although it has become less prominent over the years(22), About 8% of the patients in the VENOST study and 20% of those in a study from India had CVST due to

infection.(18) Further, low-to-middle-income countries have a higher frequency of this etiology, ranging from 18% to 34% of all pattern of cerebral Variations case.(32) In Saudi Arabia, this etiology has been reported to account for 7%–9.9% of pattern of cerebral Variations cases.(33)

Other studies have reported pattern of cerebral Variations during endovascular diagnostic angiography due to malignancy in 2.3%, 4.5%, 7.4%, and 9.9% of the patients.(34,35)

Degrading the Clinical State at Time of Maximum Impairment and cerebral Variations during endovascular diagnostic angiography the most of disease are a significant relation between the disease and age. (See Figure 1)

Conclusion

In conclusion, because the endovascular diagnostic angiography system is extremely helpful for diagnosis and endovascular treatment of cerebral Variations, this system can reduce the number of exposures. In vasculitis of medium sized brain vessels, MRA is not sufficient to reliably diagnose vascular stenoses as vessel wall contrast enhancement is mostly invisible. At present, there is no reliable imaging test to diagnose small vessel vasculitis such as leukocytoclastic vasculitis without brain biopsy.

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