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O001 / #1312

ENDOVASCULAR THROMBECTOMY WITH OR WITHOUT ALTEPLASE FOR LARGE VESSEL OCCLUSION IN ACUTE ISCHEMIC STROKE PATIENTS: A COST-EFFECTIVENESS EVALUATION BASED ON META-ANALYSES

FREE COMMUNICATIONS 01: ENDOVASCULAR THERAPY FOR ACUTE STROKE, ANEURYSMAL

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Background and Aims: The benefit of intravenous thrombolysis with alteplase before endovascular thrombectomy (EVT) for acute ischemic stroke patients due to large vessel occlusion (LVO) remains debated. Several randomized controlled trials (RCTs) failed to demonstrate non-inferiority of EVT alone. In this study, we analyzed the cost-effectiveness of alteplase before EVT versus EVT alone from the Dutch healthcare payer perspective.

Methods: A 10-year Monte Carlo simulation using a decision tree and Markov model was conducted to estimate the total costs, total quality-adjusted life years (QALYs), and incremental net monetary benefit (INMB) of alteplase before EVT compared to EVT alone. Functional outcome of each treatment was derived from pooled results of RCTs. Alteplase followed by EVT was considered cost-effective in case of a positive INMB at a threshold of \$84,000 per QALY gained.

Results: Applying weighted averages of functional outcomes collected from six RCTs, alteplase before EVT implied a 0.02 QALYs loss, while increasing costs by \$236, compared to EVT alone. Restricting the analyses to Western or Dutch patients only, alteplase before EVT yielded a 0.22 QALYs gain also at higher costs (\$5,387 and \$11,572), leading to a positive INMB (\$12,937 and \$6,544), respectively. At a threshold of \$84,000, alteplase before EVT appeared cost-effective in only 2.4% of the simulations for Western and Asian patients together, 98.4% for Western patients, and 64.8% for Dutch patients.

Conclusions: Alteplase before EVT was likely cost-effective in LVO patients in the Netherlands and should remain as the standard treatment strategy.

O002 / #1684

MECHANICAL THROMBECTOMY IN ISCHEMIC STROKE PATIENTS WITHOUT SALVAGEABLE BRAIN TISSUE ON COMPUTED TOMOGRAPHY PERFUSION IMAGING

FREE COMMUNICATIONS 01: ENDOVASCULAR THERAPY FOR ACUTE STROKE, ANEURYSMAL

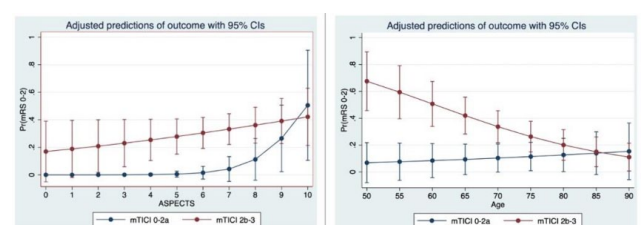
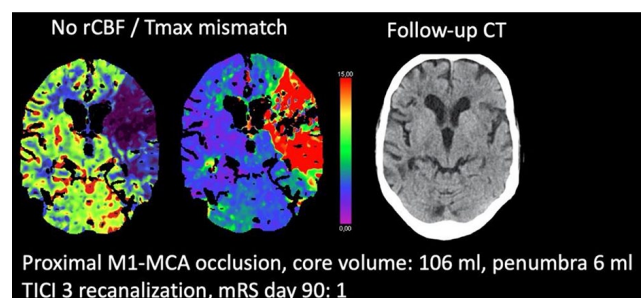
G. Broocks¹, R. McDonough², S. Klapproth¹, G. Schön³, M. Bechstein¹, A. Kemmling⁴, U. Hanning¹, T. Faizy¹, M. Bester¹, J. Fiehler¹, L. Meyer¹

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Background and Aims: Computed tomography perfusion (CTP) is regularly used to guide patient selection for mechanical thrombectomy (MT). However, the effect of MT in patients without salvageable tissue on CTP has not been investigated.

Methods: Observational study analyzing ischemic stroke patients triaged by multimodal-CT undergoing MT. CTP lesion-core mismatch profiles were defined according to the EXTEND criteria. Primary endpoint was the rate of functional independence at 90-days, defined as modified Rankin Scale (mRS) score of 0-2. Recanalization was evaluated with the mTICI scale. The effect of baseline variables on functional outcome was assessed using multivariable logistic regression analysis. Outcomes of patients with and without CTP-mismatch profiles were compared using 1:1 propensity score matching (PSM).

Results: Of 724 patients who met the inclusion criteria, 110 patients (15%) had no CTP-mismatch and were analyzed. Successful recanalization was achieved in 66% (73) and associated with functional independence at 90-days (aOR: 5.92, 95%CI: 1.10-31.79, p=0.04). A significant interaction was observed between recanalization and age as well as the extent of



EP564 / #1268**DEVELOPMENT AND CHARACTERIZATION OF NOVEL NANOPARTICULATE CARRIER FOR ORAL DELIVERY OF LOW MOLECULAR WEIGHT HEPARIN****E-POSTER VIEWING: AS17BASIC SCIENCE AND TRANSLATIONAL RESEARCH****S. Bhargava***Signa College of Pharmacy, Pharmacy, Kanpur, India*

Background and Aims: Objective of present study was to enhance oral bioavailability of an anticoagulant drug by polymeric nanoparticulate carrier system. Low Molecular Weight Heparins(LMWH) are administered by parenteral route & repetitive injections are main disadvantages which demand for an improvement of administration strategy by other non-invasive routes. It can be replaced by oral warfarin for outpatient therapy but has a slow onset & high incidence of drug-drug interaction.

Methods: Chitosan nanoparticles(NPs) were prepared by ionic gelation of chitosan & coated with alginate solution. NPs were characterized for morphology, particle size, polydispersity index, zeta potential, drug loading & entrapment efficiency. In-vitro release & permeation study was performed, in-vivo studies included venous thrombosis model, uptake using fluorescence microscopy & pharmacokinetic studies in rats.

Results: Coating of alginate over NPs improved the release profile of enoxaparin from the nanoparticles for successful oral delivery. In-vitro permeation studies elucidated that more amount of drug permeated across intestinal epithelium due to alginate coating. In-vivo studies show the enoxaparin loaded nanoparticles exhibit better anticoagulant activity during oral administration. The results of the present study indicated that this system is more stable as compared to other system.

Conclusions: Enoxaparin loaded alginate coated chitosan nanoparticulate carrier was prepared & optimized. The prepared system showed enhanced drug stability, improved availability across the intestine reduced thrombus formation in rat venous thrombosis model along with reduced side effects as compared to the drug solution. These results concluded that the designed nanocarriers as possible candidates for improving the absorption of low molecular weight heparin by oral administration.

EP565 / #1887**INTRA-ARTERIAL MESENCHYMAL STEM CELL THERAPY MODULATES SIRTUIN- I MEDIATED INFLAMMASOME SIGNALING TO CONFER NEUROPROTECTION FOLLOWING ISCHEMIC STROKE****E-POSTER VIEWING: AS17BASIC SCIENCE AND TRANSLATIONAL RESEARCH****P. Bhattacharya¹, D. Sarmah¹, A. Datta¹, N. Rana¹, B. Ghosh¹, Y. Dileep²***¹National Institute of Pharmaceutical Education and Research (NIPER), Ahmedabad., Pharmacology And Toxicology, Gandhinagar, India,**²University of Miami, Neurology, Miami, United States of America*

Background and Aims: Studies from our lab have showed that intraarterially (IA) 1×10^5 MSCs post stroke modulate inflammasome signaling. Sirtuin I (SIRT-1) involved in regulating cellular metabolism is reduced following an ischemic episode. The present study aims to decipher the role of IA MSCs in regulating the brain SIRT1 levels and further exploring the involvement of SIRT-1 in regulating inflammasome signaling towards reduction in apoptosis.

Methods: Female Sprague Dawley rats were infused intraarterially with 1×10^5 MSCs at 6 hrs post middle cerebral artery occlusion (MCAo). Following 24 hrs of MCAo, animals were examined for functional and behavioral outcomes. Brains were harvested for molecular studies. Inhibition study with SIRT1 specific inhibitor was also performed.

Results: Improvement in behavioral and motor functional outcomes and reduction in infarct size were observed following IA MSCs post stroke. Increased expression of SIRT1, BDNF and reduction in the expression of inflammatory and apoptotic markers in the brain were observed following IA MSCs administration.

Conclusions: Results from our study provides evidence that IA MSCs therapy post-stroke regulates SIRT1 to modulate inflammasome signaling and cellular apoptosis. Our study reports neuroprotective effects of IA MSCs are mediated by SIRT-1 regulation towards altering inflammasome signaling in rodent model of ischemic stroke..

EP566 / #1174**USING IMMUNOMODULATORY CANNABINOIDS FOR NEUROPROTECTION AND SUBSEQUENT IMPROVEMENT OF IMMUNE DYSREGULATION FOLLOWING STROKE****E-POSTER VIEWING: AS17BASIC SCIENCE AND TRANSLATIONAL RESEARCH****B. Bietar***Dalhousie University, Pharmacology, Halifax, Canada*

Background and Aims: Central nervous system (CNS) injuries, such as stroke or traumatic brain injury, trigger local inflammation leading to neuroinflammation. Compensatory anti-inflammatory pathways are activated to limit secondary damage, but the release of immunosuppressive neuromodulators can cause system-wide immune dysregulation (CNS injury-induced immune-depression syndrome - CIDS). This study aims to investigate CIDS using intravital microscopy (IVM) and treat it with synthetic cannabinoid type 2 receptor (CB2R) agonist, HU308.

Methods: The photothrombotic stroke (PTS) model in C57BL/6 mice was used to study peripheral immunity after lipopolysaccharide (LPS) challenge. Leukocyte activation and capillary perfusion in intestinal microcirculation were assessed using IVM. Lymphocyte subpopulations were analyzed using flow cytometry, and stroke volume was measured via brain TTC staining. HU308 or vehicle treatment was administered before PTS induction.

Results: Stroke weakened the immune response to LPS and increased immunosuppressive regulatory T-cells by 20%. PTS significantly reduced adhering leukocytes in submucosal venules of the terminal ileum in LPS-challenged mice compared to normal mice and affected leukocyte rolling. Post-stroke, mucosal functional capillary density (FCD) decreased. CB2R agonist HU-308 treatment reduced stroke size and restored normal immune response to LPS challenge.

Conclusions: The results indicate that PTS with subsequent LPS challenge is a suitable model for studying CIDS using intestinal microcirculation intravital microscopy. CB2R modulation with HU-308 improved immune response following stroke in a mouse model. These findings suggest that the ECS and CB2R offer novel pharmacological targets with the potential to revolutionize stroke treatment and enhance patient outcomes.

EP567 / #2086**AN ANALYSIS OF AORTIC ARCH BRANCH VARIATIONS BASED ON CEREBRAL ANGIOGRAPHY: A ONE-YEAR RETROSPECTIVE STUDY IN MAKASSAR, INDONESIA****E-POSTER VIEWING: AS17BASIC SCIENCE AND TRANSLATIONAL RESEARCH****A. Bintang^{1,2}, A. Bahar¹, G. Soraya^{2,3}***¹Dr.Wahidin Sudirohusodo General Hospital, Brain Centre, Makassar, Indonesia, ²Faculty of Medicine Hasanuddin University, Department Of*

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Background and Aims: The aortic arch (AA) is the main provider of blood supply to the head, neck, and upper limbs, with anatomic variations typically occurring as it travels through the thorax and give off branches. Characterization of anatomic variations is crucial as it can directly impact outcomes of endovascular procedures. This study aimed to analyze anatomic variations of the AA using cerebral angiography in the period of 1 year.

Methods: A retrospective study was performed to collect data from patients that underwent cerebral angiography in Dr. Wahidin Sudirohusodo General Hospital Makassar, from January 2022 until January 2023.

Results: A total of 232 patients were recruited. Normal vascular AA pattern was observed in 220 (94.82%) patients. Variations of the AA branch were found in the remaining 12 (5.18%) patients. We found three cases (1.29%) of Bovine arch, five cases (2.15%) of left vertebral arising directly from aortic arch, and three cases (1.29%) of aberrant right subclavian artery. One variation did not fall into the previously defined classification; the first branch was a bicarotid trunk which divided into right common carotid artery and left common carotid artery, followed by the right and then left subclavian artery.

Conclusions: A majority of patients displayed a normal vascular aortic arch pattern. The most common variation in our population was the Left Vertebral Artery arising directly from the aortic arch, followed by the Bovine Arch and Aberrant Right Subclavian Artery variations. One case in our population did not fall into previously defined categories.

EP568 / #1504

ROLE OF PAI-1 IN THE DEVELOPMENT OF INTRACRANIAL HEMORRHAGES IN CKD RATS

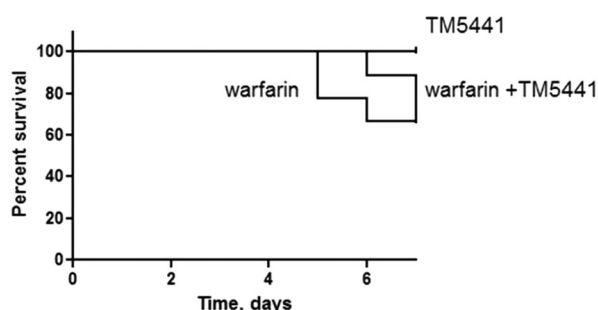
E-POSTER VIEWING: AS17BASIC SCIENCE AND TRANSLATIONAL RESEARCH

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Background and Aims: Anticoagulation therapy in humans is complicated by intracranial hemorrhages, especially in people with chronic kidney diseases (CKD). Vitamin K antagonists, such as warfarin, widely used in the clinical practice. Plasminogen activator inhibitor-1 (PAI-1) was shown to play a significant role in the maintenance of the blood-brain integrity. The aim of the current study was to investigate the role of PAI-1 in the pathogenesis of intracranial hemorrhage development.

Methods: CKD was developed in rats by 5/6 nephrectomy. Animal were treated at 3 weeks after the ablative surgery for 7 days with 0.75 mg/kg/day warfarin with or without PAI-1 inhibitor TM5441 (10 mg/kg/day) per os. Mortality was recorded, autopsy was performed to evaluate for the cause of death.



Results: Treatment with warfarin alone resulted in 34% mortality by day 7 after the beginning of therapy. The cause of death was intraperitoneal hemorrhage. None of these rats developed intracranial hemorrhage. Combined treatment with warfarin and TM5441 did not change the mortality by day 7, but all expired animals had cerebral hemorrhage in addition to intraperitoneal bleeding. All animal treated with TM5441 alone survived by day 7, but in 30% of those there was petechial cerebral hemorrhage on autopsy (Fig 1).

Conclusions: Blockade of PAI-1 by TM5441 results in the development of cerebral hemorrhage in rats. Even though the mortality rate is not increased at the short observational period, such hemorrhages may have result in long-term neurological complications. Our data indicate the role of PAI-1 in the development of cerebral hemorrhages.

EP569 / #2542

BB-031 RECANALIZES MCAO AND REDUCES INFLAMMATION IN CANINE MODEL OF LVO STROKE

E-POSTER VIEWING: AS17BASIC SCIENCE AND TRANSLATIONAL RESEARCH

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Background and Aims: Acute ischemic stroke (AIS) is the leading cause of long term disability. rtPA treatment of AIS results in intracranial hemorrhage (ICH) in 7% of patients with 40% mortality. Increased matrix metalloproteinase-9 (MMP-9) correlates with ICH, while reduced levels maintain integrity of the blood brain barrier (BBB), preventing ICH. Von Willebrand Factor (VWF) induces both thrombosis and inflammation in large vessel occlusion (LVO) stroke. BB-031 targets VWF, and lyses thrombotic occlusion. BB-025 reverses BB-031. We hypothesize BB-031 will inhibit VWF, recanalize LVO, and reduce inflammation in canine LVO stroke.

Methods: After 6 hours of autologous canine MCAO, animals were treated with vehicle, BB-031, and BB-031 + BB-025. VWF inhibition, TIC1 scores, and plasma inflammatory markers [VWF, interleukin-1 (IL-1b), interleukin-6 (IL-6), tumor necrosis factor- α (TNF- α), and matrix metalloproteinase-9 (MMP-9)] were analyzed over the course of the study.

Results: Within 15 minutes of vehicle treatment, VWF increased by $3.102 \pm .382$ ng/ml (n=6) whereas BB-031 reduced VWF by $0.223 \pm .154$ ng/ml ($p < 0.05$) (n=8). BB-031-treated animals had TIC1 > 2B in 62.5% of the animals. Although IL-1b and IL-6 were unchanged, and TNF- α was not detectable, MMP-9 levels were lower in BB-031-treated animals at sacrifice compared to both vehicle and BB-031 + BB-025 ($p < 0.0001$).

Conclusions: BB-031 treatment inhibited VWF, increased reperfusion, and reduced MMP-9 after canine MCAO, suggesting that in addition to recanalization, inhibiting VWF mitigates inflammation and iatrogenic ICH.

EP570 / #1216

DIFFERENCES IN NEURONAL DEATH, REACTIVE ASTROGLIOSIS, AND BBB LEAKAGE BETWEEN GERBIL STRIATA FOLLOWING MILD AND SEVERE TRANSIENT FOREBRAIN ISCHEMIA

E-POSTER VIEWING: AS17BASIC SCIENCE AND TRANSLATIONAL RESEARCH

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AN ANALYSIS OF AORTIC ARCH BRANCH VARIATIONS BASED ON CEREBRAL ANGIOGRAPHY: A ONE-YEAR RETROSPECTIVE STUDY IN MAKASSAR, INDONESIA

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ABSTRACT

Background and Aim

The aortic arch (AA) is the main provider of blood supply to the head, neck, and upper limbs, with anatomic variations typically occurring as it travels through the thorax and give off branches. Characterization of anatomic variations is crucial as it can directly impact outcomes of endovascular procedures. This study aimed to analyze anatomic variations of the AA using cerebral angiography in the period of 1 year.

Methods

A retrospective study was performed to collect data from patients that underwent cerebral angiography in Dr. Wahidin Sudirohusodo General Hospital Makassar, from January 2022 until January 2023.

Results

A total of 232 patients were recruited. Normal vascular AA pattern was observed in 220 (94.82%) patients. Variations of the AA branch were found in the remaining 12 (5.18%) patients. We found three cases (1.29%) of Bovine arch, five cases (2.15%) of left vertebral arising directly from aortic arch, and three cases (1.29%) of aberrant right subclavian artery. One variation did not fall into the previously defined classification; the first branch was a bicarotid trunk which divided into right common carotid artery and left common carotid artery, followed by the right and then left subclavian artery.

Conclusion

A majority of patients displayed a normal vascular aortic arch pattern. The most common variation in our population was the Left Vertebral Artery arising directly from the aortic arch, followed by the Bovine Arch and Abberant Right Subclavian Artery variations. One case in our population did not fall into previously defined categories.

Keywords: aortic arch; anatomic variations; digital subtraction angiography; bovine arch; aberrant right subclavian artery

INTRODUCTION

Endovascular approaches have become common for the management of acute ischemic stroke, especially large vessel occlusions (LVO). Endovascular access to the site of occlusion can be achieved within minutes via inguinal puncture and aortic arch catheterization in most cases. The presence of aortic arch variants (AAV) such as the bovine arch can prolong the procedure time in endovascular stroke therapy, and may even result in failure of the procedure. To anticipate possible difficulties during catheterization, it is very important to know the prevalence of these variants in stroke patients⁽¹⁾.

The aortic arch (AA) is the main provider of blood supply to the head, neck, and upper limbs, with anatomic variations typically occurring as it travels through the thorax and give off branches. Variations or anomalies can occur, although most remain undiagnosed and is first discovered during endovascular procedures⁽²⁾. The aortic arch (AA) is a direct branch of the ascending aorta and has various variations in its branching pattern. It is located between the ascending and descending aorta and it has unique anatomical and functional significance^(3,4).

Generally AA develops from the aortic sac, left dorsal aorta and left fourth AA branch, with the formation of its main branches during the fifth and sixth weeks of gestation. The normal branching pattern found consists of three main branches, from right to left, namely the brachiocephalic trunk (BT), which then branches into the right subclavian artery (RS) and right common carotid artery (RCC), followed by the left common carotid artery (LCC). and finally the left subclavian artery (LS)⁽³⁾.

Although many AA variations are asymptomatic, they have the potential to produce poor outcomes during vascular angiography and thoracic surgical procedures. Therefore, to reduce complications and improve outcomes, many types of angiographic catheters were introduced to suit different AA branching patterns. In addition, a suitable catheter should be selected taking into account the vascular anatomy of the index area⁽⁴⁾. It is also important to note incidental injury of an undiagnosed LVA arising from the aortic arch during surgery or an endovascular procedure may result in hemorrhagic or permanent neurologic complications⁽⁵⁾. Hence, this study aimed to analyze anatomic variations of the AA using cerebral angiography in the period of 1 year in our centre.

METHODS

This was a retrospective study on patients who underwent a digital subtraction angiography (DSA) procedure in the Neurology Department of RSUP DR. Wahidin Sudirohusodo Makassar during the period of January 2022– January 2023.

RESULTS

A total of 232 patients were recruited. Normal vascular AA pattern was observed in 220 (94.82%) patients, with a median age of 45 years, where the youngest was 6 years and the oldest was 77 years. Variations of the AA branch were found in the remaining 12 (5.18%) patients. We found three cases (1.29%) of Bovine arch, five cases (2.15%) of left vertebral arising directly from aortic arch, and three cases (1.29%) of aberrant right subclavian artery (ARSA). One variation did not fall into the previously defined classification; the first branch was a bicarotid trunk which divided into right common carotid artery and left common carotid artery, followed by the right and then left subclavian artery. The patients undergoing the DSA procedure were cerebral infarction in 74 cases (31.89%), carotid/cerebral artery aneurysm in 29 cases (1.25%), cerebral venous sinus thrombosis (CVT) in 22 cases (0.94%), and arteriovenous malformation (AVM) and vascular headache each in 19 (0.81%) cases, as shown in **Table 1**.

Table 1. Sample Characteristics

	Aortic Arch Variation					Total
	Normal	Bovine	LVA from AA	Abberant RS	Bicarotid trunk	
	220 (94,8%)	3 (1,29%)	5 (2,15%)	3 (1,29%)	1 (0,43%)	232 (100%)
Median age	45 (6-77)	54 (32-62)	44 (49-54)	26(22-65)	9	45 (6-77)
Gender, n(%)						
Male	117 (53,18)	0 (0%)	4 (80%)	1 (33,33%)	1 (100%)	123 (53,01%)
Female	103 (46,81)	3 (100%)	1 (20%)	2 (66,66%)	0 (0%)	109 (46,98%)
Diagnosis, n(%)						
Intracerebral Hemorrhage	14					14 (0,6%)
Arteriovenous Malformation	19					19 (0,81%)
Cerebral Infarction	67	1	4	2		74 (0,31%)
Nasopharyngeal Angiofibroma	13			1		14 (0,6%)
<i>Carotid cavernous fistula</i>	11					11 (0,47%)
Focal brain damage	1					1 (0,04%)
Intracranial Hemangioma	2					2 (0,08%)
<i>Vascular Headache</i>	18				1	19 (0,81%)
Arteriovenous fistula	6					6 (0,25)
Occlusion and stenosis of the carotid artery	11					11 (0,47%)
Multiple cranial nerve palsy	1					1 (0,04%)
Carotid artery aneurysm	12	1				13 (0,56%)
Cerebral artery aneurysm	16					16 (0,68%)
Moyamoya disease	4					4 (0,17%)

Cerebral venous thrombosis	20	1	1			22 (0,94%)
Glomus jugular	1					1 (0,04%)
Central vertigo	2					2 (0,08%)
Tumor of the orbita	1					1 (0,04%)
External carotid artery trauma	1					1 (0,04%)

DISCUSSION

Development of the branchial apparatus begins during the second week of pregnancy and is completed by the seventh week. The apparatus consists of 6 branchial arches, numbered 1 to 6 from cranial to caudal. Each branchial arch connects the paired dorsal and ventral aorta^(6,7). The most common branching pattern, known as the normal arch, consists of the right brachiocephalic artery, left common carotid, and left subclavian arteries from right to left. In a systematic review and meta-analysis of 51 articles (n=23,882) by Popieluszczo et al (2017), the prevalence of normal arches was 80.9%⁽⁸⁾. In our study of 232 patients, normal arches were found in 220 (94.8%) patients.

Although most anatomical variations in AA have no physiological consequences, they may increase the risk of complications during endovascular procedures. Another example can be seen during endovascular graft replacement procedures, where lack of information about the aortic vasculature can lead to leakage and ischemic damage to the brain and extremities^(3,9). A summary of previously described anatomical variations in our study can be seen in **Figure 1**.

The bovine type arch classically refers to the same branch of the right brachiocephalic trunk and left common carotid artery. From our study, bovine type arch was found in 3 (1.29%) cases, while in other studies the prevalence ranged from 0% to 33%. Bovine arches have been reported to make carotid stent placement more difficult and risky, depending on the approach. Stenting via the femoral approach can be difficult as a result of the narrow loop involving the brachiocephalic trunk and left common carotid artery. Therefore, patients identified as having a bovine arch can be treated with a brachial approach, a radial approach or a new transcarotid artery revascularization procedure approach^(3,9).

The LVA is the most frequently found secondary artery that branches directly from the aortic arch, with prevalence in the literature ranging from 0% to 15.4%. In our study this variation was found in 5 (2.15%) cases. This variety has also been noted to be more susceptible to certain pathological processes and surgical complications. In general, no symptoms can be observed in patients, but it can cause complications during surgical procedures and can worsen symptoms in patients with other pre-existing conditions. For example, patients with LV

variants may have an increased risk of vertebral artery dissection compared with other patients, because the LV artery has a longer course. Moreover, in patients with this variant, the LV arteries are usually not detected and misdiagnosed as occlusion, leading to unnecessary medical treatment^(3,9).

In this study, three (1.29%) ARSA cases were found. The overall incidence of ARSA is 0.7%, with the lowest incidence found in the South American population (0.2%), and the highest incidence in the African population (1.4%). ARSA is formed by the distal part of the right dorsal aorta and the right seventh intersegmental artery. Because the trunk originates from the right dorsal aorta, ARSA must cross the midline to reach the right arm. Thus, a retro-tracheal or retro-esophageal route is needed, or very rarely passes anterior to the trachea⁽⁶⁾.

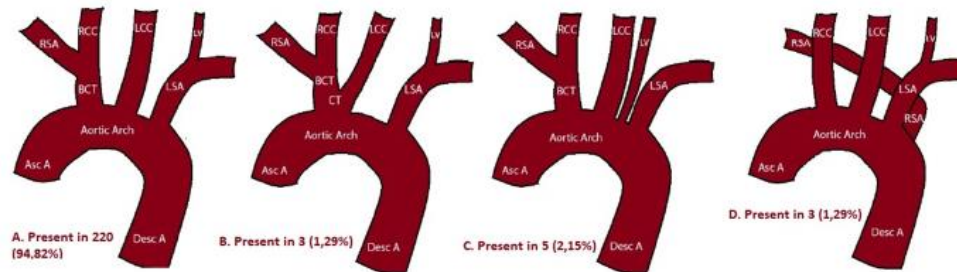


Figure 1. Variations of the aortic arch branch in our population. AscA/DescA: ascending/descending aorta, BCT: bi-carotid trunk, RCC/LCC: right/left common carotid, RSA/LSA: right/left subclavian artery, LV: left vertebral artery

There was one (0.43%) case with arch variation that did not fall into the classification of previously reported variations. In this case, the anatomical variations are with the first branch being the bicarotid trunk (right common carotid artery (RCCA) and left common carotid artery (LCCA) originating from one trunk), followed by the second branch of the right subclavian artery, and the third branch of the left subclavian artery. This novel variation can be seen in the cerebral angiography result and an illustrated rendition in **Figure 2**.

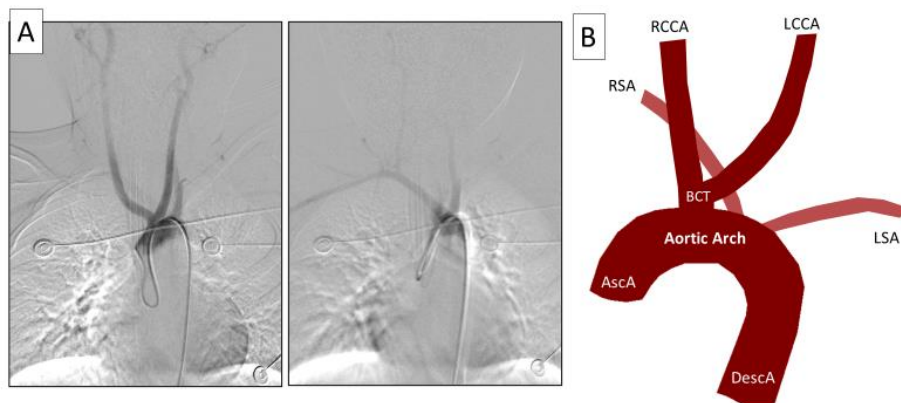


Figure 2. A variation was found that did not fall into previous classifications. (A) Cerebral angiography image of the variation showing the first branch as a bi-carotid trunk branching into the right and left common carotid, the second and third branches being the right and left subclavian arteries respectively. (B) Illustrated rendition of the variation.

CONCLUSION

In conclusion, the main significance of the AA anomaly is the potential for complications during endovascular procedures, as most of the variants are clinically undetectable and under diagnosed. While many aortic arch variants are discovered clinically or on imaging, interventional practitioners are sometimes confronted with previously unidentified anatomic variants of the arch in the catheterization setting.

ETHICS

This study has passed the ethical review of the Health Research Ethics Committee, Faculty of Medicine, Hasanuddin University, Makassar number 475/UN4.6.8/PT.01.04/2022.

DECLARATIONS

The author hereby declares that this study has no funding from other parties or conflicts of interest in this research.

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AN ANALYSIS OF AORTIC ARCH BRANCH VARIATIONS BASED ON CEREBRAL ANGIOGRAPHY: A ONE-YEAR RETROSPECTIVE STUDY IN MAKASSAR, INDONESIA

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Background and Aim

- The aortic arch (AA) is the main provider of blood supply to the head, neck, and upper limbs.
- Anatomic variations typically occur as it travels through the thorax and branches off, and may directly impact endovascular procedure outcomes.
- Study aim:** analyse anatomical variations of the AA using cerebral angiography in the period of 1 year.

Methods

Retrospective study on patients that underwent cerebral angiography at Dr. Wahidin Sudirohusodo General Hospital, Makassar, from January 2022 until January 2023.

Results

- A total of 232 patients were recruited; normal vascular AA pattern observed in 220 (94.82%) patients.
- Variations of the AA branch were found in the remaining 12 (5.18%) patients: 3 cases (1.29%) of bovine arch, 3 cases (2.15%) of left vertebral arising directly from aortic arch, and 3 cases (1.29%) of aberrant right subclavian artery.
- One variation did not fall into the previously defined classification, the first branch was a bi-carotid trunk which divided into right common carotid artery and left common carotid artery, followed by the right and then left subclavian artery.

Figure 1: Variations of the aortic arch branch in our population. A: Descending aorta, B: C1, B-carotid trunk, BCD/CCO right/left common carotid, BVC/LCA, I-right/left subclavian artery, L: left vertebral artery.

Figure 2: A variation was found that did not fall into previous classification. A: Cerebral angiography image of the aortic arch showing the first branch was a bi-carotid trunk branching into right and left common carotid, the second and third branches being the right and left subclavian arteries, respectively. B: Right and emission of the bi-carotid.

Conclusion

Most patients displayed a normal vascular aortic arch pattern. The most common variation in our population was the Left Vertebral Artery arising directly from the aortic arch, followed by the Bovine Arch and Aberrant Right Subclavian Artery variations. One case did not fall into pre-defined categories.

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