Perianeurysmal vasogenic edema

Introduction

Perianeurysmal vasogenic edema (PAVO) refers to a specific medical condition that can occur in relation to intracranial aneurysm

Perianeurysmal: This part of the term indicates that the condition is located around or adjacent to an aneurysm, which is a weakened or ballooned area in a blood vessel, typically an artery, that can pose a risk of rupture.

Vasogenic: “Vasogenic” pertains to changes in the permeability of blood vessel walls. In the context of PAVO, it suggests that there is an alteration in the permeability of blood vessels near or around the aneurysm, leading to fluid accumulation in the surrounding tissues.

Edema: Edema is the medical term for swelling, typically due to the accumulation of excess fluid in the body's tissues. In PAVO, it means that there is swelling in the tissue around the aneurysm, which is believed to result from changes in the blood vessels' permeability.

Clinical features

PAVO is a relatively rare complication associated with intracranial aneurysms and can be a serious medical condition. It may cause symptoms such as headaches, neurological deficits, or other problems, depending on the location and severity of the edema.

Diagnosis

The diagnosis of perianeurysmal vasogenic edema (PAVO) typically involves a combination of clinical evaluation, medical imaging, and sometimes additional diagnostic tests. Here are the key steps involved in diagnosing PAVO:

Clinical Assessment:

Patients with PAVO may present with various symptoms, including headaches, neurological deficits, or other focal neurological symptoms. A thorough clinical evaluation by a neurologist or neurosurgeon is essential to assess the patient's medical history and symptoms.

Imaging Studies:

Neuroimaging plays a crucial role in diagnosing PAVO. Several imaging modalities are commonly used:

Magnetic Resonance Imaging (MRI): MRI is often the preferred imaging method for PAVO diagnosis. It provides detailed images of the brain and surrounding structures, allowing for the visualization of the

aneurysm, the extent of edema, and any associated thrombosis. Specific MRI sequences, such as vessel-wall imaging, can provide insights into aneurysm walls and inflammatory changes.

Computed Tomography (CT) Scan: CT scans can also be used to visualize the aneurysm and surrounding tissues. While MRI is often more sensitive for detecting edema, CT scans can provide valuable information, especially in emergency situations. Cerebral Angiography: In some cases, cerebral angiography, which involves injecting a contrast dye into blood vessels, may be performed to visualize the anatomy of the blood vessels and the aneurysm in greater detail.

Evaluation of Edema and Thrombosis:

The imaging studies will also assess the extent of vasogenic edema surrounding the aneurysm and the presence of thrombosis within the aneurysmal sac and walls. These findings help confirm the diagnosis of PAVO and guide treatment decisions.

Treatment

Treatment options may include conservative management, anti-inflammatory medications, endovascular procedures (such as coiling or stenting), or surgical interventions (such as clipping or bypass surgery), depending on the specific characteristics of the aneurysm and the patient's condition.

Literature review

Mensah et al. describe possible risk factors, underlying mechanisms, and management of PAVO through published case reports. Developing a priori protocol according to PRISMA guidelines, they searched MEDLINE/PubMed, Embase, and Web of Science to identify case studies and reports of adult patients with intracranial aneurysms who developed perianeurysmal edema following coil embolization therapy. Data extracted from these studies included patient demographics, aneurysm characteristics, coil type, PAVO characteristics, treatment, and outcomes. Quality was assessed using a standardized tool. 21 eligible studies of acceptable quality were identified, comprising 40 unique cases from 9 countries. The mean patient age was 56.4 years and 25 (62.5%) were female. Aneurysm size ranged from 6 to 30 mm, with a mean size of 15.2 mm; only 6 (15%) of cases were giant intracranial aneurysms (≥ 25 mm). The more frequent locations of intracranial aneurysms associated with PAVO were the ICA (50%) and posterior circulation (32.5%), with 7.5% and 10% of cases occurring in MCA and anterior circulation, respectively. 16 cases (40%) were treated with bare platinum coils, and 14 (35%) with a combination of BPCs and bioactive coils; in 10 cases (25%), the coil type was not mentioned. PAVO presented between 0 days and 8 years of coil embolization, with 23 (57.5% cases) presenting symptomatically in relation to the brain region affected. Management strategies for PAVO included conservative, steroids, re-embolization, clipping, stenting, and parent artery occlusion either as monotherapy or as combination therapy. Of reported studies, 26 treated cases (65%) were resolved, with 8 (20%) remaining stable, and 4 (10%) deteriorating. PAVO can be associated with small or large intracranial aneurysms, bare and bioactive platinum coils, and all regions of the intracranial circulation. The understanding of the risk factors of this complication lies in the underlying mechanisms, which will ultimately guide appropriate patient follow-up and subsequent optimal management. [1)].

The title “Risk factors for perianeurysmal vasogenic oedema (PAVO) following embolization therapy: literature review” is informative and appropriate for the content of the abstract. It accurately conveys the main focus of the study, which is to explore the risk factors associated with PAVO following coil embolization therapy for intracranial aneurysms through a literature review.

The title clearly indicates that the study is a literature review and specifies the topic of interest (risk factors for PAVO). It also includes the relevant terminology, “embolization therapy,” which helps readers understand the context of the research. Overall, the title effectively summarizes the primary objective of the study and would likely help readers identify its relevance to their interests.

Additionally, the abstract provides details about the methodology used in the literature review, including the development of a protocol according to PRISMA guidelines and the search strategy in databases like MEDLINE/PubMed, Embase, and Web of Science to identify case studies and reports.

Case reports

Onofrj et al. report 3 cases of cerebral aneurysms associated with peri-aneurysmal edema (PE). They describe 2 cases of giant partially thrombosed aneurysms surrounded by vasogenic edema with apposition of an intramural and juxtamural thrombus. The third case is a smaller aneurysm inciting vasogenic edema several years after coil embolization. Vessel-wall magnetic resonance imaging (MRI) showed avid wall enhancement and an enhancing thrombus embedded within the coils, reflecting inflammation of the aneurysm wall and proliferation of the vasa vasorum. Thrombosis within the aneurysmal sac and walls, both in native and treated aneurysms, may promote inflammatory changes and sustain the occurrence of PE. Vessel-wall MRI has a potential role in the evaluation process of this subgroup of aneurysms [2)]

The report conveys the primary focus of the research, which is to investigate the role of thrombosis in the development of peri-aneurysmal edema (PE) in both native and treated aneurysms.

Latest Pubmed Articles

- Perianeurysmal vasogenic oedema (PAVO): A single centre 10-year retrospective review
- Risk factors for perianeurysmal vasogenic oedema (pavo) following embolization therapy: literature review
- Peri-Aneurysmal Brain Edema in Native and Treated Aneurysms: The Role of Thrombosis
- Perianeurysmal vasogenic oedema (PAVO) following aneurysm embolisation: a unique case of asymptomatic long-term progression and review of the literature
- Perianeurysmal brain inflammation after flow-diversion treatment
- Minimally conscious state after ruptured giant basilar aneurysm
- Progressive perianeurysmal edema induced after endovascular coil embolization. Report of three cases and review of the literature

Test and Answers

Question 1: What does “PAVO” stand for? A) Peripheral Aneurysm Vascular Occlusion B) Perianeurysmal Vasogenic Edema C) Post-Aneurysm Vascular Obstruction D) Paravascular Aneurysm

Oedema

Question 2: Which part of the term “Perianeurysmal” indicates that the condition is located around or adjacent to an aneurysm? A) Peri- B) Aneurysmal C) Vasogenic D) Edema

Question 3: In the context of PAVO, what does “Vasogenic” refer to? A) Accumulation of excess fluid in tissues B) Changes in blood vessel permeability C) The size of the aneurysm D) Blood clot formation

Question 4: What is “Edema” in the context of PAVO? A) The medical term for swelling due to fluid accumulation B) The name of an aneurysm treatment procedure C) A type of blood clot D) The name of a blood vessel

Question 5: What symptoms can PAVO cause? A) Joint pain B) Respiratory problems C) Headaches, neurological deficits, or other issues D) Gastrointestinal issues

Question 6: Which imaging modality is often the preferred choice for diagnosing PAVO? A) X-ray B) Ultrasound C) Magnetic Resonance Imaging (MRI) D) Electrocardiogram (ECG)

Question 7: What is the primary focus of the study by Mensah et al.? A) Investigating treatment options for PAVO B) Identifying the demographics of patients with PAVO C) Exploring the risk factors associated with PAVO through a literature review D) Developing a new surgical procedure for PAVO

Question 8: What is the potential role of vessel-wall MRI in the evaluation process of PAVO? A) To identify patients with PAVO B) To treat PAVO C) To visualize aneurysms and surrounding tissues D) To assess the patient's medical history

Question 9: What is the primary focus of the report by Onofrj et al.? A) Investigating the demographics of patients with PAVO B) Identifying the risk factors associated with PAVO C) Exploring the treatment options for PAVO D) Developing a new imaging technique for PAVO

Question 10: What is the role of thrombosis in the development of PAVO, as described by Onofrj et al.? A) Thrombosis has no role in PAVO. B) Thrombosis promotes inflammation of the aneurysm wall and may sustain the occurrence of PAVO. C) Thrombosis is the primary cause of PAVO. D) Thrombosis prevents the occurrence of PAVO.

Answers:

B) Perianeurysmal Vasogenic Edema A) Peri- B) Changes in blood vessel permeability A) The medical term for swelling due to fluid accumulation C) Headaches, neurological deficits, or other issues C) Magnetic Resonance Imaging (MRI) C) Exploring the risk factors associated with PAVO through a literature review D) To assess the patient's medical history B) Identifying the risk factors associated with PAVO B) Thrombosis promotes inflammation of the aneurysm wall and may sustain the occurrence of PAVO.

1)
Mensah EO, Abusellie AR, Pringle C, Emsley H, Alalade AF, Roberts GA. Risk factors for perianeurysmal vasogenic oedema (pavo) following embolization therapy: literature review. Neurosurg Rev. 2023 Oct 9;46(1):266. doi: 10.1007/s10143-023-02168-0. PMID: 37806987.
2)
Onofrj V, Tampieri D, Cianfoni A, Ventura E. Peri-Aneurysmal Brain Edema in Native and Treated Aneurysms: The Role of Thrombosis. Neurointervention. 2021 Mar;16(1):70-77. doi: 10.5469/neuroint.2020.00255. Epub 2020 Dec 3. Erratum in: Neurointervention. 2021 Nov;16(3):303. PMID: 33264834; PMCID: PMC7946551.