Journal of Positive Psychology & Wellbeing
2022, Vol. 6, No. 3, 497-501

http://journalppw.com
ISSN 2587-0130

Screening for cerebral vasculitis, role of physicians, nursing, pharmacists and clinical labratory

Dafer Abdullah Alshehri[1], Hassan Saed Atallah Alrashdi[2],Mohammed Hassan Mohammed Albarakati [2], Fahad Abdulaziz Alabduljabbar[3],Yosef Mohammed Monajed[4], Saleh Ahmed Mayed Alzahrani[5],Ali Ayed Al Junaid[6], Mohammed Jaber Alqurashi[7], Ali Mohammad Abkar Hattan[8],Abdullah Naji Alotaibi[7],Salman Salem Algethami[7] ,Mohammad Salem Alzahrani[9], Hani Fahad Alamri[10], Waleed Hassan Sahli[11], Saqer Aziz N Alanzi[12]

[1]family Medicine Resident Aseer
[2]general Physician, Ibn Sina Hospital
[3]resident Physician of Family Medicine, Alnuzha Phc
[4]general Practitioner, King Salman Hospital In Riyadh
[5]pharmacist - Qilwah General Hospital Al Baha, Saudi Arabia
[6]laboratory Technician, Regional Laboratory in Riyadh - Department Of Chemistry
[7]nursing Specialist, Irada And Mental Health Complex In Jeddah
[8]nurse Technician, Irada and Mental Health Complex In Jeddah
[9]qilwah General Hospital, Technician Pharmacy
[10]nursing technician, Eradah Complex For Mental Health And Addiction In Jeddah
[11]pharmacy technician, King Abdulaziz Hospital In Jeddah
[12]laboratory Technician, Alnadheem North Primary Healthcare Center

Abstract

Vasculitides are distinguished by the presence of inflammation and necrosis in the wall of blood vessels. Giant-cell arteritis primarily affects large vessels such as the aorta, while classic polyarteritis nodosa primarily affects medium-sized arteries. The small-vessel vasculitides are classified into two groups: those with antineutrophil cytoplasm antibodies (ANCA) and those without. Primary angiitis of the central nervous system (PACNS) is an uncommon condition that impacts medium and small-sized blood vessels. The primary manifestations of cerebral vasculitis include stroke, headache, and encephalopathy. The diagnosis relies on laboratory and imaging results. Systemic vasculitis can lead to cerebral affection, which is characterized by an acute inflammatory response. This response is accompanied by elevated erythrocyte sedimentation rate and higher levels of C-reactive protein. In numerous cerebral vasculitides, such as primary angiitis of the central nervous system (PACNS), cerebrospinal fluid (CSF) analysis shows evidence of inflammation. Therefore, every healthcare provider such as, physcians, nursing, pharmacist and clinical laboratory have a crucial role in the screening and management of cerebral vasculitis.

Keywords: *antineutrophil cytoplasm antibodies (ANCA), Primary angiitis of the central nervous system (PACNS), cerebrospinal fluid (CSF)*

Introduction

Central nervous system (CNS) vasculitis was initially identified as a separate condition in the 1950s, first by Newman and Wolf, and later by Cravioto and Feigin. It remains a complex and difficult clinical condition. An accurate diagnosis is crucial for successful therapy and necessitates a comprehensive review by a multidisciplinary team, including clinical, laboratory, and imaging assessments. Recent systematic longitudinal research have enhanced our comprehension of primary angiitis of the central nervous system (PACNS). To clarify, this review will utilize the term PACNS instead of the phrase primary CNS vasculitis, even though both words have been used in the literature [1]. It is crucial to differentiate primary angiitis of the central nervous system (PACNS) from secondary causes of vasculitis, as well as other inflammatory and infectious conditions, in order to properly guide treatment. This review will provide current information on the diagnostic and therapeutic approach for patients who are believed to have primary and secondary CNS vasculitis.

The appearance of CNS vasculitis can vary, ranging from acute to insidious. However, there are no unique clinical manifestations that are exclusive to CNS vasculitis. A significant number of individuals with CNS vasculitis experience the symptom of headache [2]. A patient with CNS vasculitis rarely presents with a history of a "thunderclap headache". If such a history is reported, it should raise suspicion of a condition known as reversible cerebral vasoconstriction syndrome (RCVS), which is a common mimic. Stroke-related focal deficits are frequently observed in patients with CNS vasculitis. However, it is uncommon for patients to experience isolated strokes in a single-vessel territory without any signs or symptoms of general neurological dysfunction, such as lethargy, confusion, or unexplained headaches [3]. Systemic symptoms such as weight loss, night sweats, fevers, or rash are uncommon in individuals with PACNS and should lead to evaluation of other systemic diseases [4].

Proposed diagnostic criteria for PACNS have not been verified due to the rarity of the condition [4]. The criteria encompass pre-existing neurologic deficiency that cannot be explained after a thorough evaluation, evidence of CNS vascular damage as determined by angiography or biopsy, and the exclusion of conditions that resemble the disease. These criteria can serve as a useful clinical guidance and have been effective in recruiting patients for longitudinal research [5].

Review:

Vasculitides are a diverse category of disorders that involve inflammation and tissue death in the walls of blood vessels. The Chapel Hill Consensus Conference (CHCC) classifies the primary systemic vasculitides into three broad classes based on their impact on large-sized vessels, medium-sized vessels, and small-sized vessels [6].

Giant cell arteritis (GCA) affects major blood arteries such as the aorta. From a histological perspective, the presence of granulomas with giant cell development can be observed. Temporal arteritis is a potential diagnosis for people who are over 50 years old, while Takayasu's illness may be suspected for those under 50 years old. Kawasaki illness of childhood and classic polyarteritis nodosa (PAN) both affect medium-sized arteries. Kawasaki syndrome exhibits a mucocutaneous lymph node condition, whereas polyarteritis does not. Cerebral involvement is rare in Kawasaki syndrome, but it may occur with PAN.

Every other form of systemic vasculitis impacts tiny blood vessels. The small vessel vasculitides can be classified into two groups: those with antineutrophil cytoplasmic antibodies (ANCA) and those without. Additionally, there are immune complex deposits found in the vessel wall. ANCA-positive vasculitides encompass the Churg-Strauss syndrome (CSS), also known as allergic granulomatosis, which manifests with symptoms of asthma and eosinophil granulomas. Wegener granulomatosis (WG) is characterized by the presence of granulomas in the upper airways and kidney damage, but does not entail asthma. The microscopic form of polyarteritis is characterized by angiitis without the presence of granulomas or asthma. Both CSS (Churg-Strauss syndrome) and microscopic polyangiitis are linked to pANCA (perinuclear antineutrophil cytoplasmic antibodies) and MPO (myeloperoxidase). CANCA/PR3 antibodies are found in patients with Wegener's granulomatosis (WG). WG, microscopic

polyangiitis (MPA), and CSS are commonly referred to as PSV (pauci-immune systemic vasculitis) due to the lack of immune deposits. Immune complex deposits are observed in the vasculitic forms of systemic lupus erythematosus (SLE) and rheumatoid arthritis, as well as in cryoglobulinemic angiitis [7].

The classification of the isolated vasculitides of the neurological system remains uncertain. PACNS can impact both medium-sized and tiny blood vessels, with or without the presence of granulomas. Isolated angiitis of the peripheral nervous system is a condition that specifically affects small blood vessels. This condition does not involve ANCA (antineutrophil cytoplasmic antibodies), but does involve immune complex deposits in the walls of the blood vessels [8].

Indications of a systemic vasculitis in laboratory results include an abrupt inflammatory reaction with elevated erythrocyte sedimentation rate (ESR) and heightened levels of C-reactive protein (CRP). Commonly observed accompanying results include anemia, thrombocytosis, increased liver enzymes, and decreased complement levels. Complement consumption is primarily found in vasculitides that are linked to immune complexes. If a cerebral manifestation arises during the progression of a systemic vasculitis, it is anticipated that there will be an immediate inflammatory response. In Primary Angiitis of the Central Nervous System (PACNS), the results of blood tests typically appear normal, whereas examinations of the cerebrospinal fluid (CSF) show signs of inflammation. More than 90% of patients experience either a moderate lymphomonocytic pleocytosis or a rise in protein levels [8]. In cases of suspected vasculitis, laboratory testing should be conducted to detect systemic inflammation, including particular antibodies. However, it is also crucial to rule out any significant differential diagnoses.

Imaging techniques are essential for accurately diagnosing vasculitis and detecting any involvement in the brain. Conventional digital subtraction angiography (DSA) is considered the most reliable method for seeing vessel narrowings or abnormal enlargements in large-vessel angiitis. Magnetic resonance imaging (MRI) is the preferred method for detecting and monitoring brain involvement, using both contrast and non-contrast techniques. data should encompass ADC-maps, diffusion and perfusion data, as well as gradient echo sequences. Cerebral vasculitis presents with a variety of ischemic and hemorrhagic lesions at different stages, along with evidence of localized or widespread inflammation [9].

Colour duplex sonography, computerized tomography angiography (CTA), and magnetic resonance imaging (MRI) plus magnetic resonance angiography (MRA) can detect changes in the vascular wall even when the lumen appears normal on angiography. 18-fluorodeoxyglucose positron emission tomography (PET) is highly effective in detecting irritated blood arteries. When there is suspicion of vasculitis, it is crucial to specifically investigate for the presence of cryoglobulinemia and drug-induced angiitis. Some potential pharmacological connections include thiouracil, allopurinol, minocycline, penicillamine, carbamazepine, phenytoin, MTX, and isotretinoin [9].

Cranial or temporal arteritis (TA) is a persistent inflammatory condition affecting the large- and medium-sized arteries, characterized by the formation of granulomas. Women are disproportionately impacted compared to men, with a ratio ranging from 3:1 to 5:1. The average age at the onset of the condition is 65 years or older. An relationship has been discovered between genetic predisposition and the human leukocyte antigen (HLA)-DRB1 molecule. Clinically, temporal arteritis (TA) may manifest with symptoms associated with the affected cranial blood arteries, as well as with indicators of a systemic illness characterized by fever, malaise, and weight loss, or with polymyalgia rheumatica. Neurological symptoms consist of the sudden appearance of a persistent headache, perhaps accompanied by jaw claudication. Visual symptoms may also occur, such as double vision, flickering blind spots, and temporary loss of vision (amaurosis fugax), which might lead to complete blindness, although this is a rare occurrence. In certain cases, stroke may also occur, although this is uncommon [10].

The laboratory results indicate an elevated erythrocyte sedimentation rate (ESR) and higher levels of C-reactive protein (CRP). The acute phase response is triggered by pro-inflammatory cytokines, specifically interleukins (IL) 1, 6, and tumor necrosis factor (TNF) alpha. These are

generated by activated macrophages within the vascular wall. The CD4+ T cell immune response in GCA is likely directed towards the target antigen found in the internal elastic layer of the arterial wall. This explains why the arteries of the anterior intracerebral circulation are rarely impacted, since they do not possess an internal elastic layer. Frequently, during clinical examination, soreness or reduced pulsatility of the temporal arteries is commonly observed. Colour duplex sonography can reveal a distinct black halo, which is a distinctive feature in TA. Contrast-enhanced, high-resolution MR imaging enables the evaluation of the inflammation of the wall without the need for intrusive procedures [10].

To definitively diagnose TA, it is necessary to pathologically demonstrate the presence of vasculitis with infiltrates of mononucleated cells in all layers of the arterial wall, as well as the existence of large cells on a biopsy of the temporal artery. The extent of intimal hyperplasia shown in histology results is linked to neuro-ophthalmic problems. Specifically, the presence of large cells is related with irreversible visual impairment [10]. High-dose corticosteroids are the sole efficacious treatment for TA. Immediate initiation of prednisone or prednisolone (Pred) at a daily dosage of 1 mg per kg is recommended for suspected TA. Temporal artery biopsy must not cause any delay in the administration of corticosteroid medication. The biopsy results remain positive despite several days of steroid therapy. The clinical symptoms exhibit quick improvement, typically within a few days. Once the acute phase reactants have restored to their normal levels, the gradual reduction of steroid dosage can commence. Typically, a daily amount of 30 mg prednisone is achieved after a period of 4 weeks. The process of tapering should be done with caution, reducing the dosage by no more than 2.5 mg every 2 weeks. Once the daily dosage reaches 15 mg, the reduction in dosage should not exceed 1 mg per month. If symptoms or acute phase proteins reoccur during the tapering process, it is recommended to administer the last effective dose plus an additional 10 mg. Most patients necessitate corticosteroid therapy for a duration exceeding 2 years. To mitigate potential adverse reactions, it is recommended that all patients be administered aspirin, pantoprazole, calcium, and vitamin D [11].

Approximately 80% of patients with TA encounter problems associated with steroid treatment. These conditions consist of diabetes mellitus, osteoporosis accompanied by spinal compression fractures, and Cushing syndrome. Consideration may be given to the use of steroid sparing immunosuppressive drugs such as methotrexate (MTX), particularly in those with diabetes. However, the effectiveness of this approach has not been definitively shown. In clinical studies, the efficacy of infliximab and etanercept has been assessed in patients with Takayasu's arteritis (TA) and adverse effects resulting from steroid treatment. The findings indicated a small, albeit statistically insignificant impact [12].

Conclusion:

Angiographic examinations can be used to confirm the diagnosis, especially when there is supporting evidence from laboratory tests and clinical observations of organ involvement. It is important to mention that angiography can appear normal despite the presence of vasculitis, or the results may be inconclusive. A conclusive diagnosis is obtained through a tissue biopsy. This procedure should be carried out anytime there is availability of clinically damaged tissue. Stroke can be a severe complication of sympathomimetic medications such as amphetamine, methamphetamine, ephedrine, cocaine, oxymetazoline, and phenoxazoline. Although intracerebral bleeding is the most common consequence associated with the use of sympathomimetic drugs, ischemic stroke can also occur. The angiographic pattern observed in these patients closely resembles that of cerebral vasculitis in its entirety. The primary pathological observation in this disease is the thickening of the endothelium caused by the presence of cellular fibrous tissue, resulting in the gradual narrowing of the affected area. The vessel wall does not show any symptoms of inflammation. The diagnosis can be established based on DSA results after the usual collateral network of tiny leptomeningeal and transdural vessels is present, but it may be challenging in the initial phases. In cases when patients exhibit watershed infarctions, the option of extra–intracranial bypass surgery may be considered as a preventive measure against future infarctions.

Reference

[1] Diamantopoulos AP, Haugeberg G, Lindland A, Myklebust G. The fast-track ultrasound clinic for early diagnosis of giant cell arteritis significantly reduces permanent visual impairment: towards a more effective strategy to improve clinical outcome in giant cell arteritis? Rheumatology (Oxford). 2016;55(1):66-70.

[2] Prior JA, Ranjbar H, Belcher J, et al. Diagnostic delay for giant cell arteritis - a systematic review and meta-analysis. BMC Med. 2017;15(1):120.

[3] Mackie SL, Dejaco C, Appenzeller S, et al. British Society for Rheumatology guideline on diagnosis and treatment of giant cell arteritis. Rheumatology (Oxford). 2020;59(3):e1-e23.

[4] Hunder GG, Bloch DA, Michel BA, et al. The American College of Rheumatology 1990 criteria for the classification of giant cell arteritis. Arthritis Rheum. 1990;33(8):1122-1128. doi:10.1002/art.1780330810

[5] Seeliger B, Sznajd J, Robson JC, et al. Are the 1990 American College of Rheumatology vasculitis classification criteria still valid? Rheumatology (Oxford). 2017;56(7):1154-1161.

[6] Banz Y, Stone JH. Why do temporal arteries go wrong? principles and pearls from a clinician and a pathologist. Rheumatology (Oxford). 2018;57(suppl 2):ii3-ii10.

[7] Dejaco C, Ramiro S, Duftner C, et al. EULAR recommendations for the use of imaging in large vessel vasculitis in clinical practice. Ann Rheum Dis. 2018;77(5):636-643. doi:10.1136/annrheumdis-2017-212649

[8] Laskou F, Coath F, Mackie SL, Banerjee S, Aung T, Dasgupta B. A probability score to aid the diagnosis of suspected giant cell arteritis. Clin Exp Rheumatol. 2019;37(2)(suppl 117):104-108.

[9] Ing EB, Lahaie Luna G, Toren A, et al. Multivariable prediction model for suspected giant cell arteritis: development and validation. Clin Ophthalmol.2017;11:2031-2042. doi:10.2147/OPTH.S151385

[10] Wilson MC, Henderson MC, Smetana GW. Chapter 5: Evidence-based clinical decision making. In: Wilson MC, Henderson MC, Smetana GW, eds. The Patient History: An Evidence-Based Approach to Differential Diagnosis. 2nd ed. McGraw-Hill; 2012.

[11] Smetana GW, Shmerling RH. Does this patient have temporal arteritis? JAMA. 2002;287(1):92-101. doi:10.1001/jama.287.1.92

[12] Lijmer JG, Mol BW, Heisterkamp S, et al. Empirical evidence of design-related bias in studies of diagnostic tests. JAMA. 1999;282(11):1061-1066