Assessing for Stroke from Giant Cell Arteritis

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Case Presentation

You are asked to see a previously healthy 74-year-old gentleman in follow up for a diagnosis of giant cell arteritis (GCA). He initially presented to the emergency department with new onset headache, scalp tenderness, jaw and tongue claudication, and a C-reactive protein of 137.2 mg/L. He was started on 60 mg of prednisone. You see him four weeks later at which point he has improved clinically, and an ultrasound of the temporal arteries is reported as showing evidence of GCA. Shortly before this visit, he reports experiencing new onset of blurry vision in his right eye. He saw an ophthalmologist who found no evidence of ocular GCA but had concerns for a stroke. An urgent computed tomography (CT) angiogram did not show any vasculitis or stroke. When seen in follow up, a magnetic resonance imaging (MRI) scan demonstrated persistent inflammatory changes of the temporal arteries as well as a small, subacute left cerebellar stroke.

How would you manage this case?

Strokes are one of the most feared but uncommon consequences of GCA, seen in 2-6% of individuals.[1] They can be caused by vasculitis of the vertebral, carotid, and/or intracranial arteries, causing either direct occlusion and ischemia or acting as a nidus for a thromboembolic event.

The key considerations when assessing and managing a possible stroke in GCA are:

1) Confirm a diagnosis of giant cell arteritis

Neurologic symptoms, headache, constitutional symptoms, and elevated inflammatory markers can indicate a variety of autoimmune diseases including GCA. While the presence of more specific symptoms (e.g. ischemic ocular disease, jaw claudication) is suggestive of GCA, a broad assessment for other etiologies should be considered, such as pachymeningitis causing headache and vision changes. The foremost alternative diagnoses to consider include IgG4 related disease, anti-neutrophil cytoplasmic antibody (ANCA)-associated vasculitis, primary central nervous system vasculitis (PCNSV), sarcoidosis, Behcet's, and infectious vasculopathy (most notably varicella zoster vasculopathy).

Dedicated imaging with ultrasound, magnetic resonance angiography (MRA), and/or other imaging modalities should suggest large vessel vasculitis and should be performed as soon as possible; glucocorticoid exposure can decrease imaging sensitivity from 90% to 70% within a week of use.[2] Temporal artery biopsies may be helpful. However, in cases of GCA with stroke, non-temporal arteries are often affected and imaging is the cornerstone investigation.

2) Confirm that neurologic symptoms are attributable to stroke

Individuals with neuroinflammatory diseases can present with other neurologic manifestations in addition to stroke which suggest other diagnoses. As such, all neurological symptoms should be able to be readily localized to the location of the infarct and/or hemorrhage. Unexplained symptoms should be evaluated for other neurologic processes with comprehensive serologic and imaging assessments, as well as a low threshold for testing cerebrospinal fluid.

Strokes attributable to GCA typically occur before treatment or within the first 1-2 weeks of treatment before a complete response. If strokes occur outside of this window, other etiologies should be considered. Particular attention should be directed to localize the cause of visual symptoms, as GCA can cause ischemic retinal syndromes, optic nerve perineuritis demonstrated on imaging, and/or posterior stroke. Up to 80% of strokes are in the posterior circulation and are attributed to vertebral vessel involvement, likely reflecting the vessels' smaller calibre.[3,4] Glucocorticoids can also cause visual symptoms and complications that may mimic persistent disease activity early in treatment.

3) Confirm disease location and extent of GCA

Understanding disease extent and severity helps determine treatment. Temporal artery ultrasound is insufficient to assess those with stroke; computerized tomography and/or preferably MRA with vessel wall imaging is

needed. Vertebral, carotid, and intracranial vessels should be carefully interrogated by an experienced neurovascular radiologist to assess for the extent of GCA and the presence of intracranial involvement. Of note, between 14-25% of individuals with GCA can have asymptomatic intracranial disease without stroke; it is unclear if these individuals require additional treatment or monitoring.[5,6]

4) Treat based on disease severity and extent

All individuals with ischemic stroke in the context of GCA should be treated with aspirin and undergo a comprehensive assessment for other secondary prevention measures including smoking cessation and blood pressure control as appropriate. After completing a workup, if a diagnosis of stroke in the context of active GCA is confirmed, there are typically three treatment scenarios:

a. **Individuals with a single stroke and no intracranial disease:** These individuals can be treated the same as those with severe presentation GCA without stroke (i.e. with ischemic optic neuropathy) with glucocorticoids and tocilizumab. There is no data informing whether these individuals benefit from intravenous (IV) glucocorticoids.
b. **Individuals with intracranial vasculitis and stroke:** These individuals are considered to have the most severe phenotype of GCA and may have an overlap with PCSNV. There is limited data concerning treatment; IV cyclophosphamide followed by tocilizumab or tocilizumab with methotrexate have both been used with intravenous followed by oral glucocorticoids.[3]
c. **Individuals with multiple strokes without intracranial vasculitis:** These individuals are often presumed to have intracranial disease not detected on imaging either due to technical considerations or partial treatment with glucocorticoids before image acquisition and are typically treated as though they have intracranial disease.

5) Consider outcomes of stroke in GCA

Cohort studies suggest that there is a higher risk of death in the first two years after a diagnosis of GCA that may return to normal after this time.[7] This may be partially explained by the elevated stroke risk. Increased risk of infections due to immunosuppression and other thromboses are other potential contributors. Those with symptomatic intracranial disease were found to have mortality of up to 32.6%, indicating they have a particularly poor prognosis that likely requires aggressive therapy.[3]

KEY MESSAGES:

1. Stroke is uncommon but serious in GCA; most commonly affects posterior circulation and should be suspected in those with new neurologic findings and/or non-resolving visual changes not explained by ocular GCA.
2. Extracranial GCA with stroke can be treated similarly to those with vision loss in GCA.
3. Intracranial GCA and/or those with multiple strokes likely carry a poor prognosis; tocilizumab with methotrexate and cyclophosphamide are possible treatment options.
4. Individuals with GCA and stroke should receive comprehensive cardiovascular assessments and appropriate secondary preventative measures.

How this case was managed

The patient's MRI was re-assessed by a neurovascular radiologist who found near occlusion of the right vertebral artery not previously reported, as well as involvement of the occipital and maxillary arteries. There was no intracranial disease, and no suggestion of any other diagnosis.

The patient was started on ASA and sent to a stroke clinic where a complete workup was unremarkable. He was started on tocilizumab with an excellent response to treatment. As there was no intracranial involvement nor ongoing symptoms, the patient was continued on tocilizumab and was able to taper off prednisone completely.

References:
1. Bonnan M, Debeugny S. Giant-cell arteritis related strokes: scoping review of mechanisms and rethinking treatment strategy? *Front Neurol.* 2023;14:1305093.
2. Hauenstein C, Reinhard M, Geiger J, et al. Effects of early corticosteroid treatment on magnetic resonance imaging and ultrasonography findings in giant cell arteritis. *Rheumatology (Oxford).* 2012;51(11):1999-2003.
3. Patel S, Okaj I, Scott J, et al. Intracranial GCA: a comprehensive systematic review. *Rheumatology (Oxford).* 2025;64(8):4517-24.
4. de Boysson H, Liozon E, Larivière D, et al. Giant Cell Arteritis-related Stroke: A Retrospective Multicenter Case-control Study. *J Rheumatol.* 2017;44(3):297-303.
5. Siemonsen S, Brekenfeld C, Holst B, et al. 3T MRI reveals extra- and intracranial involvement in giant cell arteritis. *American Journal of Neuroradiology.* 2015;36(1):91-7.
6. Junek ML, Riaz S, Garner S, et al. Added diagnostic yield of temporal artery magnetic resonance angiography in the evaluation of giant cell arteritis. *Rheumatology (Oxford).* 2023;62(6):2197-202.
7. Hill CL, Black RJ, Nossent JC, et al. Risk of mortality in patients with giant cell arteritis: A systematic review and meta-analysis. *Semin Arthritis Rheum.* 2017;46(4):513-9.

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