



## Case Report

## Delay in Diagnosis of Vertebrobasilar Insufficiency: The Masking Effect of Headache and Coexisting Pain Syndromes

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### ABSTRACT

Headaches of vascular and other origins can develop in the midst of work-ups for benign, long-standing pain conditions. The initial attribution of these headaches to benign conditions in the early evaluative process, especially when non-life threatening signs and symptoms are present, is not only frequently plausible but most often correct. Given the frequency with which patients present with a complaint of headache, constant vigilance and re-examination is required to prevent potentially life-threatening conditions from being overlooked as they develop. This case report describes a patient presentation that should serve as a cautionary tale for such a circumstance. Common, concurrent maladies were diagnosed and treated with varying degrees of success, yet the evolution of a potentially life-threatening disease with very similar symptomatology occurred in the midst of the workup. We believe this description will prove of value to established clinicians in their everyday practices, as well as to trainees as they study differential diagnoses.

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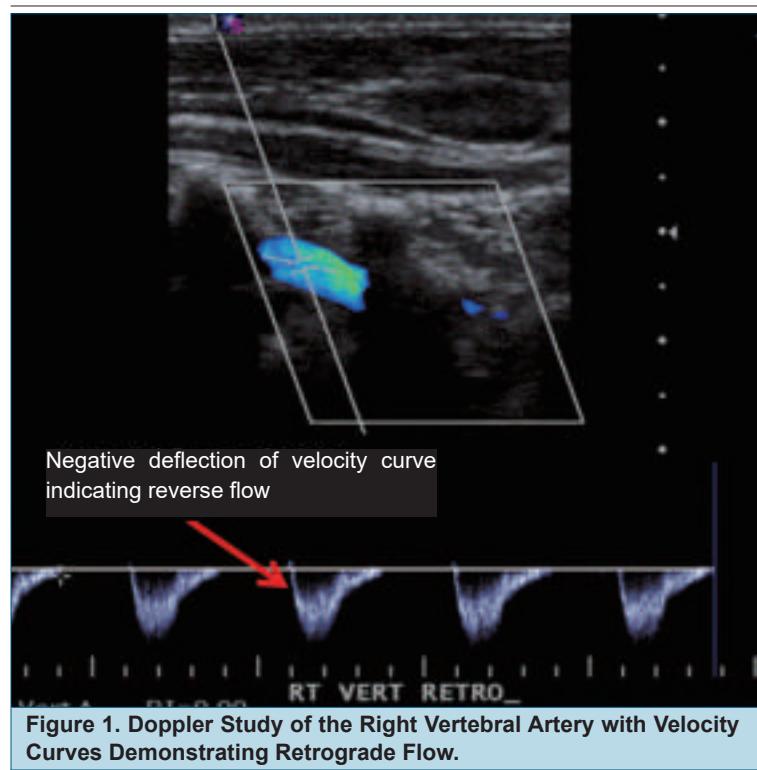
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**H**eadache is a common finding in most pain management practices (1). The lifetime prevalence of all headaches has been reported as 93% in men and 99% in women, with tension-type headache occurring in males and females at rates of 69% and 88% respectively (1). There is a high frequency of commonly encountered pain syndromes that can either trigger or are associated with headaches, especially tension headaches. The occurrence of headache during the natural history of any one of these syndromes may be ignored or expected to resolve as the initial complaint is successfully managed. We present a case in which a potentially life-threatening condition presented as a headache that evolved over several months but was masked by both pre-existing and coexisting benign diagnoses. We obtained written consent to publicly

present de-identified images and written descriptions of this patient's case. This case is correlated with radiographic images which demonstrate the extent to which a serious clinical syndrome can evolve while concurrent maladies are diagnosed and treated.

### CASE PRESENTATION

A 56 year old male had been seen over a two year period in the Pain Clinic because of neck, middle back and right scapular pain. The patient stated that he had suffered from these symptoms in one form or another over the past decade. He also described a five-year history of right shoulder pain and occasional weakness of both hands. His pain was aggravated by multiple physical activities. He denied any injury as the cause of the pain. Prior to his arrival at the

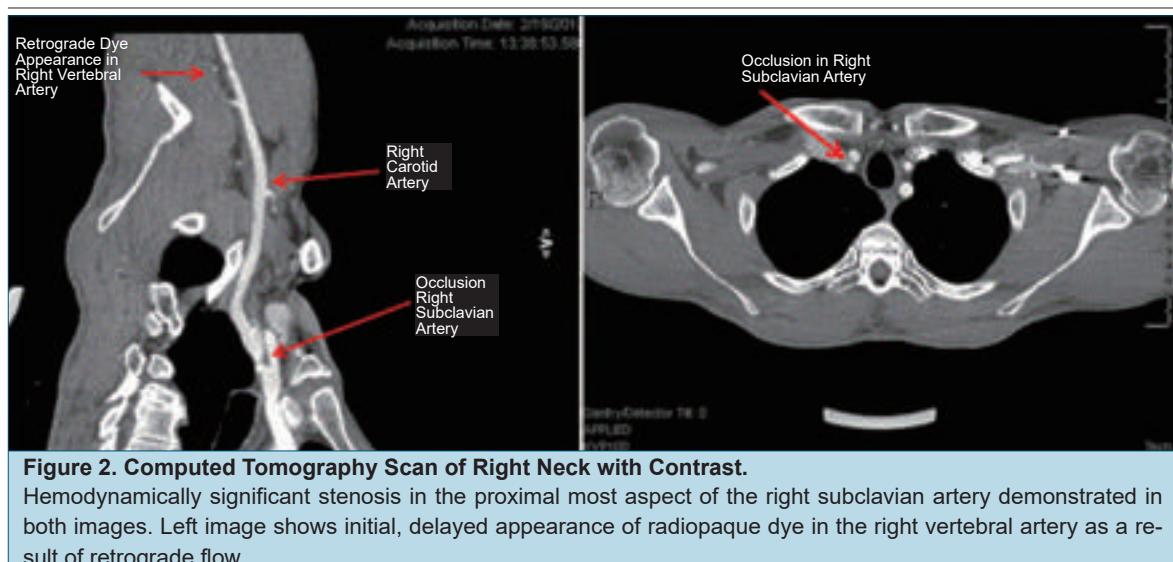


Pain Clinic at our institution, he had received a cervical epidural steroid injection that yielded no relief. The patient was an ongoing smoker, and had been a recovering alcoholic for 5 years. His past medical history was positive for depression, anxiety and substance abuse; Crohn's disease, chronic smoker's cough, osteoarthritis; and restless legs syndrome. Physical exam at his initial presentation was significant for loss of cervical lordosis; bilateral cervical paraspinal and trapezius spasm; a positive axial compression test of the spine; pain-limited abduction and internal/external rotation of his right shoulder; and supraclavicular and suprascapular tenderness. The patient had a normal peripheral vascular exam with documented symmetrical distal pulses. A magnetic resonance imaging (MRI) scan performed in the year of his presentation revealed degenerative joint disease with disc space narrowing from the fourth cervical vertebra (C4) to the seventh cervical vertebra (C7); a right - sided bone spur with foraminal stenosis at C4 - C5; and facet joint hypertrophy from the second thoracic vertebra (T2) to the fourth thoracic vertebra (T4) with foraminal stenoses at the same levels. The patient was diagnosed

with chronic neck pain secondary to degenerative arthritis and degenerative disc disease of the cervical spine; enthesopathy of the trapezius muscle; and chronic right shoulder arthralgia from rotator cuff sprain or strain.

Treatment was initiated with trigger point injections which consisted of 1-2 ml 0.5% bupivacaine with 0.5 mg dexamethasone per site; a diclofenac patch, 180mg applied twice daily; pregabalin, 50 mg taken three times daily; carisoprodol 250 mg taken three times per day; and tramadol, 50 mg taken three times daily. At twenty seven days follow-up, the patient reported that the trigger point injections had yielded one week of relief; that he had stopped taking the pregabalin because of the development of tremors; and that he had stopped the diclofenac because of gastrointestinal side effects. The patient refused any invasive procedures or physical therapy. The decision was made to change his medication regimen to topiramate 50 mg taken twice daily; meloxicam 7.5 mg daily; and lidocaine patches (5%) applied for 12 hours per day to the affected area. These medications were to be used with his ongoing tramadol therapy. In less than one month the patient reported increasing neck pain and numbness of the right hand. He was referred to the neurosurgical service which confirmed the diagnosis of cervical radiculopathy and recommended physical therapy including a transcutaneous electrical nerve stimulator (TENS).

During the ensuing six months, the patient reported a poor response to physical therapy and developed restless leg syndrome. The TENS unit proved effective in relieving his low back symptoms but was of little effect on his upper back and shoulder pain. In the ninety days that followed the patient visited the pain clinic and the neurosurgery clinic. Cervical epidural steroid injections (consisting of 1 ml, 1% preservative free lidocaine and 40 mg methylprednisolone) to be followed by a cervical laminectomy were recommended. The patient refused both of these interventions because of fear of the procedures. He accepted, instead, trigger point injections. In the next five months his neck pain worsened. He received two more trigger point injections and for the first time complained of headaches. The headaches coincided with flare-ups of his neck



**Figure 2. Computed Tomography Scan of Right Neck with Contrast.**

Hemodynamically significant stenosis in the proximal most aspect of the right subclavian artery demonstrated in both images. Left image shows initial, delayed appearance of radiopaque dye in the right vertebral artery as a result of retrograde flow.

pain. He was begun on acetaminophen- butalbital- caffeine (Fioricet; butalbital 50 mg, acetaminophen 325 mg, caffeine 40 mg).

After two months, the Fioricet proved ineffective and was discontinued. The patient reported further increase in his neck pain; documented 20% loss of strength in his right hand; and described the worsening of what was diagnosed as tension headaches. The observed changes were attributed to a combination of worsening cervical facet arthropathy, and trapezius and levator scapula muscle spasm. Bilateral shoulder radiographs were ordered which revealed bilateral acromio-clavicular joint degenerative changes. Within two months the headache pattern increased in frequency to a daily occurrence. A headache initiation point was localized to the upper one-third of the left side of the cervical spine, which activated with moderate digital pressure. Topiramate was increased to 300 mg, daily. A selective cervical nerve root block at the C3 level, and an inferior occipital nerve block were recommended but refused by the patient. Topiramate therapy failed as did trial periods of bupropion, 100 mg twice daily, and tizanidine 4 mg twice daily.

The patient was begun on propranolol, 80 mg (long acting- Inderal®) per day; and a buprenorphine patch (10 µg/h per 7days). The headaches increased in both severity and frequency and progressed to an association with nausea. The propranolol was discontinued after

18 days because of lack of effect, and the buprenorphine (20 µg/h per 7 days) and tramadol (100 mg, three times per day) were increased. A neurology consultation was obtained with a resulting diagnosis of migraine headache and a recommendation to discontinue all current medications, and add amlodipine (5 mg daily) and sumatriptan (50 mg as needed with a maximum daily dose of 200 mg). By the thirty-day follow-up appointment these medications had proved to be of no effect, the patient reported a new complaint of inadvertent dropping of objects along with increased pain and numbness in the right arm. On physical examination, blood pressure could not be obtained in the right arm via sphygmomanometer, although blood pressure in the left arm was normal. Asymmetrical radial pulses were noted. The patient was referred for arterial and venous Doppler ultrasound study of the upper extremities which was suspicious for right subclavian stenosis and steal syndrome (Figure 1).

The patient was begun on aspirin 81 mg, and a subclavian computed tomography (CT) angiography was performed which revealed an 80% occlusion of the right proximal subclavian artery with subclavian steal (Figure 2).

At follow-up visit after the CT angiography the patient reported that his headaches were always right-sided, that they began after physical activity, that they started as a perceived "lump" at the base of the neck, spread across the head ante-

**Table 1. Timeline of Headache Evolution.**

Symptoms and Working Diagnoses					
Chronic Neck Pain	1 <sup>st</sup> Complaint of Headaches	Worsening "Tension" Headaches	Change in Headache Pattern	Increased Headache Frequency and Severity	Headaches all Right-Sided
Chronic Low Back Pain	Neck Pain Worsened	Increased Neck Pain	Increased Frequency	Headache assoc. with Nausea	Colorblindness with Headaches
Cervical DJD	20% Loss of Right Hand Strength	20% Loss of Hand Strength	Left Cervical Initiation Point	Analgesia Failure	Asymmetrical Pulses
Trigger Points					CT Anglo: Right S.A Occlusion with Subclavian Steal
Day Number	1	300	360	420	648
Symptoms and working diagnoses over time (days). DJD, Degenerative joint disease; CT, computed tomography.					

riorly and felt as if they settled behind his right eye. The patient also reported the colorblindness in his right eye while he is suffering from these headaches. He reported that he had to rest for at least 30 minutes for the symptoms to subside. The timeline of the patient's symptoms and the diagnoses associated with those symptoms are summarized in Table 1. The patient is awaiting surgical intervention at the time of this writing.

## DISCUSSION

The causes of headache are legion (2-14). When confounded by the coexistence of other conditions that alone could result in the development of headaches, the accurate determination of their origin can be particularly daunting (Table 2). Depression, both clinical and reactive (2, 3); chronic pain; cervical radiculopathy involving the second, third, and fourth cervical nerve roots (4); fibromyalgia (3, 4) of the posterior neck and shoulders with the frequently associated radiating patterns may all contribute to the clinical origin of headaches, with each proving equally plausible. All of these disorders existed in this patient. Further the standard therapies used to treat headaches yielded varying degrees of pain relief reinforcing the incorrect diagnoses.

Subclavian artery occlusion typically occurs as a result of an injury to the vessel, a coagulation defect, or atherosclerosis that leads to an occlusion of the proximal subclavian artery. It is four times more common on the left side than the right (15).

In the majority of cases there is a history of re-

petitive use or stress injury to the upper extremity on the affected side (16). These were not the case in this patient. Symptoms usually result when a negative pressure gradient between the vertebral - basilar and the vertebral - subclavian artery junctions occur. Decreased cerebral blood flow (CBF) and upper extremity blood flow to the involved side lead to vertebro-basilar insufficiency and ischemia of the affected extremity. But some reports speculate increased blood flow on the affected side as the cause for headache as well. Screening for blockage of the vascular supply of the upper extremity is currently accomplished by bilateral brachial artery blood pressure measurements. The most common symptoms are upper extremity claudication on the affected side; dizziness; vertigo; imbalance; hemisensory dysfunction; and visual disturbances. These signs and symptoms were not found in this patient.

Vertebrobasilar insufficiency (VBI) causes headache in 21% to 53% of patients with major or minor syndromes. The headaches are typically occipital in location with significantly less frequent localization to the occipitofrontal or frontal regions. The headaches may be lateralized or non-lateralized and rarely present with a band-like distribution. Occipital tenderness and neck stiffness are occasionally present (7, 16, 17). Typically, pain is throbbing and may be aggravated by postural changes and the Valsalva maneuver. Headache related specifically to subclavian steal syndrome occurs in approximately 50-60% of cases with the pain located in either the cervico-occipital or mastoid regions. The pain is most commonly precipitated by strenuous exercise and not asso-

ciated with neurologic deficits (18).

Several diagnoses in this case are associated with headaches of various types. Certainly the occurrence of fibromyalgia or myofascial pain is associated with headaches as myofascial trigger points in the cervical region can refer pain to the head and face (12). The prevalence of fibromyalgia in episodic migraine is as great as 31.4% (13). In terms of suboccipital muscle trigger points, 65% of patients with chronic tension type headaches (CTTH) had active trigger points and 35% had latent trigger points (14). Headache of cervical radiculopathy origin is well described occurring in up to 58% of patients with cervical radiculopathy originating in the lower (C5-C7) cervical levels (15); but in some reports also originating in the upper cervical levels (C3-C4) (4).

Restless leg syndrome (RLS) has been linked as one of a number of sleep disorder causing syndromes that influence the development of headaches. While the precise mechanism is unclear, RLS has been positively correlated in migraine headaches with insomnia, daytime sleepiness and depression. 16 The incidence of primary headache occurred in 51.5% of RLS and in those with RLS, migraines are reported in 44% (17). While this case study is notable for several cervicogenic causes for the patient's headaches attention must also be given to the association between low back pain as a source for chronic migraine and chronic tension-type headaches. From the symptom timeline the patient reported the onset of general headaches approximately one year after his initial presentation to our service. Currently there are few data that document the time course of the appearance of headache after the onset of low back pain, although low back pain and headache has been well described. One study reported that the odds of having frequent low back pain was between 13.7 and 18.3 times higher in all chronic headache subtypes when compared to individuals with no headache (18). Iatrogenic causes of headache in the patient must be considered as well. At the time of his first headache the patient had been treated with Topiramate and Meloxicam, and several months earlier with diclofenac. All of these drugs have headache as a possible side effect. Topiramate has been shown to cause headache both in its routine administration (19)

**Table 2. Disorder/Drug-Associated Headache Rates.**

Headache-Associated Disorder/Drug	Occurrence (%)		
	Tension	Migraine	All
Fibromyalgia (9)	-	-	31.4
Trigger Points (10)	35-64	-	-
Cervical Radiculopathy (C5-C7) (11)	-	-	58
Restless Leg Syndrome (22)	-	44	51.5
Meloxicam (21)	-	-	8
Vertebrobasilar Insufficiency (16)	-	-	21-53
Subclavian Steal Syndrome (18)	-	-	50-60

as well as after long term use (13, 14, 20); and Meloxicam causes an 8% incidence of headache (Table 2) (21).

One important aspect of this case is that it allows us to see the evolution of the syndrome in real time and in light of other confounding sources of headache. These sources were being treated with varying results many of which led the initial providers away from the true, more serious, evolving malady. In addition the nature of the headache evolved and was compounded by visual disturbances. Both of these occurrences fit reasonably within the context of confirmed myofascial and cervical disc pain generators each with the potential to result in migraine type headaches (4, 12, 15).

## CONCLUSION

Headache and not upper extremity weakness, paresthesias, claudication, or decreased temperature may be the better herald of severe nervous system events caused by VBI secondary to subclavian steal syndrome. If this is the case, patients with seemingly non-vascular pain generators and headache who are at high risk for peripheral vascular disease would need to undergo earlier, more extensive vascular work-up including arteriography. These work-ups potentially should include the non-invasive and relatively inexpensive Doppler studies of the neck and upper extremity vasculature. This was performed in our case albeit much later than would be recommended in a new more insightful diagnostic protocol. Currently no studies have examined the relationship between headache and peripheral signs and symptoms to the development of VBI. The extent to which delays in treatment and diagnosis caused by these confounding fac-

tors impact morbidity and mortality is not well described. These studies are needed since the incidence of peripheral arterial disease and cases of headache secondary to pain generating syndromes of the spinal column will both increase as the population ages.

### TAKE HOME MESSAGES

In summary, patients with seemingly non-vascu-

lar pain generators and headache who are at high risk for peripheral vascular disease would need to undergo earlier, more extensive vascular work-up to rule out potential life threatening vascular issues before the diagnosis of headache from other causes is made.

The authors declare no potential conflicts of interest for this work.

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