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mhc MENTAL HEALTH CLINICIAN

CASE REPORT Open Access

Management of migraine headaches in a chronic pain patient: A case report

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How to cite: Bach LL, Goga J. Management of migraine headaches in a chronic pain patient: a case report. Ment Health Clin [Internet]. 2016;6(3):154-8. DOI: 10.9740/mhc.2016.05.154.

Abstract

Managing migraines complicated with medication overuse headaches and opioid-induced hyperalgesia can be challenging, especially within the geriatric and chronic pain population. A 65-year-old woman with a degenerative spine condition and chronic migraine headaches, along with other comorbidities, was admitted to the geriatric psychiatry unit for extreme mood swings and paranoia. Prior to admission, she had been taking extended-release morphine sulfate twice daily for more than a month and was unable to determine triggers to her frequent migraine headaches. She had a history of medication overuse and severe migraine episodes within 4 weeks prior to admission. This case report reviews the challenges of treating a geriatric patient with probable chronic migraines in addition to other pain conditions and comorbidities.

Keywords: migraine, medication overuse headache, opioid-induced hyperalgesia, chronic pain, geriatric, opioid

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Introduction

Migraines are a type of headache associated with nausea, vomiting, and/or sensitivity to light. The headache can be potentiated by abnormal brain activity triggered by caffeine withdrawal, changes in sleep patterns, loud noises, bright lights, various foods, stress, or anxiety. Currently, there is no cure for migraine headaches. The goal of treatment is to manage symptoms and prevent recurrence.[1] Guidelines exist for preventing recurring migraines and treating acute attacks, but patients with coexisting chronic pain may pose additional challenges to these treatments. These patients are at risk for medication overuse headaches (MOHs) and opioid-induced hyperalgesia (OIH) due to regular intake of acute or chronic analgesics.

When managing migraines, treatment approach is similar for chronic ($\geq$15 migraines per month for more than 3 months on $\geq$8 days per month) and episodic migraines ($<$15 migraines per month); both include prophylactic therapy and acute therapy.[2] The American Academy of Neurology guidelines for migraine recurrence prevention lists several medications shown to be effective in migraine prevention[3]:

- Antiepileptic drugs: topiramate and valproic acid and derivatives
- Beta-blockers: metoprolol, propranolol, and timolol
- Triptans: for short-term menstrually associated migraine prevention

In clinical practice, first-line prophylactic medications for chronic migraine include the following[4]:

- Propanolol
- Amitriptyline
- Topiramate
- Valproic acid and derivatives (second line in women due to teratogenicity)

In 2 randomized, double-blinded, placebo-controlled trials, topiramate was found to be effective and well-

tolerated in patients with chronic migraine with or without presence of medication overuse.[5,6] Botulinum toxin injections may also be an option in reducing migraine attacks if they occur more than 15 days a month.[1] OnabotulinumtoxinA has been approved by the US Food and Drug Administration to treat chronic migraine.

For acute treatment options, first-line therapies include the following[7]:

- Acetaminophen/aspirin/caffeine combination analgesic
- Nonsteroidal anti-inflammatory drugs (eg, ibuprofen and naproxen)
- Triptans (eg, sumatriptan)
- Triptan/nonsteroidal anti-inflammatory drugs combination analgesic (eg, sumatriptan/naproxen)

According to the International Headache Society, MOH is characterized by (1) a headache present for ≥15 days per month with a preexisting headache disorder, (2) regular overuse for more than 3 months of one or more drugs taken for acute and/or symptomatic treatment of headache, and (3) a headache developed or markedly worsened during medication overuse (ie, ≥15 days per month of simple analgesics and combination acute medications or ≥10 days per month of triptans, ergotamines, opioids, and/or combination analgesics).[2,8] Risk factors for MOH include previous primary headaches (eg, migraine and tension headaches) in addition to a history of substance abuse, regular use of tranquilizers, or an increased score on the Hospital Anxiety and Depression Scale.[8] Depression and anxiety are also common coexisting conditions in patients with MOH, which may be related to the frequency of headaches these patients experience. Chronic pain medication therapies, especially with opioids, have the potential to trigger MOH as well as induce migraines and other types of headaches.

For people receiving long-term opioid therapy, pain management can be limited not only by opioid tolerance but also by OIH, which is characterized by increased pain sensitization as a result of increased or long-term opioid exposure.[9,10] There are multiple theories on the cause of OIH, but the most studied mechanism is the increased activation of N-methyl-D-aspartate (NMDA) receptors by opioids, which can cause more pain impulse transmissions and affect the amount of pain sensitivity in both acute and chronic pain states.[11,12] According to a prospective study, some patients on oral morphine therapy experienced both analgesic tolerance and hyperalgesia within 1 month of initiating therapy.[10] In addition, the occurrence of OIH may be due to accumulation of toxic opioid metabolites, such as morphine-3-glucuronide, which may act as NMDA agonists and lead to other opioid hyperexcitability effects, such as delirium and seizures.[11,13,14] Clinicians should suspect OIH if treatment effect appears to decline in absence of disease progression or if there are unexplained pain reports unrelated to the site of injury.[15] Treatments for OIH include the following:

- Reducing opioid exposure by reducing the dose or removing it from therapy[11,16,17]
- Opioid rotation or switching to a different opioid[11,17,18]
- Adding an NMDA receptor antagonist (eg, methadone, cyclooxygenase-2 inhibitors)[11,17,19]
- Adding alpha-2 receptor agonists (eg, clonidine)[17]

Managing migraines in patients complicated with MOH and OIH can be challenging, especially in the geriatric population, because the prevalence of persistent pain increases with age and most geriatric patients have significant pain problems that are not adequately relieved.[20] Opioids are the "gold standard" for therapeutic management of chronic pain, and with many of the elderly being treated for chronic pain, the geriatric population is at higher risk of OIH.[9] A study of 2 health plans found that from 1997 to 2005 the total percentage increase in prevalence of long-term opioid use ranged from 61% to 135%; women aged 65 years or older had the highest prevalence in 2005.[21] In the Group Health cooperative study from 2005, 44.1% of those aged 65 years or older were on long-term schedule II opioid treatment.[21] Also, from 1998 to 2006, regular opioid use increased with age, and the prevalence of regular opioid use in those aged 70 years or older was 3.4% by 2006.[22] Arthritis and back pain were the most common chronic conditions found among regular users of opioids, and most of these users had more than one pain condition that needed treatment.[23] The following case report reviews the challenges of treating a geriatric patient with probable chronic migraine in addition to other patient-related variables.

Case Description

The patient, a 65-year-old woman, was admitted to the geriatric psychiatry inpatient unit due to depression, severe anxiety, paranoia, delirium, and extreme mood swings. She reported poor sleep and poor appetite and had expressed problems with concentration. She also reported painful migraines and had been admitted to a community hospital for a migraine episode prior to admission. When asked about headache triggers, the patient noticed that caffeine, particularly coffee, and loud voices were possible triggers but otherwise had not noticed any other trigger patterns for her chronic migraines. At least 2 reports of migraine headaches coinciding with overmedication were found within the 2 weeks prior to admission in external records (Table 1). Her relevant past medical history included depression, fre-

TABLE 1: Pharmacy medication records 3 months prior to admission

Pharmacy A (Near Previous Home)	Pharmacy B (Near New Home)
Aripiprazole, 15 mg, 1/2 or 1 tablet daily as directed	Morphine sulfate extended release, 30 mg twice daily
Clonazepam, 0.5 mg, 1 tablet 3 times daily as needed for anxiety	Oxycodone, 5 mg 5 times daily
Clonazepam, 0.5 mg, 1 tablet every 6 hours as needed for anxiety[a]	Etodolac, 500 mg, unspecified directions[a]
Valsartan, 40 mg daily	Methylphenidate, 20 mg 3 times daily
Divalproex delayed release, 750 mg daily[a]	
Levothyroxine, 125 µg every morning on an empty stomach	
Lidocaine patch, apply 1 daily for 12 hours	
Sumatriptan, 100 mg, as directed for acute attacks	
Topiramate, 25 mg, 3 tablets daily	

[a]Discontinued according to patient.

quent migraines, arthritis, and chronic neck and spine pain from her degenerative spine condition. Her family history included migraines in her maternal grandmother, and her social history included substance abuse with opioids.

The patient reported being compliant with medications, though she stated that she had decreased her topiramate prior to admission due to her concern about weight loss. The patient had been seeing a psychotherapist and psychiatrist but failed to follow up after relocating and facing financial burden. The patient last saw her psychiatrist about a year prior to admission, and all her psychiatric medications were being prescribed by her neurologist. She also had a pain specialist who at first prescribed extended-release morphine sulfate 30 mg twice daily for her chronic spine pain but then switched her to oxycodone 5 mg 5 times daily prior to admission. All medications dispensed 3 months prior to admission came from 2 pharmacies.

According to the patient, her current life stressors included finances, adjusting to her new home, and lack of sleep. During the first interview, the patient reported that she was addicted to morphine and was withdrawing from it. She also reported not abusing her medications and only following the instructions on the medication labels. Her husband and primary care physician did not believe she was abusing her medications.

For migraine treatment, the patient reported that she had tried beta blockers in the past and those did not work for her. The patient also reported that her divalproex delayed release was discontinued and that acetaminophen "spiked" her liver enzymes. Additionally, the patient mentioned that her neurologist said she was a candidate for botulinum toxin injection and before admission had scheduled her to have a treatment within the next couple of months. The patient admitted to consuming caffeinated sodas around the clock prior to admission.

During admission, the patient's problem list included bipolar II disorder, anxiety, insomnia, migraines, chronic spinal pain, neuropathic pain, arthritis, hypertension, hypothyroidism, and gastroesophageal reflux disease. Bipolar II disorder was a new diagnosis during this admission, and relevant medications were added or increased in dose to minimize side effects and optimize overall therapy. Reports were unclear as to whether the patient's frequent migraines existed prior to medication overuse or if medication overuse caused the frequent migraines. Regardless, the patient was converted to oxycodone, topiramate was titrated to 100 mg daily for migraine prophylaxis, and the patient was counseled to reduce caffeine consumption. Also, methylphenidate was originally not included in overall therapy due to risk of worsening migraines but was eventually added at a low dose to improve patient affect and energy. Neuropathic pain was another new diagnosis during admission, and thus gabapentin was added into overall therapy. Toward the time of discharge, the patient reported worsening arthritis that affected her sleep, and naproxen was prescribed as needed to address the pain and improve sleep. The patient's overall pain ranged between 3 and 8 out of 10; however, most scores hovered around 5 of 10 with 10 being the worst pain imaginable.

Her vital signs were all within normal limits and renal function remained normal. The medications prescribed upon discharge after 3 weeks of admission are shown in Table 2.

The patient was referred for follow-up with her neurologist and a new pain specialist upon discharge.

Discussion

In controlling migraine recurrence, this patient's modifiable risk factors included depression, anxiety, stress triggers, previous chronic caffeine exposure, medication

TABLE 2: Discharge medications

Condition	Medications
Depression	Mirtazapine, 15 mg at every bedtime
Bipolar disorder	Lamotrigine, 100 mg at every bedtime
	Aripiprazole, 12.5 mg at every bedtime
Anxiety	Clonazepam, 0.5 mg at every bedtime as needed
Insomnia	Trazodone, 50 mg at every bedtime as needed
	Ramelteon, 8 mg at every bedtime as needed
Degenerative spine pain/ nerve pain/ arthritis	Oxycodone, 5 mg 4 times a day
	Lidocaine patch, daily
	Gabapentin, 100 mg every morning, 300 mg at every bedtime
	Naproxen, 250 mg twice a day as needed
Migraines	Topiramate, 100 mg at every bedtime (increased from 50 mg at start of admission)
	Sumatriptan, 100 mg as directed for acute attacks
ADHD	Methylphenidate, 5 mg every morning
Nausea	Ondansetron, 4 mg every 4 hours as needed
HTN	Valsartan, 40 mg every morning
Hypothyroidism	Levothyroxine, 125 µg every morning
GERD	Omeprazole, 40 mg every morning
Cardiac health	Aspirin enteric coated, 81 mg daily

ADHD = attention deficit/hyperactivity disorder; GERD = gastroesophageal reflux disease; HTN = hypertension.

overuse, and chronic pain. Previous longitudinal studies support a bidirectional relationship between depression and migraines.[24] Also, the effects of depression and anxiety can worsen migraine symptoms and frequency. Stress can trigger headaches, and in this case the patient's financial and living situation, lack of sleep, and other stressors may have contributed to her chronic migraines. The patient admitted to consuming caffeinated sodas around the clock prior to admission, which can lead to withdrawal from chronic consumption and trigger migraine headaches. Additionally, medication overuse with barbiturates or opiates can cause rebound headache and OIH, and in this patient's case, she had been taking extended-release morphine sulfate twice daily for more than a month prior to admission. Finally, the patient continued to have chronic pain from her degenerative spine condition, which was not adequately managed and potentially exaggerated from OIH. Managing these risk factors would improve this patient's frequent migraines.

During admission, the treatment focused on managing the patient's psychiatric conditions, her overall pain, and her frequent migraines. Because morphine sulfate is known to metabolize into codeine and morphine-3-glucuronide and the patient was delirious prior to admission while being on morphine sulfate, she was switched from extended-release morphine sulfate to oxycodone to reduce probable MOH, opioid toxicity, and OIH.[25] Since then, the patient has had reduced symptoms of delirium, and her overall pain has remained relatively stable around 5 out of 10. With the new onset of neuropathic pain, gabapentin was also added and adequately managed this pain without worsening other therapies. Finally, naproxen was given as needed to relieve worsening arthritic pain, and it adequately managed her arthritis without inducing additional headaches. Because the patient still had unrelieved moderate-level pain in her neck and back, the patient was told to follow up with her pain specialist and neurologist to manage her pain and frequent migraines.

While the patient was being treated for anxiety and depression, her migraines were managed according to current migraine guidelines. At least 2 randomized placebo-controlled trials support the use of topiramate for chronic migraine prophylaxis compared with the lower-quality evidence for use of valproic acid and derivatives.[4-6] The patient also reported having been discontinued on divalproex and taking topiramate before admission. After multiple interviews, and considering the patient's overall condition and medication history, the patient agreed to take topiramate at bedtime for migraine recurrence prevention and sumatriptan for acute migraine attacks. She was also advised to record any migraine triggers so that she could identify patterns and try to avoid them. Finally, the patient was counseled on how and why she takes her medications and the risks and side effects involved with each one, especially with oxycodone and topiramate as she has a history of medication overuse and self-decreased dosing. Since then, the patient has worked on identifying more migraine triggers and appeared to have better affect as well as reduced severity and frequency of migraines.

Even though methylphenidate can potentially worsen migraines, the patient reported improved concentration and productivity at a low dose without worsening migraines. The patient also achieved her original weight as overall mood, affect, and pain improved. Although the patient was improving in most aspects of therapy, however, her migraines and overall pain were not adequately relieved. In conclusion, this case report discusses the challenges of managing migraines when chronic pain management and other conditions are involved. Patient education, combined with good communication, is essential for optimal treatment.

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