Case Report

Beta-Blockers, a Spanner in the Works for Acute Management of Migraine?

Susannah Leaf

Hull York Medical School, 379 Aberford Road, Stanley, Wakefield, West Yorkshire WF3 4HE, UK
Address correspondence to Susannah Leaf, lvysh2@hyms.ac.uk

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Abstract Many patients suffer with migraine and do not feel their therapeutic needs are met, particularly in acute treatment. Beta-blockers are inexpensive, well-tolerated medications licensed for prophylaxis of migraine but not for acute treatment of episodic migraine (EM). However, this is based on trials that are possibly too narrow. A known association exists between migraine and various psychological disorders. In particular, anxiety disorder is implicated as a trigger and a pain modulator affecting experience and reporting of migraine. This case report highlights the need for a larger randomized-controlled trial assessing the efficacy of beta-blockers for the acute treatment of migraines, and in particular reviewing their effect in those patients with an associated anxiety disorder.

Keywords beta-blocker; propranolol; acute treatment; migraine; case study; anxiety; mood disorders; pain

1. Introduction

Beta-blockers can be utilized both as an anxiolytic and in the prophylaxis of migraine, with demonstrated efficacy in reducing the incidence of migraine paroxysms. However, the effect of beta-blockers, when used acutely in the treatment of migraine paroxysms that have an associated anxiety trigger, has yet to be established.

Migraine is a chronic, disabling, paroxysmal disorder with symptoms of severe headache and nausea typically lasting for 2–24 h. It is often associated with a prodromal period involving symptoms of fatigue, mood change, and a proportion of patients develop a preceding aura, typically involving visual disturbance, paresthesias, or speech disturbance. Migraines impact quality of life (QoL) and have higher rates of comorbid medical and psychiatric conditions and lower socioeconomic status within the population [1].

The pathophysiology of migraine is complex and largely unknown, involving both a genetic vulnerability and environmental triggers. Theories involve both neurological disturbance, with altered cerebral activity known as cortical spreading depression, and alterations in cerebral vasculature, inducing headache and aura. There are a number of properties belonging to beta-blockers that may explain their action in migraine.

The vascular element, after an initial neurological stimulus due to neuron hyperexcitability, is followed by a moderate reduction in blood flow. Given the vasodilatory effect of beta-blockers, and the propensity of propranolol to cross the blood-brain barrier, it could be theorized that this is one mechanism behind the observed effect.

Migraines often coexist with anxiety, sleep deprivation, and other mood disorders; these factors are implicated as a trigger and a pain modulator in migraine. Furthermore, migraines can perpetuate patients’ reporting worse depression and anxiety on objective and subjective outcome measures [2]. This can form a vicious cycle to trigger more migraine episodes. Anxiety sensitivity predicts pain, adjustment to pain, and evaluation of factors influencing pain. Although anxiety has been studied in other types of chronic pain disorders, there is still more to learn about the relationship with migraine and also the benefits of targeting this mechanism in the treatment of migraine.

Migraine is like a complex machine made up of many moving, interacting parts and powered differently, depending on the individual. There may be a group of people where beta-blockers can stop this machine in its tracks like a spanner caught in the works (Figure 1).

2. Case report

A 28-year-old man has suffered with a 15-year history of EM with aura. They often occur during stressful life events and/or sleep deprivation. His migraines occur approximately three times a year, with higher frequency of up to once a week in teenage years. Treatment has been largely unsuccessful with simple analgesics failing to give pain relief. Episodes start with lights appearing in the temporal region of the left eye with progression to both visual fields and almost complete loss of vision. Delirium, expressive dysphasia, auditory verbal agnosia, peripheral and circumoral paresthesia, worse in the left-hand side, radiating centrally and increasing distress are prominent early features. This is
Figure 1: The vicious cycle of migraine—stress triggers an aura, which increases anxiety, and in turn potentiates the progression and interpretation of pain, leading to a full-blown migraine. Beta-blockers are a spanner in the works, stopping the progression of a migraine.

followed with an intense headache, bilaterally in the parietal area, that progressively spreads towards the frontal area associated with nausea and further disturbance of senses: hyperesthesia, hyperacusis, photophobia, and hypersomnia. Episodes last between 10 h and 24 h followed by 12 h of nonmigraine headache.

On two particular occasions, this patient suffered migraine paroxysms associated with stressful triggers. On both occasions he described prodromal symptoms and aura, typical for this patient, followed by headache. However, within 30 min from onset of symptoms, the patient took 20 mg propranolol and experienced resolution of all symptoms other than a mild headache, persisting for approximately two hours.

3. Discussion

This case report suggests a possible role for beta-blockers in the acute treatment of migraine paroxysms, in particular with a patient with associated anxiety.

3.1. Current treatment

Migraine treatment options consist of the acute treatment of the migraine attack and prophylactic measures. Acute treatment aims to reduce the intensity and duration of symptoms. Oral nonsteroidal anti-inflammatory drugs (NSAIDs) and serotonin (5-HT) 1B/D-agonists or triptans are licensed. Additional drugs are used for specific symptoms or very severe attacks. Prophylactic medication, indicated when attacks occur more than twice a month, reduces frequency, duration, and intensity of attacks. The beta-receptor blocker propranolol is considered first line.

There is a need for new acute antimigraine drugs especially for those with EM. In the American Migraine Prevalence and Prevention (AMPP) study it was found that more than 40% of migraineurs have at least one unmet need, and the most common dissatisfaction was with current acute treatment [1].

3.2. Previous research

After a PubMed and Medline search, there have been a number of case reports suggesting efficacy, of which we are adding to the literature, and only four papers were found to be investigating the use of beta-blockers for acute management. Results are conflicting in these few studies dating between 1978 and 1991 with no recent papers extant [3,4,5].

All studies, irrespective of outcome, had small sample sizes and mostly looked at patients with chronic migraine, therefore qualifying for prophylaxis. Tokola and Hokkanen found propranolol was preferred by patients and was effective in certain patients but did not go further to find why it worked in that cohort [3].

Migraine has a myriad of etiologies and manifestations, however frequency and severity are the indicators of previous studies, with no discussion about anxiety and mood disorders. Banerjee and Findley looked at specific criteria in 18 patients, and patients with psychiatric issues were actively excluded [5].

The focus for acute management is finding novel drugs for novel sites. This is a time-consuming and expensive process. We could make a positive change for a proportion of these sufferers that may still be assisted in a cost-effective, immediate way.

4. Conclusion

This case shows dramatic clinical efficacy in aborting severe migraine from progressing on two occasions. This paper suggests there may be a link between efficacy and comorbid mood disorders or those with emotional triggers. Beta-blockers may have an important anxiolytic and vascular effect in patients with migraine. There is potentially a large body of patients to benefit from this well-tolerated and affordable medication including those with infrequent but debilitating episodes, those that do not qualify for prophylaxis or those who simply prefer to avoid chronic medication use. Literature review has demonstrated a paucity of studies assessing the efficacy of beta-blocker use on the acute treatment of migraine paroxysms. Studies have been small, involving at most 25 patients. Beta-blockers have been used as a safe, inexpensive pharmacological therapy for anxiety and have been shown to be effective for prophylactic
migraine. Unwanted side effects are uncommon. This case report highlights the need for a larger randomized-controlled trial assessing the efficacy of beta-blockers for the acute treatment of migraines, and in particular reviewing their effect in those patients with an associated anxiety disorder.

**List of definitions**

- **Chronic migraine**: > 15 migraines per month
- **Episodic migraine**: < 15 migraines per month

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**Consent** Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of the written consent is available for review by the editor of this journal.

**Conflict of interest** The authors declare that they have no conflict of interest.

**References**


