

The Prevalence of Imploding, Exploding and Ocular Headache

Types in a Women's Health Outpatient Practice

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Introduction

Migraine headaches are a unilateral, global or bi-frontal headache with gradual onset described as pulsating and/or crescendo-decrescendo in pattern and often occur with signs and symptoms such as nausea, vomiting, photophobia, phonophobia, and an aura. They can be debilitating to those who experience them and are more prevalent among women.

OnabotulinumtoxinA (Botox) is a protein derived from the bacterium *Clostridium botulinum* used for migraine prophylaxis via injections at certain trigger points. Recent migraine trials evaluating the efficacy of therapy have noted differences in the efficacy of Botox therapy based on *directionality* of migraines. Botox has been found to be more effective in imploding (squeezing in) and ocular (eye pain) migraines than in exploding migraines (pushing out). However, the prevalence of these migraine types and their responses to conventional migraine prevention therapies has not yet been assessed.

Objectives of the study were to: (i) Determine the prevalence of imploding, exploding and/or ocular headaches in women with migraine in a primary care practice of women (ii) Investigate the concordance of physician diagnosis with patient self-diagnosis of pain directionality (iii) Assess correlation between the type of headache and severity of migraines, reproductive stage, and response to acute and prophylactic treatments

Methods

Internal Review Board (IRB) approval

Inclusion criteria

- female
- diagnosis of migraine based on the International Classification of Headache Disorders-2nd edition (ICHD-II) criteria for migraine diagnosis (headaches lasting 4-72 hours at least 5 times with at least two typical characteristics in addition to one associated symptom during the headache)

Exclusion criteria

- not fulfilling ICHD-II migraine diagnosis criteria
- inability to read English
- visual or communication impairment that would lead to inability to complete survey
- long term maintenance opioid therapy for headache or another chronic pain condition
- patient refusal to participate

Patients were identified for participation in the study when they presented at the Women's Health Internal Medicine (WHIM) Clinic at Mayo Clinic Arizona with a migraine or a history of migraines or, if they requested migraine medication refills via the clinic prescription nurse

Face to face interviews conducted by investigators in a standardized manner utilizing three surveys:

Methods Contd.

- Migraine Disability Assessment (MIDAS) questionnaire (patient completed)
 - reliable and valid in assessing migraine disability
 - five questions whose responses are then summed up to grade the amount of disability.
 - MIDAS score of 0-5 indicates no disability, 6-10 mild disability, 11-20 moderate disability and 21+ severe disability.
- Headache Questionnaire (patient completed)
 - used to determine patient description on headache, current and previous treatments and their effectiveness in addition to reproductive age
 - utilized pictorial (Figure 1, adapted from Jakubowski et al.) and non-pictorial representations of directionality
- Headache Interview Questionnaire (physician completed)
 - re-phrased the migraine directionality questions
 - used for physician diagnosis of directionality

All survey data were entered into a study specific database. Descriptive and non-descriptive statistics were utilized to analyze data.

Figure 1: pictorial representation of patient migraine directionality attempting to represent imploding, exploding and ocular migraines, respectively



Results

Table 1: Demographics summary and menopausal status

Age	Average Range	46 11.7-77.2
Race	Caucasian	176 (88.4%)
	Asian/Pacific Islanders	8 (4%)
	African-American	5 (2.5%)
	Other	10 (5%)
	No response	2 (0.99%)
Education	Missing	1 (0.5%)
	1 = Grade 11 or Less	4 (2.0%)
	2 = Graduated High School	7 (3.5%)
	3 = Some college or technical school	60 (30.0%)
	4 = Graduated College	65 (32.5%)
	5 = Some graduate work	16 (8.0%)
	6 = A graduate degree	48 (24.0%)
Menopausal status	1 = Reproductive Stage	65 (34.2%)
	2 = Menopausal transition	32 (16.8%)
	3 = Postmenopausal	59 (31.1%)
	4 = Hysterectomy with ovaries removed before age 50	34 (17.9%)
	No response	11 (5.5%)

When comparing menopausal status with different types of headache, the association was not statistically ($p=0.2812$)

Results Contd.

Table 2: The prevalence of imploding, exploding and ocular headaches based on physician diagnosis and patient self report

	Physicians' Diagnosis		Patient self report (picture)		Patient self report (words)	
	n	%	n	%	n	%
Imploding (with and without ocular)	72	35.82	65	32.66	83	41.92
Exploding (with and without ocular)	89	44.28	36	18.09	83	26.77
Imploding and exploding (With and without ocular)	26	12.94	20	10.05	16	8.08
Ocular only	14	6.97	78	39.20	46	23.23

Concordance rate between physician's diagnosis and patients' self report based on words: 54.44% (108/198), Kappa coefficient: 0.36 (i.e. week agreement, $p<0.0001$)

Concordance rate for patient responses to the pictorial migraine representation versus written questions: 54.08% (106/196), Kappa coefficient: 0.35 (i.e. weak agreement, $p=0.0005$).

Table 3: Summary of responses to Migraine Disability Assessment (MIDAS) questionnaire

Question	Mean (SD)	Median	Range
1. Days in last 3 months missed work or school	0.8 (2.3)	0.0	0.0-18.0
2. Days in last 3 months productivity at work or school was reduced by at least half	2.9 (8.2)	0.0	0.0-90.0
3. Number of days in the last three months housework was not done	3.4 (6.7)	1.0	0.0-45.0
4. Number of days in the last three months housework productivity was reduced by at least half	3.6 (8.0)	1.0	0.0-90.0
5. Number of days in the last three months family social or leisure activities were missed because of migraines	2.1 (3.9)	1.0	0.0-30.0
Total number of days affected by migraines (sum questions 1-5)	12.5 (23.2)	6.0	0.0-255.0

Table 4: Summary of frequency and severity of migraines based on migraine type

	Imploding Mean (SD)	Exploding Mean (SD)	Ocular only Mean (SD)	Combined imploding and exploding (without ocular) Mean (SD)	Significance
Total number of days affected by headache	10.65 (16.26)	13.07 (29.55)	9.43 (9.80)	17.62 (19.91)	$P=0.1136$
Number of days in the last three months with headache	12.5 (14.20)	17.48 (24.62)	9.79 (14.61)	33.00 (29.94)	$P=0.0008$
Severity of headache in the last three months	6.10 (2.24)	5.76 (2.51)	4.14 (3.55)	5.40 (2.35)	$P=0.0914$
MIDAS	10.65 (16.26)	13.07 (29.55)	9.43 (9.80)	17.62 (19.91)	$P=0.1136$

Results Contd.

Twenty one (29.17%) patients with imploding migraines had taken prophylactic medications, out of which 13 (61.9%) thought they were effective.

No significance was noted in efficacy of common prophylactic medication based on migraine type. Medications evaluated included: amitriptyline, nortriptyline, propranolol, topiramate, divalproex sodium, gabapentin, onabotulinumtoxinA, verapamil, sumatriptan, naratriptan, almotriptan, frovatriptan, eletriptan, rizatriptan and zolmitriptan

Discussion

The study highlights the widespread prevalence of directionality in migraines among a sample of mostly Caucasian females, as hypothesized.

The response to treatment based on headache type was unremarkable, unlike hypothesized by the authors based on results from published botox trials. More research needs to be done on this topic to further delineate differences among treatment options and responses of the migraine types.

The majority of the patients had not tried many of the common prophylactic medication. The barriers of which, are likely multifactorial (physician lack of knowledge/ experience, patient reluctance etc.)

The strengths of the study included a large sample size ($n=201$), evaluation in a primary care setting to evaluate actual prevalence (unlike skewed data obtained from a migraine specialty clinic), and a standardized method to survey patients. The weakness of the study includes a mostly homogenous sample with decreased generalizability to the general public.

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