

HEADACHE

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INTRACRANIAL HYPERTENSION IN INFANCY: IDIOPATHIC INTRACRANIAL HYPERTENSION OR SECUNDARY PSEUDOTUMOR CEREBRI SYNDROME

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Introduction: The Pseudotumor cerebri syndrome may be primary (idiopathic intracranial hypertension) or secondary cause. It is important to recognize that patients with a secondary cause and papilledema may be indistinguishable from those with IHH. In addition to advising the secondary cause, these patients frequently require treatments used for IHH to prevent blindness.

Objective: Describe a group of patients with diagnosis of benign intracranial hypertension and the associated conditions which can define an idiopathic intracranial hypertension or secondary pseudotumor cerebri in this entity.

Materials y methods: Retrospective analysis of clinical charts. All patients 18 years old or younger between March 2005 and March 2013 with benign intracranial hypertension who met Dandy Modified Criteria were included.

Results: 16 patients were included (6 female). Headache (14/16), diplopia (4/16) and tinnitus 3/16) were the more frequent symptoms reported. Associated conditions were present in ten patients (62, 5%): LLA preB (2/16), drugs (6/16), morbid obesity (1/16), renal failure (1/16). No associated conditions were found in 6 patients. Just one patient presented recidivisms. Only one patient lost visual acuteness.

Conclusion: IHH in infancy is a diagnosis of exclusion. In our experience 62, 5% of children had associated conditions. In pediatric population with IHH a complete evaluation is suggest so associated conditions can be exclude.

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ACUTE HEADACHE AT THE EMERGENCY DEPARTMENT OF A PEDIATRIC HOSPITAL

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Objectives: To assess the etiologies of headache seen at an emergency department, to determine the warning signs and symptoms of serious pathology, and to evaluate the usefulness of CT scan.

Material and methods: Records of the emergency department between June 1, 2010 and May 31, 2011 were reviewed. Headache was the chief complaint in 341 patients. To assess outcome, clinical charts were reviewed or follow-up phone calls were made. The 2004 Classification of the International Headache Society was used.

Results: Headache accounted for 0.63% of the consultations with a similar sex ratio. Extracranial infections were found in 37.4% of the patients and headache was isolated (headache without etiology that does not recur within the following 6 months) in 21%. Headaches associated with an underlying disease accounted for 17.8% of all cases. Hydrocephalus was observed in 33.8% of these patients. The events were considered as primary headaches in 14.7%. Fever and vomiting were seen related to both benign and more serious pathology. Symptoms associated with intracranial disorders were: ataxia, papilledema, sensory disturbances, and hemiparesis. Brain CT scan was performed in 102 children and abnormalities were found in eight: Shunt dysfunction in five, CNS tumors in two, and an arachnoid cyst in one.

Conclusions: The majority of children presenting at the emergency department because of headache do not have serious underlying pathology. A detailed neurologic examination will identify those patients who are at risk of serious pathology and that require imaging studies.

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A POSSIBLE RELATION OF METHYLENETETRAHYDROFOLATEREDUCTASE (MTHFR) GENE POLYMORPHISMS 677T/1298C TO MIGRAINE IN BOYS AND GIRLS.

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Introduction: Women have been found to have a higher risk for migraine. The pathogenesis of migraine is known to be related to the presence of genetic polymorphisms of *MTHFR* mutations c.677C>T and c.1298A>C. The aim of the study is to examine the role of two *MTHFR* polymorphisms as risk factors for pediatric migraine and examine the differences between genders.

Methods: 47 patients (M=16; F=31) with migraine diagnosed according to the International Classification of Headache Disorders were randomly selected. The mean age of the study group was 13.4 yrs (SD=3.5). The control group (M=150, F=150) consisted of population-based healthy people ages 18-30. DNA testing for *MTHFR* 677C>T, 1298A>C mutations were performed. *MTHFR* genotypes were determined by PCR using specific primers.

Results: Amongst patients with aura, girls had higher frequency for c.1298A>C and c.677C>T mutations than boys: 46.6% vs 20% and 26.7% vs 13.3% respectively. In the patients' group without aura, girls also had higher frequency for mutation of c.677C>T than boys, 33.3% vs 16.7% respectively. Comparing the overall migraine group with controls, we also found higher frequency for mutations in women with migraine (54.8% vs 48% for 1298A>C; 58.1% vs 40% for 677C>T).

Conclusion: Our study shows that girls have a higher frequency for migraine than boys. We found that girls with migraine (with aura and without aura) have increased frequency of c.677C>T mutation. The present result indicate a possible contribution of *MTHFR* gene polymorphisms to migraine headache generation in children.

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CHRONIC AND RECURRENT VERTIGO AND DIZZINESS IN CHILDREN AND ADOLESCENTS

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Introduction: Vertigo and dizziness are most bothersome in disorders causing chronic or recurrent complaints. Migraine related vertigo is one of the most frequent causes of vertigo and dizziness in childhood and adolescence. Pediatric neurologists need to be familiarized also with the rare diagnosis, which might be missed by general pediatricians.

Methods: A retrospective analysis on 132 patient with chronic (>3 month) and recurrent (> 3 attacks) vertigo/dizziness who presented to a referral vertigo center in a 1, 5 year period (demographics, medical history, neuroophthalmological and neurological findings, vestibular testing, diagnosis).

Results: Mean age of patients was 12, 7 ± 2 years (range 1, 4 - 18, 8 years, 60% female). Most frequent diagnosis was migraine (33%), followed by somatoform vertigo (24%) and peripheral vertigo (benign paroxysmal positioning vertigo, unilateral or bilateral failure, Ménière's disease; 16%). Less frequent diagnoses were cerebellar ataxia (6%), orthostatic dysregulation (6%) and vestibular paroxysmia (5%). Headache was present in 60% of all patients and in 76% with migraine related vertigo. Rotational vertigo was described by 51%. Permanent dizziness was complained in 24%. Vertigo or dizziness in patients with migraine last less than 1 hour in 54% of attacks.

Conclusion: Migraine is the most common cause of recurrent vertigo and dizziness in childhood and adolescence. Somatoform vertigo ranks second, followed by different forms of peripheral vertigo. Headache is the most prevalent accompanying symptom. An accurate medical history taking and careful physical examination are most relevant to make the correct diagnosis.

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PREVALENCE OF HEADACHE AMONG ADOLESCENTS IN NORTHERN ISRAEL

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Objective: To estimate the prevalence of headache among adolescents in Northern Israel.

Methods: A self-administered, anonymous questionnaire was presented to 2,088 tenth grade students attending 19 high-schools in Northern Israel. Participants were Jews and Arabs (the latter including Muslim, Christians, and Druze) between the ages of 15-16. Parental and student consent was obtained from all participants. The study was approved by the IRB of our institution.

Results: All 2088 questionnaires were returned although only 2019 were usable and analyzed. Arabs comprised 55% (1117) of the analyzed sample and Jews 45% (902). With regard to gender, 56% of participants were female. Of the Arab participants, 18.6% reported having frequent headaches (females 25.3%, males 9.1%, $P < 0.0001$). In contrast 27.9% of Jewish participants reported having frequent headaches (girls 35.6%, boys 19% $P < 0.0001$). Other somatic complaints such as abdominal pain, palpitations, disordered sleep and fatigue were more frequent ($P < 0.0001$) in adolescents (Jews and Arabs, girls and boys) who suffered from headaches than in their peers who did not report having headaches.

Conclusions: Headache is a frequent complaint among adolescents in Northern Israel. Jewish adolescents reported having headaches more frequently than their Arab peers. Those who suffered from frequent headaches also reported significantly more somatic complaints than those adolescents not reporting headaches.

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CHILD HEADACHE OUTPATIENT CLINIC

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We have started "Child Headache Outpatient Clinic" at the Hospital of Kyoto Prefectural University of Medicine since April 2010. After the 2 years of opening of the clinic, new headache patients were 44. This means 0.92 new patient per one clinic, 25 new patients were referral from other hospitals. 20 (45.5%) were males and the others (54.5%) were females, mean age was 11.8 ± 3.1 ranging from 4 to 17.3 years of age. Final diagnoses based on ICHD-II were 33 migraines (75%) in which 14 with aura. In migraineurs, there were 12 with positive family history, of this 9 whose mothers have migraine. There were 8 with orthostatic dysregulation (OD), of this 7 were associated with migraine. We have 6 patients with psychosomatic headache, of this 5 were associated with migraine. Brain MRI were done for 31 patients, and we have found 4 secondary headache patients, including 3 with decrease of cerebrospinal fluid, 1 with moyamoya disease. The treatment options were 29 prophylaxis using Ca blockers, anti depressants, Valproate, and Propranolol. Analgesics and triptans were adequately and successfully used.

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EFFECTIVENESS OF OCCIPITAL NERVE BLOCK FOR OCCIPITAL NEURALGIA IN PEDIATRIC PATIENTS

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Purpose: The purpose of this study was to verifying the responses to the occipital nerve block for occipital neuralgia patients who has tender point around suboccipital area.

Methods: In a prospective way, 45 pediatric patients with occipital neuralgia were enrolled since July, 2005. All patients have normal vital sign and physical examination except for exquisite tenderness at suboccipital region in the great occipital nerve or less occipital nerve. If pressing on these areas induces radiating pain over or through the scalp to the eye, the diagnosis is made. Pain was measured before and after the procedure using the visual analog pain indexes.

Results: Forty five pediatric patients with occipital neuralgia were enrolled from July 2005 to July 2013. Forty five patients, male: female = 15: 30, mean age: 15 +/- 8 years. Twenty three out of 45 patients (51%) performed brain MRI. All patients except for two epilepsy patients showed normal neuroimaging study. Thirty nine (87%) patients were treated with 2% lidocaine (8%), 2% mepivacaine (85%), 0.2% ropivacaine (8%) and steroid. Six (13%) patients were treated with acupuncture. Pain indexes were declined in 31 patients, but 6 were not response. Mean visual analog pain index scores declined by 4.3 units. Twenty four (53%) patients experienced recurrence of the disorder, but 24 patients, 15(63%) patients were relieved without the need for any further treatment. No complications or side effects were reported.

Conclusion: Our data suggests that occipital nerve block were safe and effective treatment for the children with occipital neuralgia.

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SIGNIFICANCE OF HEAD-UP TILT TEST IN THE INTRACTABLE PEDIATRIC MIGRAINE WITH DIZZINESS

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Purpose: Headaches children are sometimes associated with dizziness, and complain of very severe pain and sometimes may be intractable to the usual headache treatments. So it is very necessary for accurate diagnosis and proper treatment.

Materials and Methods: the 17 pediatric patients with headache and/or dizziness were enrolled from July 2012 to August 2013. The patients were divided into two groups; the migraine group (MG) and the dizziness without headache group (DG). All patients were carried out autonomic nerve function and head-up tilt test (HUT). The two groups were compared by non-parametric statistics.

Results: In total of 17 people, the male to female ratio was 1:4.7 and mean age 13.4 ± 2.9 years. At the nine patients in MG, symptoms or signs of dizziness were orthostatic causes in 5 (55.6 %), transient visual changes in 4 (44.4%), cold sweats in 4 (44.4 %), general fatigues in 4 (44.4%), and transient tachycardia in 2 (22.2 %) in order. After HUT, three patients were compatible to the orthostatic intolerance (OI), and one was postural orthostatic tachycardia syndrome (POTS) in 9 migraine patients, but two was OI, one was POTS, and the others was vasovagal causes. At HUT the heart rate (HR) increased 16 ± 15 (beats/min) in DG and 19.0 ± 12.9 (beats/min) in MG, which was significantly increased than in DG. The effects of fludrocortisone treatment showed improvement in 6 patients (66.6%) with migraine, and in 4 (100%) with dizziness.

Conclusions: The Head-up tilt test is important for the accurate diagnosis and proper treatment in migraine patients with dizziness

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EFFICACY AND SAFETY OF FLUNARIZINE IN TREATMENT OF PEDIATRIC HEADACHES

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Objectives: The aim of this study was to estimate the efficacy and safety of flunarizine in treatment of pediatric headaches.

Methods: We conducted a retrospective analysis of clinical records of children aged between 4 and 19 years who were treated with flunarizine for headache at the Chosun university hospital between April 2006 and December 2012. Flunarizine was prescribed to patients 5 mg daily. We evaluated frequency, duration, severity, and disability of headache before and after treatment of flunarizine. Effective treatment was defined as a reduction in the frequency of individual attacks by at the least 50%.

Results: Eighty five patients were identified, 23 were excluded due to missing records. Finally 62 children were identified: 18 boys and 44 girls with a mean age of 11 years. The diagnostic categories were: migraine (27), tension type headache (7), others (28). The mean frequency of attack was 15.1 ± 8.9 per month. Good outcome was observed 54.8% (34/62) in 1 month, 70.4% (38/54) in 3 month, and 80.8% (42/52) in 6 month. Adverse effects were seen in 15 (24.2%): worsening of headache (4), sedation (3), weight gain/increased appetite (2), dizziness (1), drowsiness (1) and others (4). Adverse effects lead to discontinuation of flunarizine were seen in 6 patients including worsening of headache (4), muscle ache (1), and tremor (1). Flunarizine was discontinued due to lack of response in seven patients.

Conclusions: Flunarizine appears to be effective and safe in pediatric headache in our study. In 9.7% of patients, adverse effects lead to discontinuation of flunarizine.

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PEDIATRIC MIGRAINE: USE OF ICHD II CRITERIA AND TREATMENT EFFICACY

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Objective: We assessed ICHD II criteria in all children referred to our hospital during 2011.

Methods: Out of 185 patients, 148 fulfilled inclusion criteria. Medical records were analysed, the current condition was assessed by two questionnaires. Statistical analysis was done by SPSS 20;

Results: Among 68 boys and 80 girls with migraine, the frequency in girls increased with age, while it was more frequent in boys in the age group younger than seven. 43.2% had migraine without aura, 41.2% with aura, 15.6% other types. The clinical features matched criteria ICHD II in more than 2/3 of children; the sensitivity to smell during the attack was present in 25.6% patients. The pain was bilateral in 44.4%. In 50% of children younger than 11 years the headache lasted less than 2 hours. Therapeutic measures were effective in 2/3 of patients. The average result of the PedMIDAS was 18.1. The migraine was not a burden for 80.4% of the children. All hypotheses tested at the $p < 0.05$ level.

Conclusions: The use of ICHD II criteria as diagnostic tool is appropriate in 2/3 children with migraine: bilateral localization and duration of the headache less than two hours are important criteria in preschool age patients compared to the adult population. Oversensitivity to smell is an accompanying symptom in one quarter of the patients. Therapeutic measures are effective in more than 50% of the patients. Prophylactic measures can efficiently reduce the frequency and intensity, but are rarely used.

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THE EVALUATION OF PROPHYLACTIC TREATMENT OF THE CHILDREN WITH MIGRAINE BY USING PEDMIDAS SCORE

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OBJECTIVES: Migraine is a significant problem and childhood migraine can significantly impair a child's quality of life. The aim of this study is to evaluate the efficacy of prophylactic treatments of our patients diagnosed as migraine by using Pediatric Migraine Disability Assessment score (PedMIDAS).

METHODS: Children with migraine aged between 6-17 years were followed-up at least 6 months and PedMIDAS questionnaire were applied at 0, 3 and 6th months.

RESULTS: The changes between PedMIDAS scores of 0-3 month, 0-6 month ve 3-6 month of patients who were given prophylactic therapy were significantly higher than the patients who did not receive any therapy. The changes between PedMIDAS scores of 0-3 months were 21.11 ± 14.68 days in topiramate group, 9.00 ± 9.30 days in flunarizine group and 26.80 ± 11.89 days in propranolol group. The changes between PedMIDAS scores of 0-3 months were significantly higher in topiramate and propranolol groups than flunarizine group ($p < 0.05$). The number of days on analgesics treatment significantly decreased in the patients who had topiramate and propranolol treatments ($p < 0.05$), whereas remained unchanged in flunarizine prophylaxis group ($p > 0.05$).

CONCLUSIONS: PedMIDAS scoring system was observed to be useful when evaluating the efficacy of pharmacological agents used in the prophylactic therapy of pediatric migraine. Topiramate and propranolol therapies were shown to lower the PedMIDAS scores better than flunarizine therapy.

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TOPIRAMATE FOR MIGRAINE HEADACHES IN A PEDIATRIC POPULATION

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Introduction: Migraine is the most frequent primary headache in pediatric population. Migraine incidence increases with age, affecting 11% of children between 5 and 15 years. Up to 25% of patients require preventive treatment due to high frequency, severity or repercussions of episodes. Topiramate has proven effective for migraine.

Objective: Assess response and safety of Topiramate for migraine in a pediatric population.

Methods: Prospective study between 04/01/2008 to 10/31/2013 at the Headache group, Pediatric Neurology Department, Pereira Rossell Children's Hospital, Montevideo, Uruguay. We included children up to 15 years old with migraine, classified according to the International Classification of Headaches Disorders, 2nd Edition. Topiramate was introduced in patients with 3 or more episodes per month. We started with 0.5mg/kg/day, increasing dose to 1mg/kg/day, maximum 2mg/kg/day or 100mg/day. Effectiveness was considered when a 50% or

more reduction in episodes occurred. Adverse effects were assessed by questionnaire to patients and their family.

Results: 190 patients with primary headaches consulted in this period, 121 (63.9%) had migraine. In the migraine group 59% (n=72) were girls, mean age was 9.63 years. 58 patients (48%) were treated with Topiramate, 60% (n=35) were girls and mean age was 9.94 years. Topiramate reduced episodes in 89.6% (n=52) of patients. In 2 patients there was no response to treatment and in 6 patients treatment was discontinued due to worsening of headaches or secondary effects (gastrointestinal, fatigue, muscular weakness). Secondary effects disappeared after treatment discontinuation.

Conclusions: Topiramate is effective and secure for migraine preventive treatment.

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HEADACHES ASSOCIATED WITH BILATERAL CHOROID PLEXUS XANTHOGRANULOMAS - ARE THEY ALWAYS BENIGN? CASE REPORT AND LITERATURE REVIEW

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Introduction: Xanthogranulomas of the choroid plexus (CPXG) are benign tumors which are most often found incidentally at autopsy. They have been reported in 1.4-7.0% of all autopsies. They are more common in the elderly populations and are very rare in children. Here we report a 4 year old boy with unusual headaches, bilateral CPXG and complete symptom-resolution after MRI-guided laser ablation (MGLA).

Methods: Case Report and Literature Review.

Case Description: A 4 year-old, previously healthy boy presented to clinic with headaches progressing from a few times a week to 3-4 times daily over the course of several months. They were exacerbated by sleep and lying supine. Lying with an elevated head decreased the severity but not the frequency of the headaches. They were intermittently associated with "blurred vision" but no photo/phonophobia or nausea. NSAIDs provided minimal pain relief. Neurological examination, including fundoscopy, was normal. Magnetic resonance imaging of the brain revealed bilateral CPXG. Lumbar puncture showed normal opening pressures and magnetic resonance venography was negative. The patient underwent stereotactic MGLA of the CPXG resulting in a decrease in the size of the CPXG and complete resolution of his headaches.

Conclusion/Discussion: Xanthogranulomas of the choroid plexus may present with unusual headaches in childhood and require detailed assessments and investigations. Intermittent positional obstruction of CSF flow and changes in CSF secretion may not be reflected in CSF pressure measurements. Clinical history is essential for guidance of therapy. MGLA proved to be a safe and effective treatment modality.

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OPHTHALMOPLAGIC MIGRAINE: IS IT A RECURRENT 3RD CRANIAL NERVE NEUROPATHY?

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Background: Ophthalmoplegic migraine (OM) is an uncommon type of headache, reclassified under cranial neuralgias in 2004. The International Classification of Headache Disorders defined OM as at least 2 attacks of "migraine-like" headache followed within 4 days by III, IV and/or VI cranial nerve (CN) palsy.

Aim: To describe clinical and neuroimaging findings of two adolescents with OM and review the literature on OM in pediatrics.

Methods: Retrospective review of clinical records and all cases of OM published since 2004.

Results: Case 1: A 13-year-old female, with previous migraine, had two episodes of OM at 10 and 13 years of age. She developed ocular pain and complete left third CN palsy. Brain MRI showed third CN gadolinium enhancement. She was put on prednisone with complete recovery. **Case 2:** A 15-year-old female with a history of migraine had two attacks of hemicranial headache, ocular pain, eyelid ptosis, and diplopia with spontaneous full recovery. MRI showed left third CN gadolinium enhancement. Twenty-one cases have been reported. OM onset ranged from 9 months to 16 years and 56% had a history of headache. MRI showed third CN gadolinium enhancement in 69% of cases and in only one the fourth CN was involved. At follow-up imaging, 17% of cases had third CN thickening without enhancement.

Conclusion: OM is a rare condition in pediatrics. Brain MRI with third CN enhancement confirmed the diagnosis. The physiopathology remains unknown. A recurrent demyelinating cranial neuropathy has recently gained favor based on MRI findings but vascular/inflammatory mechanisms also has been considered.