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I feel dizzy

A clinical approach to evaluation
I HAVE NOTHING TO DISCLOSE
Learning objectives

1. Define dizziness
2. Apply algorithm to evaluation of dizziness
3. Identify differential diagnoses related to presenting symptom of dizziness
4. Describe pertinent key history and physical exam findings when evaluating dizziness
5. List diagnostic criteria for selected diagnosis
   • Basilar migraine
   • Benign paroxysmal vertigo of childhood
   • Postural orthostatic tachycardia syndrome
There is limited literature on the prevalence of dizziness in children but it is more common than previously thought. Studies have shown the prevalence to be 5-18% (maybe up to 25%) in children.

- Humphriss and Hall did a population-based cohort study to estimate the prevalence of dizziness in 10 year old children in the UK.
- Dizziness was found to be not uncommon, with the prevalence being 5.7%.

(Humphriss & Hall, 2011)  
(Syed, Rutka, Sharma & Cushing, 2014)
Occurrence of causes of dizziness in children

BPV, benign paroxysmal vertigo of childhood
BPPV, benign paroxysmal positioning vertigo;
CV, central vertigo (includes cerebellar syndromes, central ocular motor disorders, and episodic ataxia);
HT, head trauma;
OV, orthostatic vertigo;
PVS, peripheral vestibular syndrome (includes unilateral and bilateral vestibular loss, vestibular neuritis, labyrinthitis, Menière's disease, and vertigo in middle ear effusion/otitis media);
SV, somatoform vertigo (includes phobic postural vertigo, chronic subjective dizziness, and vertigo in psychiatric disorders);
VP, vestibular paroxysmia.
Unknown

(Jahn, Langhagen & Heinen 2015)
Most common clinical diagnoses associated with dizziness in children

Benign paroxysmal vertigo of childhood 18%
Migraine-associated vertigo 17%
Head trauma 14%

The above findings were generated by an analysis of 10 articles found on Pub Med that dealt with dizziness and vertigo. The analysis was then published as a review article by Gioacchini et al.

In several clinical studies more than 50% of children with dizziness also have headaches

(Gioacchini, 2014)
Dizzy, I'm so dizzy my head is spinning
What do you mean by feeling dizzy?

Spinning
Twirling
Lightheaded
Fuzzy
Fainting
Blurry vision
Upset stomach
Weak legs
Funny vision
Off balance
Rocking
Falling
Anxiety
Woozy
Weak
Unsteady
Tilting
Key points to history

Define Dizziness

What do you mean dizzy?

I might faint
I’m lightheaded

The room is spinning
I am spinning

I am just dizzy

(Adapted from AAN and AAFP dizziness algorithm)
Algorithm for dizziness

What do you mean dizzy?

I might faint
I’m lightheaded

Syncope or Near/Pre syncope

Vertigo

The room is spinning
I am spinning

Postural orthostatic tachycardia syndrome

I am just dizzy

Mental health conditions

Ill-defined lightheadedness

Orthostatic hypotension

Cardiac arrhythmia

Vasovagal syncope

Postural orthostatic tachycardia syndrome

Acute

Chronic
**Differential diagnosis of dizziness**

**Vertigo pathway**

- **What do you mean dizzy?**
  - I might faint
  - I’m lightheaded
  - The room is spinning
  - I am spinning
  - I just dizzy

**Vertigo**

- **Acute/Episodic**
  - Hearing loss
    - Fever
      - Yes
        - Labyrinthitis
      - No
        - Trauma
          - Yes
            - Benign paroxysmal vertigo of childhood
          - No
            - Migraine
- <5 years old
- > 5 years old

- **Chronic**
  - Hearing loss
    - Neuro Deficits?
      - Yes
        - Cerebellopontine angle or posterior fossa tumor
        - Otitis media Cholesteatoma
      - No
        - Posterior fossa tumor/Degenerative disease
        - Systemic disease
Definition of vertigo

True vertigo is defined as the sensation of movement, usually rotation or spinning though displacement or tilting may also be experienced

Subjective vertigo is the illusion of movement by the patient

Objective vertigo is the sensation of the environment moving

Usually vertigo is accompanied by symptoms of nausea, vomiting, pallor, nystagmus and sweating with no change in consciousness
Vertigo Categories

Vertigo is categorized into peripheral and central causes

**Peripheral**
- Arising from the vestibular system in the inner ear
- Hearing loss and ear pain may be features
  - Benign Paroxysmal vertigo of childhood
  - Head trauma
  - Meniere
  - Vestibular neuronitis
  - Labyrinthitis
  - Vertiginous seizures
  - *Benign paroxysmal positional vertigo*

**Central**
- Arising from the central nervous system
- Cerebellar and cranial nerve dysfunction are often noted
- Hearing is intact
  - Chiari malformation
  - Cerebrovascular disease
  - Tumor- posterior fossa
  - Multiple sclerosis
  - Migraine
History key points in diagnosis of dizziness

What does dizzy mean to patient?
Age of patient
Frequency/duration of episodes
  • Acute or chronic
  • Short or long duration
Is there change with movement?
Associated symptoms
  • Hearing loss
  • Ear pain
  • Vomiting
  • Recent upper respiratory infection
  • Vision issues
  • Gait issues
History key points in diagnosis of dizziness

Current medications
Head injury or trauma
Alteration in mental status
Mental health issues
Physical exam key points in diagnosis of dizziness

Vital signs

Orthostatic blood pressure and heart rate

Ear exam-external and middle ear

- Look for vesicles in canal
- Signs of otitis media
- Discharge, perforated ear drum
- Mastoid swelling
- Vertigo or nystagmus after pneumatic otoscopy
- Hearing loss
- Signs of cholesteatoma
Physical exam key points in diagnosis of dizziness

**Eye exam**
- **Nystagmus**
  - In peripheral vertigo-nystagmus is suppressed by visual fixation and may be positional. The nystagmus is toward unaffected side
  - In central vertigo-nystagmus is constant and does not stop with fixation

**Full neurologic exam**
- **Cranial nerve**
- **Gait assessment to check for ataxia**
Vestibular/balance testing

**Head thrust or Head Impulse Test**
The head thrust test (HTT) is used to assess the vestibulo-ocular reflex (VOR).

It evaluates unilateral vestibular weakness.

- During the HTT, sit facing the patient holding the patient’s head from the front.
- Have patient fix gaze on a target, usually the nose of the examiner.
- Next, the patient's head is gently grasped, and a small-amplitude (5°-10°) but high-acceleration thrust is applied by the examiner.
- Once the head stops moving, the eyes are observed for a corrective saccade.
- The corrective saccade is a rapid eye motion that returns the eyes toward the target and indicates a decreased gain (eye velocity/head velocity) of the VOR.
- Individuals with normal vestibular function do not use corrective saccades after the HTT (the eyes stay fixed on the target).
Head Thrust Test

https://www.youtube.com/watch?v=CZXDNLLGG8k
Vestibular testing

Head shake

Have child close eyes
Tilt head down 30 degrees
Oscillate head 20 times horizontally
Watch for nystagmus once shaking is done
If nystagmus present indicates vestibular imbalance

Syed, Rutka, Sharma, & Cushing, 2014
Head Shake Test

https://www.youtube.com/watch?v=FqvVRStFf2s
Vestibular testing

Fukuda stepping test
Originally described by Fukuda using 100 steps on a marked floor. Patients are asked to step with eyes closed and hands out in front. Rotation by more than 45 degrees is abnormal. Rotation usually occurs to the side of the lesion. Rotation often found in asymptomatic patients.
Fukuda stepping test

https://www.youtube.com/watch?v=XGUNTS_Z2UM
Vestibular testing

**Romberg testing**

Patient asked to stand with feet together and eyes closed
Fall or step is positive test
Equal sway with eyes open and closed suggests proprioceptive or cerebellar site
More sway with eyes closed suggests vestibular weakness
Dix Hallpike test

Bring child from a sitting to a supine position with the head turned 45 degrees to one side and extended about 20 degrees backward.

Once supine, the eyes are typically observed for about 30 seconds. If no nystagmus ensues, the child is brought back to sitting.

There is a delay of about 30 seconds and then the other side is tested. Nystagmus occurring is a positive test.
Dix Hallpike Test

https://www.youtube.com/watch?v=RNBJLed_Slc
The examiner stands at the patient's head, 45° to the right, to align the right posterior semicircular canal with the sagittal plane of the body.

The examiner moves the patient, whose eyes are open, from the seated to the supine, right-ear-down position and then extends the patient's neck slightly so that the chin is pointed slightly upward. The latency, duration, and direction of nystagmus, if present, and the latency and duration of vertigo, if present, should be noted. Inset: The arrows over the eyes depict the direction of nystagmus in patients with typical BPPV. The presumed location in the labyrinth of the free-floating debris thought to cause the disorder is also shown.
Additional testing

Hearing test
Blood tests-only indicated if history supportive of concerns
Imaging-
  Brain MRI indicated if focal neurologic exam
  CT scan if trauma
Specialized vestibular testing-if screening vestibular tests are abnormal
EEG-only if history concerning for seizures with loss of consciousness
Case #1

TM is a 9 year old male presenting with dizzy spells.

History of Present illness

- TM presents with history of dizziness starting around Fall 2012. (18 months prior to being seen)
- Initial episodes were associated with sore throat and strep throat and felt related to this.
- Episodes occur every 30-45 days.
- Dizziness is always in the morning upon awakening. He will wake up and feel dizzy with spinning sensation, he feels motion and notes room spinning.
- There is nausea most of the time with emesis 30% of the time.
- Around 10 minutes into the episode he will develop a severe headache on the top of his head.
- The headache occurs with 50% of episodes.
- There may be earache and ringing at times.
- The episodes of dizziness last around 6 hours then resolve.
- Usually he will take Dramamine for the dizziness which helps most of the time.
- No identified trigger for the episodes.
- In between episodes he is normal with no complaints of headaches, hearing issues, dizziness, behavior change, weakness or vision issues.
Case #1

TM is a 9 year old male presenting with dizzy spells.

Review of systems-negative; no hearing loss
Current medications-none
School-in 4th grade, at grade level with no learning issues
Birth history- not significant
Family history
- Headaches/Migraine  Mother
- Headaches/Migraine  Maternal Grandmother
- Motion Sickness  Maternal Aunt
- Seizures/Epilepsy  Mother  
  
in infancy
- Heart Maternal Grandfather
Diagnostic evaluations-no previous brain scan, EEG or lab tests done
Case #1

TM is a 9 year old male presenting with dizzy spells.

**Physical exam**

Vital Signs BP 102/69 | Pulse 101 | Ht 138 cm | Wt 47.6 kg

**Orthostatics**

- Laying 115/74 | Pulse 86
- Sitting 115/74 | Pulse 86
- Standing 111/80 | Pulse 100
Case #1

TM is a 9 year old male presenting with dizzy spells.

GENERAL PHYSICAL EXAMINATION: normal including normal Tympanic membranes and ear canal.

NEUROLOGIC EXAMINATION:


SPEECH: Speech and articulation are normal for age.

CRANIAL NERVES:

Cranial nerves 2 through 12 as able to test for age and cooperation:

II: Visual fields: Full to confrontation. Fundoscopic exam: Optic discs are sharp and flat bilaterally. +venous pulsations

III, IV, VI: Pupils: Equal, round, reactive to light and accommodation. Extraocular eye movements: Able to track with full and conjugate extraocular eye movements.

No nystagmus

V: Facial sensation: Grossly intact to touch.

VII: Facial movements: Normal and symmetric.

VIII: Hearing intact to: Finger rub.

IX, X: Palate: Elevates symmetrically.

XI: Sternocleidomastoid and trapezius: Movement and strength are normal for age.

XII: Tongue: Midline and protrudes normally.

DEEP TENDON REFLEXES: Biceps, triceps, brachioradialis, patellar and Achilles reflexes are 2+ and symmetric bilaterally. Plantar responses are Toes down-going (flexor).

MOTOR SYSTEM: Normal muscle tone, bulk, and strength. No asymmetries noted.

SENSORY EXAMINATION: Intact to: Touch,

COORDINATION: Finger-nose-finger testing is normal and without tremor, dysmetria, or abnormal movements. Arm extension is normal and without tremor or pronator drift. Rapid alternating movements are smooth and coordinated. Heel-knee-shin testing is normal and without dysmetria or abnormal movements. Able to balance on each foot for 10 seconds without difficulty. Romberg is negative.

GAIT: Casual, heel, toe, tandem, and running gait are normal for age.
Case #1

TM is a 9 year old male presenting with dizzy spells

From HPI: Dizziness is always in the morning upon awakening. He will wake up and feel dizzy with spinning sensation, he feels motion and notes room spinning. Around 10 minutes into the episode he will develop a severe headache on the top of his head.

The headache occurs with 50% of episodes.

What do you mean dizzy?

- I might faint
- I’m lightheaded
- The room is spinning
- I am spinning
- I am just dizzy
Differential diagnosis of dizziness

What do you mean dizzy?

- I might faint
  - I’m lightheaded
- I might fall
- The room is spinning
  - I am spinning
- I am just dizzy

Vertigo
Differential diagnosis of dizziness

Vertigo pathway

What do you mean dizzy?

- I might faint
- I'm lightheaded
- The room is spinning
- I am spinning
- I am just dizzy

Vertigo

Acute/Episodic

- Hearing loss
  - <5 years old
    - Fever
      - Yes
        - Labyrinthitis
      - No
        - Trauma
  - > 5 years old
    - Benign paroxysmal vertigo of childhood

Chronic

- Hearing loss
  - Neuro Deficits?
    - Yes
      - Cerebellopontine angle or posterior fossa tumor
      - Otitis media Cholesteatoma
      - Posterior fossa tumor/Degenerative disease
    - No
      - Migraine

- Neuro Deficits?
  - Yes
    - Systemic disease
  - No
Differential diagnosis of dizziness
Acute/Episodic vertigo pathway

- Acute/Episodic
  - Hearing loss
    - Yes
      - Fever
        - Yes: Labyrinthitis
        - No: Trauma
    - No
      - <5 years old
        - Yes: Benign paroxysmal vertigo of childhood
        - No: Migraine
      - > 5 years old
Basilar-type migraine (vestibular or vertiginous migraine)

Classification from IHS

Migraine with aura symptoms clearly originating from the brainstem and/or from both hemispheres simultaneously affected, but no motor weakness.

Diagnostic criteria:

At least 2 attacks fulfilling criteria B-D

• Aura consisting of at least two of the following fully reversible symptoms, but no motor weakness:
  • dysarthria
  • vertigo
  • tinnitus
  • hypacusia
  • diplopia
  • visual symptoms simultaneously in both temporal and nasal fields of both eyes
  • ataxia
  • decreased level of consciousness
  • simultaneously bilateral paraesthesias

(IHS Classification ICHD II)
Basilar-type migraine (vestibular or vertiginous migraine)

At least one of the following:

• at least one aura symptom develops gradually over ≥5 minutes and/or different aura symptoms occur in succession over ≥5 minutes
• each aura symptom lasts ≥5 and ≤60 minutes

Headache fulfilling criteria B-D for 1.1 Migraine without aura begins during the aura or follows aura within 60 minutes

Not attributed to another disorder

History and physical and neurological examinations do not suggest any of the disorders listed in groups 5-12, or history and/or physical and/or neurological examinations do suggest such disorder but it is ruled out by appropriate investigations, or such disorder is present but attacks do not occur for the first time in close temporal relation to the disorder.

(IHS Classification ICHD II)
Case #1

TM is a 9 year old male presenting with dizzy spells.

Testing

In this case no testing was needed or done since symptoms were not chronic and fully resolved.

If neurologic deficits on exam or diagnosis is unclear then further testing is recommended:

- Brain MRI if focal deficits on exam or hearing loss noted

Treatment

Consider preventive medication if episodes are frequent.

Treat acute episodes with anti nausea medication and NSAID.
Case #1
TM is a 9 year old male presenting with dizzy spells

Other diagnosis to consider

Seizure--no symptoms consistent with these episodes being seizures

Vestibular related--no consistent hearing loss or ongoing auditory issues

Intracranial lesion--duration of symptoms long with normal history in between episodes and normal non focal exam

Orthostatic hypotension--orthostatic blood pressures normal

Benign paroxysmal vertigo of childhood
Case #2
AF is a 6 year old with dizzy spells

History of present illness

- Onset a few years ago.
- The episodes vary in time during day.
- The episodes can occur sitting, standing but mostly when laying down or at rest.
- At times can occur during activity.
- Often occur in clusters a few days ago but then none
- AF describes feeling ground moving, fuzzy in head and maybe spinning sensation.
- The episodes are brief lasting 1-5 minutes.
- She is always scared during the episodes and doesn't like the feeling.
- She is aware and responsive during the episodes.
- At times there is nausea but not every episode. Never any emesis.
- Few times with chest pain. Very infrequent headaches associated with the episodes.
Case #2
AF is a 6 year old with dizzy spells

Review of systems: all normal including hearing, vision, sleep
Current medications: none
Developmental milestones: normal
School: into 1st grade, grade level work

Family history
- Headaches/Migraine   Mother
- Headaches/Migraine   Maternal Grandmother
- Headaches/Migraine   Maternal Relative
- Headaches/Migraine   Paternal Grandmother

Birth History: not significant
Prior diagnostic evaluations: none
Case #2

AF is a 6 year old with dizzy spells

Physical exam

Vital signs: BP 125/57 (pt moving arm) Pulse 97 | Temp 99 (Tympanic)
| Ht 114 cm | Wt 19.5 kg | HC 51.0 cm

Orthostatic Vitals

99/64 100 Standing
96/51 80 Sitting
93/46 86 Supine

General and neurologic exam normal
Differential diagnosis of dizziness

AF describes feeling ground moving, fuzzy in head and maybe spinning sensation.

What do you mean dizzy?

- I might faint
- I’m lightheaded
- The room is spinning
- I am spinning
- I am just dizzy
Differential diagnosis of dizziness

What do you mean dizzy?

I might faint
I’m lightheaded

The room is spinning
I am spinning

I am just dizzy

Vertigo

Acute/Episodic

Chronic
Differential diagnosis of dizziness

Acute/Episodic vertigo pathway

- Acute/Episodic
  - Hearing loss
    - Yes
      - Fever
        - Yes: Labyrinthitis
        - No: Trauma
    - No
      - <5 years old
        - Yes: Benign paroxysmal vertigo of childhood
      - >5 years old: Migraine
      - No:
Case #2
AF is a 6 year old with dizzy spells
Benign Paroxysmal vertigo of childhood (BPVC)

- Abrupt episode that occurs without warning that resolves spontaneously
- Episodes occur in clusters and lessen with time/age
- Occurs between 2-6 years of age (though may continue through 10 years of age)
- One of the most common causes of vertigo in childhood
- Short duration often less than 5 minutes to rarely hours
- There is spinning sensation with loss of equilibrium
- Usually with associated nausea, sweating and paleness
- Nystagmus may be present
- **Child is often appears fearful/scared and anxious**
- There is no loss of consciousness or change in awareness during the episodes
- Triggers may be spinning, fever, over tired or stressful events

Classified as a childhood periodic syndrome by IHS-II. This is felt to be related to migraines

Often there is family history of migraines

Acute episodes can be treated with anti emetics and rest

If having recurrent episodes can consider Cyproheptadine as preventive medication
Case #2
AF is a 6 year old with dizzy spells
Other diagnoses to consider

Seizures—would consider if any concern regarding loss of awareness or abnormal movements during the episode

Benign positional paroxysmal vertigo (BPPV)—uncommon in childhood, especially young children

There is always a positional component and disruption in inner ear dysfunction. Felt to be attributed to calcium debris broken off the otoliths and lodging in the posterior semicircular canal. This causes a false sense of motion

Treatment is head positioning exercises
Dix Hallpike test is positive in this syndrome
Case #2
AF, a 6 year old with dizzy spells
Other diagnoses to consider

Migraine-basilar-type: if headache occurring then can consider this a migraine—there is little that differentiates BPVC from migraine in older children

Vestibular neuronitis/labyrinthitis
consider if vertigo lasting hours to days. A child having on going symptoms of vertigo will need more extensive evaluation including vestibular testing through ENT. Usually vestibular neuronitis is triggered by viral illness. Treatment of this is bed rest, hydration and treatment of the vertigo with antiemetics. Some children will need additional vestibular physical therapy
Case #3

HC is a 17 year old female with dizziness and headaches

History of present illness:

HC presents with history of dizziness and headaches
Dizziness on a regular daily basis, not a spinning sensation, just feeling lightheaded
Majority of headaches are dull ache and moderate in severity though she will have sharp pains overlying the dull ache at times.
No vision change, light or sound sensitivity with the headaches
Complains of racing heart and palpitations frequently
She has on going nausea and upset stomach
She is tired and sleeping excessively
Some mild sadness but denies significant depressive symptoms.
There are no concerns regarding seizures or episodes of unresponsiveness.
Case #3
HC is a 17 year old female with dizziness and headaches

Review of systems: all negative including hearing and vision
Current medications-none
School-in 11\textsuperscript{th} grade, does above average work
Family history
  - Headaches/Migraine    sister
  - Motion Sickness      sister
Diagnostic evaluations-no previous brain scan, EEG or lab tests done
Case #3
HC is a 17 year old female with dizziness and headaches

Physical exam

Vital signs

Orthostatic Vitals
126/75  112  Standing  Right Arm  12:02 PM
117/74  91  Sitting   Right Arm  12:00 PM
113/68  81  Supine   Right Arm  11:51 AM

General exam and neurologic exam normal and non focal
Case #3

HC is a 17 year old female with dizziness and headaches

HC complains of dizziness on a regular daily basis, not a spinning sensation, just feeling lightheaded.

What do you mean dizzy?

I might faint
I’m lightheaded

The room is spinning
I am spinning

I am just dizzy
Case #3
HC is a 17 year old female with dizziness and headaches.

What do you mean dizzy?
- I might faint
- I'm lightheaded
- The room is spinning
- I am spinning
- I am just dizzy

Pre syncope
Syncope

Ill-defined lightheadedness

Mental health conditions
Postural orthostatic tachycardia syndrome

Orthostatic hypotension
Cardiac arrhythmia
Vasovagal syncope
Postural orthostatic tachycardia syndrome
Postural orthostatic tachycardia syndrome (POTS)

Noted syndrome since 1999
Typically female (4:1 ratio), age 12-40 years, Caucasian
Combination of orthostatic intolerance and postural tachycardia
It is a type of autonomic dysfunction
Around 50% of patients have antecedent viral illness
POTS can be classified by a variety of ways.

There is overlap between subsets and most patients have symptoms that fall under more than one subtype.

**Neuropathic POTS**

- Decreased sympathetic adrenergic vasoconstriction of legs—this impaired peripheral vasoconstriction leads to venous pooling in the lower limbs. Tachycardia comes from redistribution of blood.

**Hyper adrenergic POTS**

- Symptoms of sympathetic activation, adrenergic over activity most obvious. There is noted increased levels of norepinephrine.
POTS classification

Deconditioned and bedrest POTS
   Bed rest leads to an ongoing state of orthostatic intolerance

Volume dysregulation
   Low blood volume
POTS symptoms

Orthostatic symptoms
• Dizziness and lightheadedness
• Near faint
• Blurred vision
• Blackout or whiteout of vision
• Weakness in legs
• Poor concentration
• Headache
• Nausea

Sympathetic over activation
• Palpitations
• Chest pain
• Migraine
• Tremor
• Anxiety
• Pallor
• Excessive sweating

(Jarjour2014)
POTS Diagnosis

Objective measures just one part of the diagnosis
  Diagnosis can be made on symptoms alone

Gold standard is tilt table test
  Heart rate increase > 40 beats/min or
  Absolute orthostatic heart rate > 130 beats/min for children < 13 years
  Absolute orthostatic heart rate > 120 beats/min for children > 13 years
    • Changes within 5 minutes of head-up on tilt table

If tilt table not available can do orthostatic measurements
  Current recommendation is initial laying measurement and then measurement after standing 10 minutes-same criteria as above applies
POTS Diagnosis
additional testing

EKG
Holter monitoring—to exclude other cardiac abnormalities
Lab tests—based on symptoms and to exclude other etiologies
  CBC, thyroid function, Complete metabolic panel
  Vitamin D
  Ferritin
Other testing may be done by other specialists
  Testing to look at autonomic function, exclude more significant etiologies
POTS treatment

Trigger avoidance
- Change in position
- Prolonged laying
- High environmental temperatures
- Large meals

Treatment focused on increased blood volume and blood return
- Increased water intake to at least 64 oz (2 liters) a day
- Drinking 16 oz (500 ml) prior to rising in morning
- Extra salt intake—recommendations for adults at least 3 grams at day
- Compression stockings or abdominal binder
- Exercise/conditioning
POTS therapy-pharmacologic

Mineralcorticoid

**Fludrocortisone (Florinef)**
Helps with intravascular volume expansion
*Dose 0.05-0.2 mg once or twice daily*

**Beta Blockers**

**Propranolol**
Reduce peripheral pooling of blood
*10 mg daily initially with titrating up to 10 mg three times a day*
  • May aggravate fatigue and depression in adolescents
Other beta blockers such as metoprolol and atenolol can be tried

**Alpha-adrenergic agonist**

**Midodrine**
Causes vasoconstriction
Side effects of tingling and goosebumps
*Start at 2.5 mg three times a day and increase up to 5-10 mg three times a day*
*Give last dose 4 hours prior to bedtime since may led to supine hypertension*
POTS pharmacologic treatment

Other medications that have been found to be potentially effective include:

Pyridostigmine - may help by increasing orthostatic blood pressure and reducing heart rate
  • Watch for GI side effects

Clonidine

SSRI

Medications for co-morbid disorders
  • Amitriptyline
  • Cyproheptadine
  • Stimulants
Case #4
DR is a 17 year old male with dizziness

History of present illness:
DR presents with a history of fainting and dizzy episodes starting one year ago. He describes the dizzy episodes as being lightheaded. A lot of episodes of "black vision". He describes feeling like his vision is going black, lasts a few seconds and then resolves. 4 episodes in past year where vision went completely black and he fainted. His eyes were closed, no abnormal movement, drooling or incontinence with these episodes. Denies any morning jerking, abnormal movements, staring spells or episodes of unresponsiveness not associated with the fainting.
Case #4

DR is a 17 year old male with dizziness

Review of systems: significant for anxiety, no other pertinent positives

Current medications: none

School: in 12th grade, academic performance is average

Family history:
  Headaches/Migraine  Mother
  Other (specify)  Mother
    fatigue due to medication use
  Back Pain  Mother
  Heart  Maternal Aunt
    valve repair in 20s

Prior diagnostic evaluations: none
Case #4

DR is a 17 year old male with dizziness

**Physical examination**

Vital signs-BP 126/65 | Pulse 84 | Temp 97.7 (Tympanic) | Ht 162 cm | Wt 53.7 kg | HC 55.5 cm

**Orthostatic blood pressures**

130/61   68  supine
131/67   78  sitting
110/68   86  standing

**General and neurologic exams are normal and non focal**
Case #4
DR is a 17 year old male with dizziness

HPI: He describes the dizzy episodes as being lightheaded. A lot of episodes of "black vision". He describes feeling like his vision is going black, lasts a few seconds and then resolved.
4 episodes in past year where vision went completely black and he fainted. There is no spinning sensation

What do you mean dizzy?

- I might faint
- I’m lightheaded
- The room is spinning
- I am spinning
- I am just dizzy
Case #4
DR is a 17 year old male with dizziness

What do you mean dizzy?

I might faint
I’m lightheaded

The room is spinning
I am spinning

I am just dizzy

Pre-syncope and Syncope

Orthostatic hypotension
Cardiac arrhythmia
Vasovagal syncope
Postural orthostatic tachycardia syndrome
Syncope

- Syncope is a abrupt loss of consciousness and postural tone due to loss of cerebral perfusion
- Pre syncope is a feeling of passing out but no loss of consciousness
- Recovery is spontaneous
- Prodrome that can occur seconds or 1-2 minutes prior to event and may include:
  - Nausea
  - Blurred or tunnel vision
  - Muffled hearing
  - Dizziness or lightheadedness
  - Sweating
  - Hyperventilation
  - Pallor with cool clammy skin
  - Weakness
- Can affect 15-25% of children and adolescents
  - Peak incidence 15-19 years of age
  - Female predominance
Syncope

Types of syncope

Cardiovascular mediated
- Arrhythmias
- Structural cardiac defect

Neurocardiogenic-most common in children and adolescents
- Vasodepressor, vasovagal or reflex

Noncardiovascular
- Orthostatic hypotension
- Convulsive syncope

Metabolic
- Hypoglycemia
- Electrolyte disorder
- Endocrine disorder
Syncope

**Testing**

Cardiac
- EKG
- Echocardiogram
- Holter/transient arrhythmia monitor

Laboratory testing
- CBC
- Complete metabolic panel
- Iron studies

Other testing
- Brain MRI if neurologic deficits
- EEG only if suspicion of seizures

**Treatment**

- Trigger avoidance
- Increased water intake to at least 62 oz (2 liters) a day
- Counter pressure maneuvers
- Head off bed elevated
- Compression stockings, abdominal binders

**Medications:**
- Beta adrenergic antagonists
- Mineralcorticoids
- SSRI
- Alpha adrenergic agonists
Syncope vs epileptic seizures

Syncope is brief loss of consciousness with typical prodrome
Loss of consciousness is few seconds to 1-2 minutes
Recovery is rapid with no post ictal phase
Incontinence is rare but can occur
Brief tonic posturing or clonic movement may occur
Usually occurs in context of environmental factor
  • Upright posture, heat, fatigue, hunger, change in posture or illness
If above not evident then consider seizures as a diagnosis and do EEG
Case #4

DR is a 17 year old male with dizziness

Orthostatic hypotension
Drop in blood pressure on position change causing decreased blood flow to the brain

Diagnostic criteria

• Systolic blood pressure decrease of 20 mm Hg OR
• Diastolic blood pressure decrease of 10 mm Hg within 2-5 minutes of standing after 5 minutes of supine rest

Associated symptoms

• Generalized weakness, visual blurring or black vision
Algorithm for dizziness

What do you mean dizzy?

I might faint
I'm lightheaded

Syncope or Near/Pre syncope

The room is spinning
I am spinning

Vertigo

I am just dizzy

Ill-defined lightheadedness

Acute

Orthostatic hypotension
Cardiac arrhythmia
Vasovagal syncope
Postural orthostatic tachycardia syndrome

Chronic

Mental health conditions
Postural orthostatic tachycardia syndrome
Differential diagnosis of dizziness

Vertigo pathway

What do you mean dizzy?

- I might faint
  - I’m lightheaded
- The room is spinning
  - I am spinning
- I am just dizzy

Vertigo

Acute/Episodic

- Hearing loss
  - <5 years old
  - Fever
    - Yes
      - Labyrinthitis
    - No
      - Trauma
  - > 5 years old
    - Benign paroxysmal vertigo of childhood

Chronic

- Hearing loss
  - Neuro Deficits?
    - Yes
      - Cerebellopontine angle or posterior fossa tumor
    - No
      - Otitis media
    - Neuro Deficits?
      - Yes
        - Systemic disease
      - No
        - Posterior fossa tumor/Degenerative disease

I am just dizzy

- No: Yes
- Yes: No
Learning objectives

1. Defined dizziness
2. Applied algorithm to evaluation of dizziness
3. Identified differential diagnoses related to presenting symptom of dizziness
4. Described pertinent key history and physical exam findings when evaluating dizziness
5. Listed diagnostic criteria for selected diagnosis
   - Basilar migraine
   - Benign paroxysmal vertigo of childhood
   - Postural orthostatic tachycardia syndrome


questions