Update on Impact and Treatment of Falls in Parkinson's Disease

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Topics for today

- How falls affect
  our patient's lives
- Normal walking
- Common causes of falls
- Therapeutic approach

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Why do falls in PD matter?

- Recent meta-analysis of PD falls studies results (n = 473)[1]
  - 46% had 1 fall in a 3 month period
- Falls and balance issues highly correlated with poor quality of life[2]
- Total cost of falls in US = $27.3 billion[3]

[1]PickeringRM, et al. Mov Disord 2007; 22:1892–1900.
[2]Rahman, et al. Mov Disord. 2008 Jul 30;23(10):1428-34.
[3]http://www.cdc.gov/ncipc/factsheets/fallcost.htm

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Impact of falls

- Fractures (broken bones)
  - 33% of falls in PD have fractures[1]
  - Hip fractures account for most of medical costs
- Bruising
- Brain hemorrhage
- Immobility if unable to arise after fall
- Fear of falling

[1]Wielinski, et al. Mov Disord. 2005 Apr;20(4):410-5.

Physiology of falls

- Walking = "Controlled falling"
- Balance requires integration of multiple inputs and outputs
  - Sensory perception
    - Vestibular, Visual, Proprioceptive
  - Higher Processing
    - Basal ganglia, premotor cortex, SMA, PPN, cerebellum
  - Signals to muscles
    - Multiple muscles – appendicular and axial

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Gait and Balance problems in PD

- Usually appears later in disease
  - 5-10 years
- Gait – may respond to dopaminergics
  - Small, shuffling steps
  - Festination
  - Freezing
- Balance – likely not respond to rx
  - Usually worse when turning
  - May fall backwards

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What makes the assessment of falls difficult?

- List of possible causes is HUGE
- Usually multifactorial
- Belief that there is nothing we can do about them

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Risk factors for falls in PD

- >2 falls in last 2 years
- Polypharmacy
- Increased disease severity
- Orthostatic hypotension
- Other Orthopedic or neurological problems
  - Cognitive dysfunction
- Fear of falling
- Visual difficulties
- Substance abuse (ie EtOH)

Boonstra, et al. Cur Opin in Neurology 2008; 21:461-471.
Dennison, et al. Am J Phys Med Rehabil. 2007;86:621–632.

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Polypharmacy

- Problem medications
  - Benzodiazepams
  - Anticholinergics
  - Antidepressants
  - Antipsychotics
  - Sleep medications
  - Antihistamines
  - Antihypertensives
  - Coumadin*

Tapering off meds active in brain over 14 weeks led to 39% reduction in falls (Campbell, 1999).

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Assessment of falls

- Determine main cause of falls
  - Helps to pick out a few specific recent falls and go through circumstances
  - Involve caregiver/spouse in discussion
- Thorough physical examination

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Clinical Circumstance

- What symptoms precipitated fall?
  - Syncope/presyncope
  - Leg weakness
  - Joint instability/knee "locked up"
  - Lost balance
    - Which direction (front/back/right/left)?
    - While standing?
  - Vertigo
  - Tripping
  - Freezing/festination

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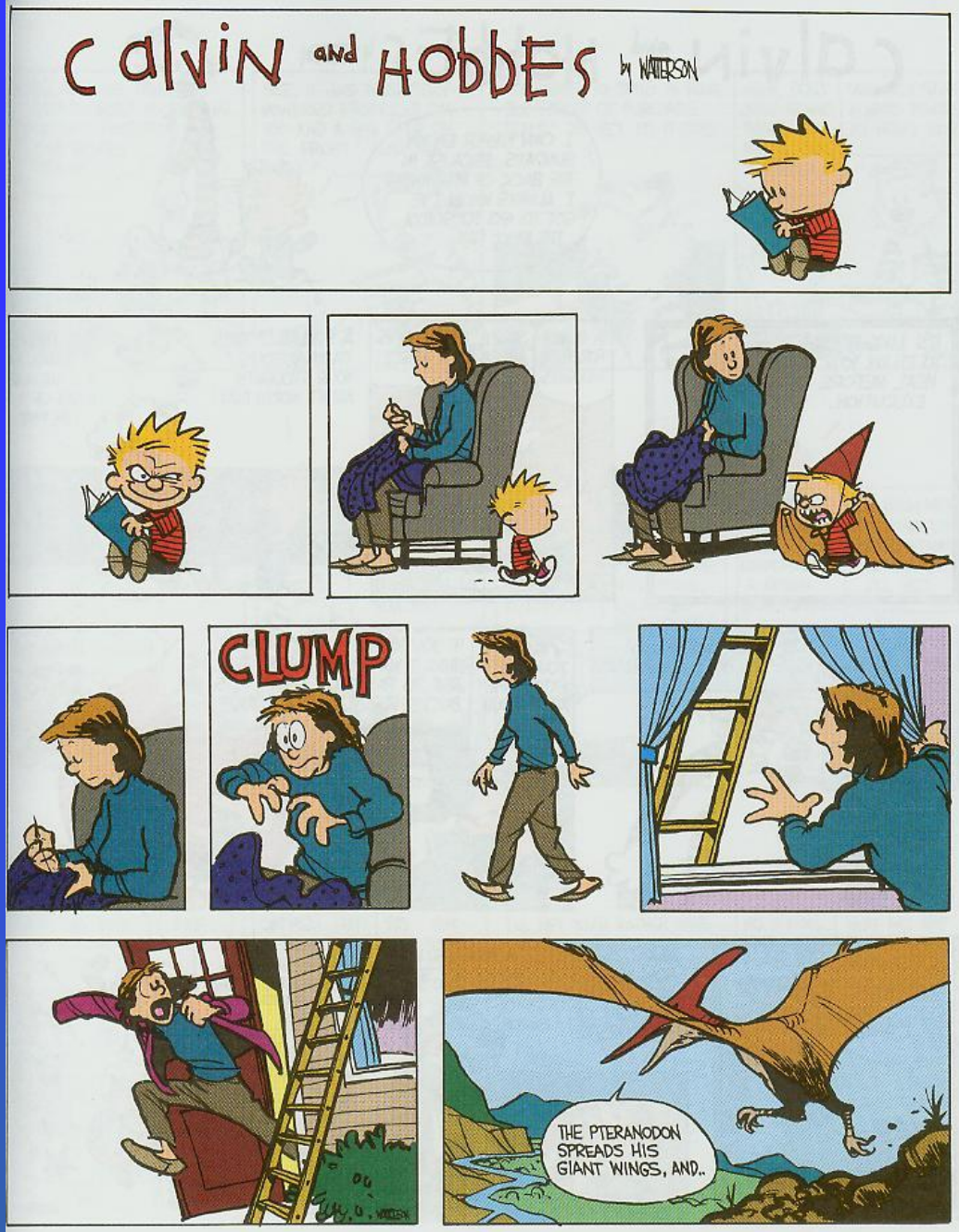
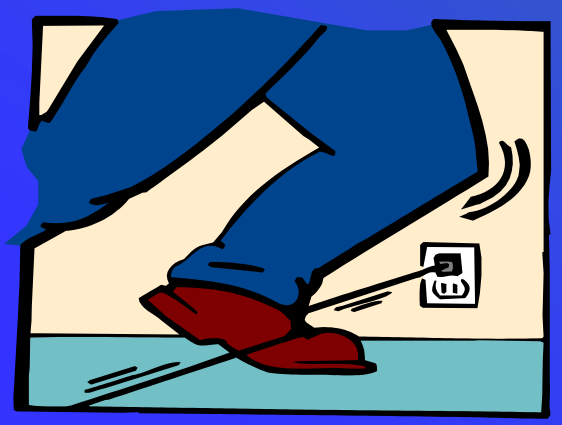


From – Indispensible Calvin and Hobbs. Copyright 1992 – Bill Waterson

Environment

- Environmental hazards
  - Tripping hazards
  - Uneven surfaces
  - Stairs
  - Ice/slippery surfaces
  - Insufficient lighting
  - Improperly used assistive device



Assessment (cont)

- Thorough physical examination
  - Orthostatic blood pressure
  - Mental status examination
  - Strength and sensation
  - Coordination testing
  - Station and gait testing
    - Arising from chair
    - Gait
    - Romberg
    - Posterior pull/push and release

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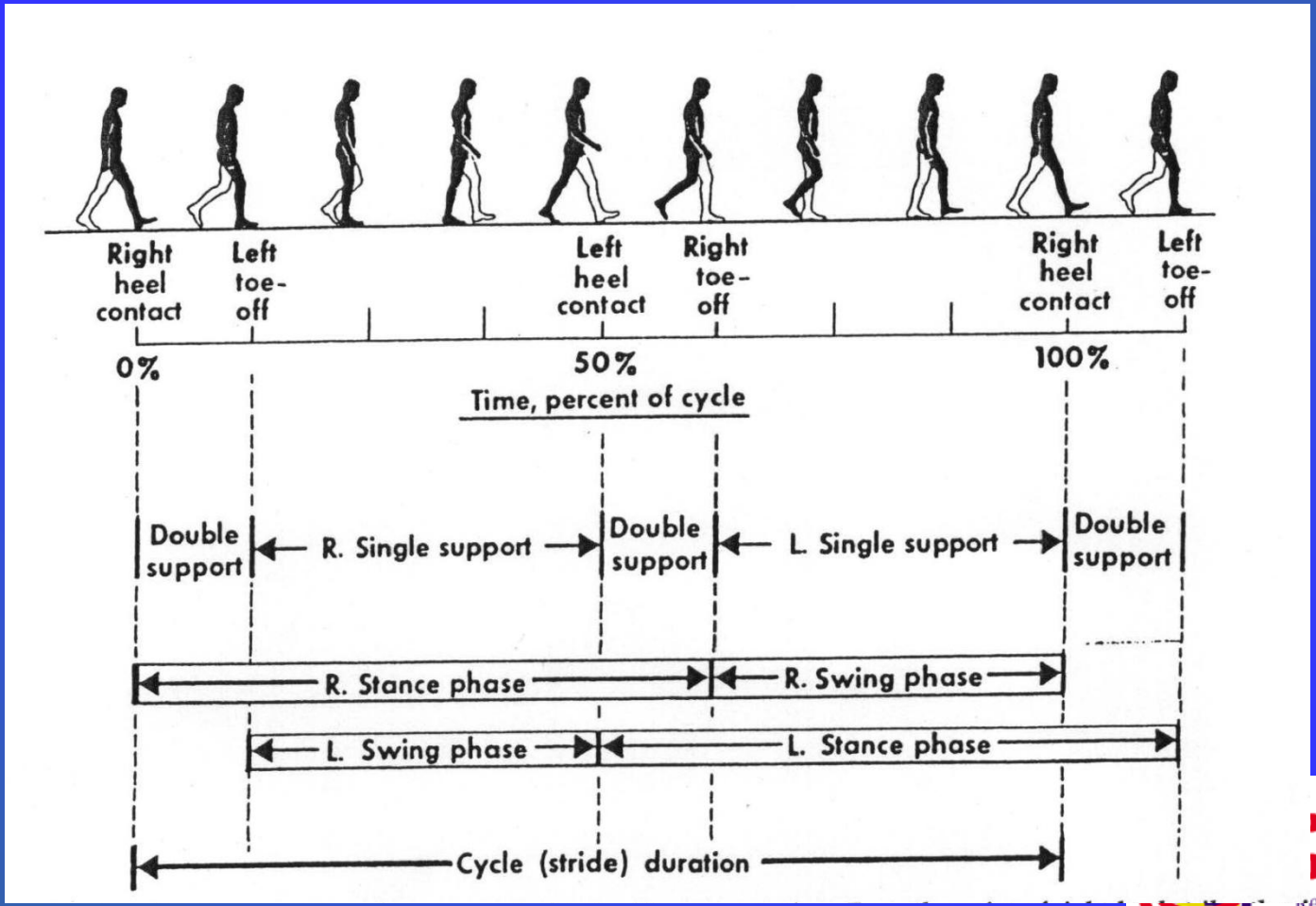
Exam - Gait



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Exam - Gait

- Watch for all the phases of gait
  - Step initiation
  - Swing phase
  - Heel strike
  - Double support
  - Toe off
- Also pay attention to
  - Arm swing
  - Base of support
  - Freezing episodes

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Gait/Balance assessment tools

- Get up and go test[1]
- Berg Balance scale[2]
  - http://www.aahf.info/pdf/Berg_Balance_Scale.pdf
- Activities-specific balance confidence (ABC)[3]
  - *web.missouri.edu/~proste/tool/**Activities-specific-Balance-Confidence**-Scale.rtf*
- Posterior pull test vs push and release test[4]

[1]Podsiadlo, et al. J Am Ger Soc. 1991 Feb;39(2):142-8.

[2]Berg, et al. Can J Public Health. 1992 Jul-Aug;83 Suppl 2:S7-11.

[3]J Gerontol A Biol Sci Med Sci. 1995 Jan;50A(1):M28-34.

[4]Jacobs, et al. J Neurol Neurosurg Psychiatry 2006; 77:322.

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Diagnostic testing

- Highly dependent on findings
- Balance Master or Gait Rite testing if available
- Imaging
  - If warranted
    - Fractures
    - potential sub-dural if indicated

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Treatment

- Medication options
  - Limited when specifically targeting balance
    - Emerging evidence about methylphenidate in gait and freezing[1]
  - Dopamingeric medication may help mobility
  - Be careful in setting of cognitive impairment
  - Taper off psychoactive medications if possible
- However, that doesn't mean we can't help…

[2]reviewed in Boonstra, et al. Cur Opin in Neurology 2008; 21:461-471.

Surgical treatments

- Deep brain stimulation
  - STN/GPi stim may help just as medication adjustment does
  - Decreasing frequency later in course may help balance[1]
  - STN DBS long term effects debatable on gait and balance[2]
    - Sometimes using proximal leads can help
  - Experimentally looking into PPN stimulation for gait and balance problems[3]

[1] Moreau, et al. Neurology. 2008 Jul 8;71(2):80-4.
[2]reviewed in Boonstra, et al. Cur Opin in Neurology 2008; 21:461-471.
[3]Stefani, et al. Brain. 2007 Jun;130(Pt 6):1596-607. Epub 2007 Jan 24.

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Other medical concerns

- Orthostasis
  - Aggressively treat with non-medical and medical options
- Osteoporosis
  - More common in PD
  - Ca/Vit D replacement
  - Vit D may have direct effects on balance and gait[1]

[1]in Cochrane review on fall prevention in elderly. 2001.

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Physical therapy

- Gait assessment
  - Help with motor strategies and assistive devices
  - Cueing may help with gait
- Exercise programs
  - Help with overall motor activity in PD[2]
  - Water therapy, Tai Chi, Pilates, treadmill training

[1]reviewed in Boonstra, et al. Cur Opin in Neurology 2008; 21:461-471.
[2]Goodwin, et al. Mov Disord 2008; 23:631–640.

OT Home visit modifications

- Most common recommendations
  - Removal of throw rugs
  - Safer footwear
  - Non-slip bathmats
  - Lighting for night
  - Addition of stair rails (one-floor living?)
  - Sidewalk repair of cracks,etc
  - Emergency call system (if nec)

[1]Scanameo, et al. Geriatrics. 1995 Mar;50(3):33-6, 39.

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Strategies to reduce falls

Table 1. Strategies Shown in Randomized Clinical Trials to Be Effective in Reducing the Occurrence of Falls among Elderly Persons Living in the Community.*

Strategy	Estimated Risk Reduction	No. of Trials with Positive Results†
	%	
Health care–based strategy‡		
Balance and gait training and strengthening exercise	14–27	2 of 3
Reduction in home hazards after hospitalization	19	1 of 1
Discontinuation of psychotropic medication	39	1 of 1
Multifactorial risk assessment with targeted management§	25–39	3 of 3
Community-based strategy¶		
Specific balance or strength exercise programs	29–49	2 of 2

From Tinetti, NEJM. 2003 Jan 2;348(1):42-9.

Nursing home recommendations

- Prevalence of falls increases sharply in nursing home residents
- Ideas for facilities
  - Safe environment
  - Attend to toileting needs promptly
  - Regular supervised exercise
  - Avoid sedatives as much as possible
  - Hip protectors

http://www.parknicollet.com/Methodist/Parkinsons/education/tulips.cfm

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Conclusions

- Falls have significant morbidity
- Evaluation of falls requires:
  - Broad differential diagnosis
  - Attention to circumstances of falls
  - Critical to assess gait in systematic fashion
- Therapeutic interventions for falls best if mulifactorial approach with tailored response.

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Additional Bibliography

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  - Thurman, et al. Neurology 2008;70:473–479
  - www.aan.com/go/practice/guidelines

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