Swallowing Issues in Parkinson Disease

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Learning Objectives

• Review the complex pathology of Parkinson disease and how this relates to deficits in swallowing.
• Define the onset, progression, and nature of swallowing deficits associated with Parkinson disease.
• Discuss surgical, pharmacological, and behavioral treatments for PD and their effects on swallowing function.
• Provide examples of common evaluation techniques and treatments used for dysphagia (swallowing disorder) associated with Parkinson disease.

Parkinson Disease

- Bradykinesia
- Postural Instability
- Tremor
- Rigidity
- Gait Disturbances
- Hypokinesia
- Cognitive Deficits
- Depression
- Autonomic dysfunction
- Sensory Impairment
- Dysarthria
- Dysphagia

Other systems affected by PD

- Cognition
  - Memory
  - Executive Function
  - Reasoning
- Mood/Affect
  - Depression
- Sleep
- Autonomic
  - GI
  - HR
Parkinson disease has many phenotypes

- Really described as ‘Parkinsonism’
  - Genetic causes
  - Idiopathic
  - Trauma-induced
  - Drug-induced
  - Young-onset
  - Tremor-predominant vs. Akinetic (freezing predominant)
- What does this mean?
  - Variability in presentation


Old way of thinking....

- PD is a motor only issue
  - Only neurotransmitter affected is dopamine
  - Only brain regions affected are the basal ganglia
- Doesn’t affect swallowing until later stages
New way of thinking

• PD affects entire brain
• PD affects other neurotransmitters
• PD is a problem of sensorimotor control
  – Scaling
  – Magnitude of Movement
  – Sensory feedback
• Dysphagia can occur at ANY stage

New way of thinking....

• Primary Component of Sensorimotor Control
  – Goal Directed Movement
  – Internally generated movement
  – Postural Control Adjustment
  – Skilled Movement
  – Adjust Movement to the environment
    • Bolus
Sensorimotor Control of Deglutition

Humbert, et al., 2009

Basal Ganglia & Deglutition

– Select & Initiate Motor Plans
– Sequence, Force & Timing
– Adapt to bolus changes
– Adapt general motor plans
How does this cause dysphagia?

– Decreased force
– Decreased range of motion
– Slowness
– Delay onset
– Inability to adapt to changes in bolus
  • Volume
  • Consistency

Dysphagia & Parkinson Disease

Oral Stage
• delayed oral transit
• tongue pumping
• uncontrolled bolus
• premature loss of liquid
• piecemeal deglutition
• tongue residue
• anterior/lateral sulci residue
Dysphagia & Parkinson Disease

Pharyngeal Stage:
- impaired motility
- delayed laryngeal elevation
- vallecular residue
- pyriform sinus residue
- laryngeal penetration
- aspiration
- deficient epiglottic position and ROM

Oropharyngeal Swallowing

- Difficulty with bolus propulsion and clearance resulting in
  - Residue
  - Airway compromise
  - Inefficient deglutition and inability to meet nutrition and hydration needs

Miller et al., 2006; Potulska et al., 2003; Ali et al., 1996; Bird et al., 1994; Troche, Sapienza, & Rosenbek, 2008; El Sharkawi et al., 2002; Leopold & Kagel, 1997; Fuh et al., 1997; Nagaya, Kachi, Yamada, & Igata, 1998; Potulska et al., 2003; Robbins et al., 1986; Wintzen et al., 1994
Esophageal Stage

- Weak esophageal peristalsis with food remaining in the esophagus
- Esophageal spasm
- Hiatal hernia
- Higher incidence of gastroesophageal reflux

Eadie & Tyrer, 1965; Leopold & Kagel, 1997

Morbidity and Mortality

- Weight loss
- Changes in diet
- Decreased quality of life
- Aspiration pneumonia
  - Leading cause of death related to PD

Beyer, Herlofson, Arsland, & Larsen, 2001; Clarke, 2000; D’Amelio et al., 2006
This is also a quality of life issue

- Social activities
  - Dining with friends, family and work colleagues can be negatively impacted.
  - Reluctance to eat in public due to embarrassment about drooling, slowness of eating, or fear of choking (Rosenbek & Jones, 2009).
- Patients may also have difficulty with reach-to-eat movements which can negatively impact feeding (Doan, Melvin, Whishaw, & Suchowersky, 2008).

Evaluation: Does this person have dysphagia?

- The answer is probably ‘yes’ to some degree
- Swallowing impairments do not necessarily correlate well with general ‘disease severity’
- Under-noticed by patient
  - Targeted probes may help the patient identify issues with more accuracy
- Under-noticed by practitioner
  - May not ask
  - UPDRS questions

Mahler, Ramig & Logemann, 2008
Variability

- Medications
- Fatigue
- Deep brain stimulation
- Disease progression

Evaluation

- Thorough history, medical history, chart review, structured interview
  - Ask the patient
  - Ask the S.O.
- Keep in mind that there are significant fluctuations in function
- Get an imaging study immediately, even if there are no significant signs of dysphagia
  - This will be your baseline
  - There may be ‘preclinical’ signs and YOU may be the first to document this
Treatment for Parkinson Disease

• Pharmacological
  – Dopamine
  – Other Neurotransmitters
• Surgical
  • Ablation
  • Transplantation
  • Deep Brain Stimulation
• Behavioral
  – Exercise

Effects of Medications on Swallowing

• Review medications
  – L-dopa, COMT or MAO inhibitor, Dopamine Agonist, other medications
  – Acknowledge side effects
  – Evaluate on and off of therapies
• No evidence for improvement, may actually diminish function

Effects of DBS on swallowing

• No improvement in the oral stage of swallowing
• Improved pharyngeal transit time, reduced pharyngeal residue and aspiration in the stimulated vs. non-stimulated condition.
• Likely, movements that require more precise/fine motor control may not be improved but the overall transfer of the bolus through the pharynx and airway protection may be improved with STN DBS.
• Impact of DBS on speech and swallowing likely depends on
  – Location of the implanted electrodes
  – Stimulation parameters

What can we do?

• Right now, all roads lead to.....
LSVT/LOUD

- Improved tongue base movement in oral and pharyngeal stages
- Improved OPSE


Respiration and Swallowing

- Weakness in voluntary cough is related to penetration/aspiration
  – Pitts et al., 2008 (Chest)
- Expiratory muscle strength training led to decrease in penetration/aspiration
  – Pitts, et al., 2008 (Dysphagia)

Other treatment options

Compensatory Strategies

• “Chin down” led to less aspiration
  – Logemann, et al., 2008
  – Ashford et al., 2009
• Supraglottic swallow was ineffective
  – Nagaya et al., 1998
• No evidence for effortful swallow or Mendelssohn maneuver
  – But, could we use this as a swallow-specific therapy?
Bolus Modifications

• Bigger vs. Smaller
  – Role of sensation?

• Thickened liquids = less aspiration
  – Troche, et al., 2008
  – Logemann, et al., 2008
  – Caveat: thickened liquids are association with increased pulmonary complications

Dysphagia Therapy and PD

• Begin to address early
• Exercise
  – LSVT/Loud
  – EMST
• Design our own treatment paradigm based on patient needs
  – Diet Modifications
  – Postural Changes
  – Frequent follow-up
  – Observe over time
  – Evaluate patients in ON and OFF states
    • DBS
    • Medications
Principles of Exercise

• Intensity
  – Intensive practice is important for maximal plasticity
  – frequency
  – repetitions
  – force/resistance
  – effort
  – accuracy

• Complexity
  – Complex movements/ environmental enrichment promote greater structural plasticity

• Salience
  – Rewarding tasks activates basal ganglia circuitry

• Use it or lose it
  • Inactivity may accelerate deficits
  • Continuous activity may slow disease progression

• Timing
  • Injury creates fertile field for plasticity


Alexander et al., 1990; Fox et al., 2002; Graybiel 1998; Kliem et al., 2003; Kleim and Jones, 2005; Jones et al. 1999; Saint-Cyr JA, 2003; Tillerson et al., 2002; Vergara-Aragon et al., 2003; Black et al. 1990; Comery 1995; Fisher et al, 2004; Kleim et al., 2001; 1996; Perez et al. 2004; Pisani et al., 2005 Plautz et al., 2000
Specifics

- Identify particular areas of difficulty
- Address that area with exercise
  - Simple cue
  - Focus on effort
  - How does that feel?
  - Intensive practice
  - Salient practice
  - Determine amount of cuing needed to maintain/carryover

Concrete Examples

- Begin intervention early and continue intervention throughout the disease process
- Practice should be task-specific
  - Example: Focus on an exercise to improve laryngeal elevation, but do this during a swallow and not during another task.
- Use a single cue
  - Minimize cognitive load
  - Example: Use one phrase, such as ‘swallow hard’ instead of multiple instructions such as ‘put the pudding in your mouth, hold it, push your tongue back forcefully, really lift your larynx and squeeze your throat, etc. The phrase you choose should elicit the behavior easily.
• Make the task highly salient and rewarding
  – Luckily, for most people, food is both salient and rewarding. Choose items that the patient wishes to eat and drink if they are safe.

• High intensity and multiple repetitions
  – Multiple repetitions, multiple times per day, for a period of weeks

• Include a sensory recalibration component
  – Example: Identify the appropriate behavior, such as the amount of tongue force to clear a bolus, and instruct the patient to ‘feel’ the amount of effort that it took to elicit that behavior. Focus on that amount of effort and although it may seem exaggerated, the patient must be trained to use that amount of effort until it becomes habitual.

Thank you!

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Outline

• General Effects of Parkinson's Disease
• Facial Effects of Parkinson’s Disease
• Oral Effects of Parkinson’s Disease
• Dental Treatment for the Parkinson’s Patient
• Oral Hygiene for the Parkinson’s Patient
• Dental Visit Recommendations
• Oral Hygiene Home Care
Learning Objectives

• Understand the oral and facial effects of Parkinson’s disease.

• Learn ways to make dental treatment easier and more successful for the patient with Parkinson’s.

• Discover tips for a more effective oral hygiene care routine in the home.

General Effects of Parkinson’s Disease

Fatigue
• both physical and mental fatigue may occur during dental treatment.

Anxiety
• may cause uneasiness during dental procedures.

Depression and Apathy
• affects keeping appointments and hygiene compliance.

Orthostatic Hypotension
• affects standing after being in a supine position.
Facial Effects of Parkinson’s Disease

Bradykinesia of the facial muscles
- causes slowness of chewing muscles
- difficulty in biting down correctly

Speech
- voice softens, words slurred, speech hurried
- hesitation in speaking also common

Reduced sense of smell and taste

Decreased blink rate and upward gaze of eyes

Mask-like facial appearance

The Many Faces of Parkinson’s Disease

Joyful          Pensive          Irritated
Fearful         Bemused         Bored
Ticked          Stunned         Ecstatic
Facial Effects of Parkinson’s Disease

Rigidity, Tremor and Dyskinesia

- leads to TMJ discomfort, cracked teeth, attrition (tooth wear) and denture instability and wear.
- tremors and dyskinesia of forehead, eyelids, lips, tongue, and mandible make dental visits difficult.
- rigidity/tremors of the hands causes loss of dexterity, leads to oral hygiene issues.
- drug dyskinesias may cause bruxism (tooth grinding).

Oral Effects of Parkinson’s Disease

Salivary Dysfunction

**Saliva:**

- lubricates the oral tissues
- assists in chewing/swallowing
- provides immunity to infection
- buffers, preventing tooth demineralization
Oral Effects of Parkinson’s Disease

**Sialorrhea** - excess saliva

- affects 78% of PD patients.
- drooling is related to dysphagia.
- can lead to angular cheilitis - fungal infection at the corners of the mouth.
- Sialorrhea may be treated with anti-cholinergic drugs, such as Amantadine.

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**Oral Effects of Parkinson’s Disease**

**Xerostomia** – lack of saliva, dry mouth

Increases risk of dental decay, especially root caries (cavities)

**Causes**

- the disease process
- general aging
- drug therapy side effects, especially the anticholinergic drugs

**Treatment**

- artificial saliva substitutes and/or sugar-free hard candy
- avoid irritating products such as alcohol, tobacco, spicy and acidic foods
Burning Mouth Syndrome

• the tissues of the mouth become dry and painful.
• affects up to ¼ of PD patients.
• may be caused by
  ✷ Xerostomia
  ✷ Infections
  ✷ Nutritional deficiencies
  ✷ Poor oral hygiene
  ✷ Parkinson medications

Dental Disease

• Dental caries (decayed teeth):
  The research shows mixed results, but an increase in decay will occur if oral hygiene is poor. Untreated decay can lead to tooth abscesses.

• Periodontal Disease (gum disease):
  Usually more prevalent due to inadequate oral hygiene from loss of dexterity.
Dental Treatment for the Parkinson’s Patient

Medical History Review
The more your dentist knows about you, the better care he/she can provide proper treatment.

The dentist should:

• update overall health, Parkinson’s level of disability and all medications, prescription and non-prescription.

• record your vitals; blood pressure, pulse, respirations.

• consider a medical consult; disease stage, cognitive impairment, drug interactions, treatment modifications.
Dental Treatment for the Parkinson’s Patient

Evaluate for nutritional deficiencies:

PD patients more likely to be Vitamin D deficient.

“Archives of Neurology” study concluded that more than $\frac{1}{2}$ were D insufficient and $\frac{1}{4}$ were deficient.

Dental Treatment for the Parkinson’s Patient

PD Medications: MAO-B Inhibitors

*Rasagiline* (Azilect) and *Selegiline* (Eldepryl)

- Not receive a local anesthetic that contains ingredients that can raise blood pressure (e.g. epinephrine).

- Should consult with neurologist regarding an MAO-B inhibitor. May opt to stop for elective surgery with general anesthesia due to risk of raising blood pressure.

- Avoid or limit
  
  Demerol
  
  OTC cold/cough meds - pseudoephedrine, phenylephrine, dextromethorphan
  
  Anti-depressants - MAO-A, SSRI, SNRI, tricyclics.
Dental Treatment for the Parkinson’s Patient

Dental treatment may be hampered by:

- Rigidity and a decreased mouth opening
- Bradykinesia of the facial muscles
- Difficulty in biting down correctly
- Tremors or dyskinesias of tongue and head
- Saliva difficulties
- Swallowing difficulties
- Fatigue and/or anxiety
- Orthostatic Hypotension
- Speech Difficulties

Recommend more frequent check-ups. Teeth cleaning every 6 months, 3 months if there is gum disease.

Even if you wear dentures, routine visits screen for oral cancer and evaluate the fit of your denture.
Dental Treatment for the Parkinson’s Patient

Ask to keep the dental chair more upright to assist in swallowing.

Plan shorter, morning appointments about 45 minutes.

Schedule the start about 60-90 minutes after a levodopa dose.

Dental Treatment for the Parkinson’s Patient

Restoration of oral health best completed in the early stages of PD.

Replace old fillings, crown and bridges, ill-fitting dentures. Consider dental implants, especially for overdentures.
Dental Treatment for the Parkinson’s Patient

After treatment, rise from dental chair slowly to prevent orthostatic hypotension.

All instructions should be oral and written and given to the caregiver.

Good oral hygiene should be encouraged to reduce complex treatment at an advanced stage, as well as reduce the risk for systemic Infective Endocarditis from oral bacteria.

Oral Hygiene for the Parkinson’s Patient
Oral Hygiene for the Parkinson’s Patient

Toothbrushing

• Use a toothbrush with a large handled grip and soft bristles. A small brush head reaches the corners better.

• The regular grip brush can be fixed inside a bike handlebar grip or a tennis ball for stability and dexterity.

• Electric toothbrushes are good. Some have timers.

Oral Hygiene for the Parkinson’s Patient

• Brush after every meal for 2 minutes, and brush your tongue.

• Try a “one handed” strategy – use the stronger side of your body.

• If you can’t brush after a meal, rinse your mouth with water.

• Replace your brush every 3 months or if the bristles show wear.
Oral Hygiene for the Parkinson’s Patient

Flossing

- Floss once daily, preferably at bedtime. Floss aids (floss swords) may be helpful.
- Caregiver assistance may be needed.

Oral Hygiene for the Parkinson’s Patient

Poor oral hygiene affects nutrition and increases risk of weight loss, stroke and heart problems.

- Eat nutritious meals and snacks.
- Avoid snacking on high sugar sweets, especially soft sticky candy.
- Avoid sipping on soda or fruit juice all day, instead drink water.
Oral Hygiene for the Parkinson’s Patient

Fluoride

Over the counter fluoride rinses (ACT) – must be able to swish and spit.

Prescription fluoride gels – apply with a toothbrush or sponge applicator.

Anti-microbial mouth rinses

Chlorhexidine

If cannot swish and spit, apply with brush or sponge applicator.

Oral Hygiene for the Parkinson’s Patient

Clean dentures daily.

If manual dexterity is difficult, try attaching a nail brush to a surface with a suction cup and move the denture across the brush.

May use soaking cleaners, (Efferdent, Polident).

“Be true to your teeth, or they will be false for you.”
Dental Visit Recommendations

Let’s review

• Inform your dentist of any changes in your medical history and/or medications. Discuss anesthetic and surgery concerns if you are on a MAO-B Inhibitor.

• Schedule several shorter visits, 45 minutes or less, rather than fewer longer ones.

• Schedule morning appointments, preferably 60-90 minutes post L-dopa dosing.

Dental Visit Recommendations

• Keep on a maintenance schedule for routine check-ups and cleanings, every 6 months, every 3 months if gum disease is present. Even denture wearers need an oral exam.

• Request that the staff position the chair more upright to reduce aspiration risks. Also at the completion of treatment, stand up slowly to prevent orthostatic hypotension (dizziness).

• Request all instructions be also given to your caregiver, preferably in written form.
Oral Hygiene Home Care

• Use a large handled toothbrush or an electric toothbrush with soft bristles. Brush a minimum of twice daily, after each meal is ideal. If brushing after a meal is not possible, rinse your mouth with water.

• Use the hand on the strongest side of the body to brush your teeth.

• If manual dexterity prevents normal flossing, try a floss aid and/or get caregiver assistance.

• If you wear dentures, remove after each meal, brush or rinse the denture. At night brush well or clean in a soaking solution.

Oral Hygiene Home Care

• If there is a decay concern, rinse and spit with an OTC fluoride rinse (unless there are swallowing concerns) or apply a prescribed fluoride gel with a brush or sponge applicator.

• Your dentist may prescribe a chlorhexidine rinse for gum disease. This can be rinsed and spit or applied with a brush or sponge applicator.

• Employ a diet of good nutrition with fruits and vegetables for gingival health. Take vitamin supplements if recommended by your physician.

• Limit soda, high sugar juices and sugary snacks, especially soft sticky ones.
References


James M. Noble, MD, MS, CPH. "Dental Health and Parkinson’s Disease", Parkinson’s Disease Foundation, winter, 2009.

"Low Vitamin D Levels Associated with Parkinson’s Disease", Parkinson Disease Foundation News and Review, winter 2009.


Thank You
Questions and Discussion

Resources from PDF

Fact Sheets
- Dental Health and Parkinson’s Disease
- Speech Therapy in PD

PD Resource List
- 750 Resources

Online
- Improving Communication in Parkinson’s Disease: One Voice, Many Listeners

PD ExpertBriefings
- Listen. Watch. Learn.
Upcoming PD Expert Briefings

Managing the Motor Symptoms in PD
Tuesday, March 11, 2014, 1:00 PM - 2:00 PM ET
Sotirios A. Parashos, M.D.
Minneapolis Clinic of Neurology

PD Medications: Managing Side Effects
Tuesday, April 8, 2014, 1:00 PM - 2:00 PM ET
Hubert H. Fernandez, M.D.
Cleveland Clinic Lerner College of Medicine

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Your responses help us to improve the work that we do.

Thank you.