2019 NCSHLA Annual Convention

Medications and their effects on swallowing

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Disclosures

Kristen Cline has no financial or non-financial disclosures.
Learner objectives

• Learner will be able to describe the mechanisms for how some medications cause dysphagia.

• Learner will be able to list at least 3 medication types that can influence swallowing function.

• Learner will explain how polypharmacy can increase the risk for aspiration pneumonia in the elderly population.
Dysphagia

- defined as difficulty swallowing
- prevalence may be as high as 22% in adults over age 50
- even higher (30%) in the elderly population receiving inpatient medical care
- and even higher (up to 68%) in long-term care settings
Phases of swallowing
• Anticipatory Phase
• Oral preparation/oral phase
• Pharyngeal phase
• Esophageal phase
Anticipatory phase

- Alertness
- Attention to task
- Orientation
- Visual and sensory stimulation (sight and smell of food)
Oral preparation/oral phase

- Contain the bolus in the oral cavity
- Prepare the bolus (mastication)
- Prepare bolus for transfer (collect bolus)
- Propel bolus A-P to the hypopharynx
Pharyngeal phase

- Base of tongue contact to posterior pharyngeal wall
- Velar closure
- Hyolaryngeal excursion
- Laryngeal vestibule closure
- Pharyngeal constriction
- Opening of UES
Esophageal phase

- Primary peristalsis squeezes bolus through the esophagus
- LES opens and allows bolus to enter the stomach
All phases of swallowing can be impacted by certain medications!
Ways medications influence swallowing

- Changes in cognitive function (sedation, lethargy, decreased attention to task, confusion)
- Changes in nerve & motor function
- Reduction in lubrication
- Impaired GI motility; esophageal injury
Medication groups that can influence normal swallowing
• Antipsychotics

• Anti-convulsant/anti-epileptic medications

• Pain medications

• Medications for Alzheimer’s disease

• Parkinson’s medications

• Medications that impact GI function/cause esophageal injury
The Nervous System
Central Nervous System (CNS)

- Brain
- Spinal cord
Peripheral Nervous System

- Autonomic nervous system
- Somatic nervous system (cranial nerves & spinal nerves)
Autonomic Nervous System

- Parasympathetic nervous system
- Sympathetic nervous system
Parasympathetic:
- Stimulates flow of saliva
- Slows heartbeat
- Constricts bronchi
- Stimulates peristalsis and secretion
- Stimulates release of bile
- Contracts bladder

Sympathetic:
- Dilates pupils
- Inhibits flow of saliva
- Accelerates heartbeat
- Dilates bronchi
- Inhibits peristalsis and secretion
- Conversion of glycogen to glucose
- Secretion of adrenaline and noradrenaline
- Inhibits bladder contraction

Medulla oblongata

Yagus nerve

Chain of sympathetic ganglia
CNS

Brain

Spinal cord

PNS

Somatic nervous system (cranial & spinal nerves)

Autonomic nervous system

Parasympathetic nervous system

Sympathetic nervous system
Antipsychotics
Antipsychotics

- Treat psychotic disorders
- Schizophrenia, paranoia, manic-depressive psychosis
- These medications block dopamine
Antipsychotic medications

- Associated side effects that have the potential to worsen or cause dysphagia
  1. Sedation
  2. Anticholinergic effects (enhance the sympathetic nervous system)
  3. Extrapyramidal symptoms
EPS effects on swallowing
<table>
<thead>
<tr>
<th>Impaired/Reduced Mastication</th>
<th>Reduced BOT Movement</th>
<th>Reduced Laryngeal Movement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tongue Pumping</td>
<td>Impaired Bolus Control</td>
<td>Pharyngeal Residuals</td>
</tr>
<tr>
<td>Reduced Tongue Range of Motion</td>
<td>Delayed Initiation of Pharyngeal Swallow</td>
<td>Aspiration</td>
</tr>
</tbody>
</table>
Tardive dyskinesia

- A form of EPS
- Tardive dyskinesia produces involuntary movements impacting the oral prep/oral phase of swallowing
- Involuntary choreiform movements (repetitive, rapid)
- Can affect the eyes, lips, tongue, jaw, and limbs

https://www.youtube.com/watch?v=fLwZQBJs8fI
Neuroleptic-induced choking

- This may be associated with medication-induced dysphagia (from EPS effects or tardive dyskinesia)

- Deepika, et al. 2017 - In psychiatric hospitals, asphyxiation is 100 times that of the normal population

- Yim & Chong 2009 - Chinese psychiatric patients in Hong Kong over a 12 year period; mortality rate due to choking was 8-fold higher than of the general population
Antipsychotic drug use and risk of pneumonia in elderly people

• Knol, et al

• cohort of 22,944 elderly people with at least one antipsychotic prescription

• 543 cases of hospital admission for pneumonia were identified

• Results indicated that current use of antipsychotics was associated with an almost 60% increase in the risk of pneumonia

• Similar associations were found even when elderly people with a diagnosis of delirium were excluded
Antipsychotics and Oropharyngeal Dysphagia in Hospitalized Older Patients

- Rudolph, et al.

- identified 379 inpatients older than 50 years that had VFSS from 2002-2006

- Subjects were excluded if they had a medical condition that may cause dysphagia (i.e. stroke, neurological disease, otolaryngological disorders, h/o dysphagia, and trauma)

- The focus of the study was the acute effect of antipsychotic drugs, therefore, patients on chronic antipsychotic therapy before admission were excluded

- 292 of the 379 inpatients did not meet inclusion criteria
Antipsychotics and Oropharyngeal Dysphagia in Hospitalized Older Patients

- 87 patients met inclusion criteria

- The mean Dysphagia Severity Rating Scale (DSRS) score increases (is worse) with increasing antipsychotic exposure (one point difference between the two groups)

- Clinical takeaway - the swallowing ramifications from introduction of the antipsychotic medication could lead to changes in diet consistency, maneuvers to prevent aspiration, or even alternate methods of feeding
Typical vs Atypical Antipsychotics
Typical Antipsychotics

First generation

Higher risk of EPS and tardive dyskinesia

Examples:

- Chlorpromazine (Thorazine)
- Loxapine (Loxitane)
- Haloperidol (Haldol)
## Atypical antipsychotics

Newer antipsychotics (second generation)

Less adverse side effects

Examples:

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Trade Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lurasidone (Latuda)</td>
<td></td>
</tr>
<tr>
<td>Risperidone (Risperdal)</td>
<td></td>
</tr>
<tr>
<td>Olanzapine (Zyprexa)</td>
<td></td>
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<tr>
<td>Quetiapine (Seroquel)</td>
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<tr>
<td>Aripiprazole (Abilify)</td>
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<td>Ziprasidone (Geodon)</td>
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<td>Clozapine (Clozaril)</td>
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</table>
Discontinuing the offending medication

- May resolve the dysphagia.
- Could take days to completely clear the body. Elderly with liver and kidney disease will have slower clearance.
- Tardive dyskinesia may be irreversible. Anti-parkinson medications are ineffective.
- Persistent tardive dyskinesia is greater in the elderly on high dose therapy (especially in females).
Anti-convulsant/anti-epileptic medications
Anti-convulsant/anti-epileptic medications

- Used to treat seizures
- May impact motor function and coordination due to changes in neurotransmitters
Associated side effects that can influence normal swallowing
<table>
<thead>
<tr>
<th></th>
<th>impaired voluntary muscle control</th>
<th>gingival hyperplasia (most common with phenytoin)</th>
</tr>
</thead>
<tbody>
<tr>
<td>sedation</td>
<td></td>
<td></td>
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<tr>
<td>confusion/mental status changes</td>
<td>xerostomia</td>
<td>severe skin and mucosal injury (in hypersensitivity reactions)</td>
</tr>
<tr>
<td>impaired cognition</td>
<td>mucositis</td>
<td></td>
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<tr>
<td>decreased awareness</td>
<td>GI upset</td>
<td></td>
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</tbody>
</table>
xerostomia
mucositis

bluemcare.com
<table>
<thead>
<tr>
<th>Anti-convulsant/anti-epileptic medications</th>
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</thead>
<tbody>
<tr>
<td>Phenytoin (Dilantin)</td>
</tr>
<tr>
<td>Carbamazapine (Tegretol)</td>
</tr>
<tr>
<td>Valproic Acid (Depakene, Depakote)</td>
</tr>
<tr>
<td>Ethosuximide (Zarontin)</td>
</tr>
<tr>
<td>Lamotrigine (Lamictal)</td>
</tr>
<tr>
<td>Gabapentin (Neurontin)</td>
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<tr>
<td>Phenobarbital</td>
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<tr>
<td>Topiramate (Topamax)</td>
</tr>
<tr>
<td>Levatiracetam (Keppra)</td>
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<tr>
<td>Lacosamide (Vimpat)</td>
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</tbody>
</table>
Pain medications
Pain medications

- Used to treat and/or control pain levels
- Three categories of pain medications
  1. Non-opioid analgesics
  2. Opioid analgesics
  3. Adjuvant analgesics
• Non-opioid analgesics - examples are aspirin, acetaminophen, and NSAIDs (e.g. ibuprofen)

• **Opioid analgesics** - narcotics (e.g. morphine)

• Adjuvant analgesics - used in combination with other agents to boost effects
Opioid Side effects that can cause dysphagia

- Sedation
- Nausea/vomiting
- Constipation
- Dry mouth
- Reduced GI motility
## Opioid pain medications

- **Codeine**
- Hydrocodone/acetaminophen (Vicodin, Lortab, Lorcet, Norco)
- **Morphine (MS Contin)**
- Oxycodone (Oxycontin, Percocet)
- Oxycodone and acetaminophen (Percocet, Roxicet)
- **Hydromorphone (Dilaudid)**
- **Fentanyl (Duragesic)**
- **Meperidine (Demerol)**
Medications for Alzheimer’s disease
Alzheimer’s disease

• Alzheimer’s disease is defined as an irreversible, progressive brain disorder that slowly destroys memory and thinking skills.

• 6th leading cause of death in the US
Alzheimer’s medications

- Used to improve cognitive and behavioral function in patients with dementia
Alzheimer’s medications

Donepezil (Aricept)

Rivastigmine (Exelon)

Galantamine (Razadyne)

Memantine (Namenda)
Many Alzheimer’s medications may cause **cholinergic effects** such as nausea, vomiting, diarrhea, abdominal pain, dyspepsia, anorexia, ataxia, confusion, sedation, and muscle weakness.
Dysphagia side effects of Alzheimer’s medications

- Donepezil (Aricept)
- Rivastigmine (Exelon) ➔ Cholinergic effects
- Galantamine (Razadyne)
- Memantine (Namenda) - agitation, confusion, drowsiness
Medications for Parkinson’s disease
Parkinson’s disease

- Symptoms of Parkinson’s disease include tremor, akinesia, rigidity, bradykinesia, shuffling gait, drooling, masked facies, dysarthria

- Usually diagnosed over the age of 55
<table>
<thead>
<tr>
<th>Parkinson’s medications</th>
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</thead>
<tbody>
<tr>
<td>Carbidopa/levodopa (Sinemet)</td>
</tr>
<tr>
<td>Carbidopa/levodopa-extended release (Parcopa)</td>
</tr>
<tr>
<td>Carbidopa/levodopa/entacapone (Stalevo)</td>
</tr>
<tr>
<td>Amantadine (Symmetrel)</td>
</tr>
<tr>
<td>Tolcapone (Tasmar)</td>
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<tr>
<td>Apomorphine (Apokyn)</td>
</tr>
</tbody>
</table>
Improvement in swallowing function

- Case studies, as well as anecdotal reports, suggest improvement in swallowing function following the administration of Parkinson’s medication.

- Fonda, et al., case study suggests swallowing improvement in some Parkinson’s patients when Sinemet (levodopa-carbidopa) was administered one hour before meals.

- Specifically, improvements in the following: reduction in oral tremor, reduction in laryngeal tremor, improvements in total swallow time, reduction in laryngeal penetration w/ solids/liquids, and reduction in aspiration of liquids.
Side effects of Parkinson’s medications that can impact swallowing

- anorexia
- nausea/vomiting
- dry mouth
- constipation
- confusion
- dyskinesias
Medications impacting GI function and/or causing esophageal injury
• esophageal injury
• obstruction
• altered esophageal motility
• altered LES function
Medication classes that can induce LES relaxation

- nitroglycerins
- anticholinergics
- aminophyllines
- Beta-receptor agonists
- benzodiazepines
Anticholinergics can also impact esophageal peristalsis
Symptoms/complaints with lodged pill

- feeling something “stuck”
- no symptoms
- retrosternal chest pain
- painful swallowing (odynophagia)
- food doesn’t go down
- pressure in chest
Increased risk of esophageal injury

- Pills that:
  1. have a large diameter
  2. are acid-containing (pH less than 3)
  3. have a prolonged dissolution time
Risk factors

- Extrinsic compression of the esophagus (from mediastinal mass, cardiomegaly, or vascular compression)
- GERD
- Swallowing medications with little or no fluid
- Pills that have slower dissolution rates and/or are large-sized forms
Medication groups that can cause injury to the esophagus

- Anti-inflammatory medications
- Acid-containing medications
- Bisphosphonates
- Potassium chloride supplements
- Methylxanthines
- Quinidines
Anti-inflammatory medications

Aspirin

NSAIDs (non-steroidal anti-inflammatory drugs)
  • Ibuprofen (Motrin, Advil)
  • Naproxen sodium (Aleve)

Steroids
  • prednisone
## Acid-containing medications

- **Cleocin** (clindamycin)
- **Vibramycin** (doxycycline)
- **Ery-tabs, E-mycin** (erythromycin)
- **Sumycin** (tetracycline)
- **Iron supplements (Slow FE, FeoSol, Feratab)**
- **Vitamin C (ascorbic acid) supplements**
Bisphosphonates

Alendronate (Fosamax)
Potassium chloride supplements

K-Dur

K-Tabs

Slow K
Methylxanthines

theophylline (Theo-Dur, Unidur, Slo-Bid)
Quinidine

Quinidex

Quinaglute
Pill-induced esophageal injury

- Endoscopy records from Jan 1997 - June 2003
- 92 patients with esophageal injury were identified
- Common symptoms: odynophagia, chest pain, vomiting, dysphagia, hematemesis
- Causative pills: NSAIDs, tetracyclines, potassium chloride, alendronate, and other drugs
Abstract
We report a case of acute esophageal obstruction from nelfinavir ingestion. A 43-year old man presented with odynophagia and inability to swallow following ingestion of 3 nelfinavir pills. Upper gastrointestinal endoscopy revealed complete obstruction by pill fragments. Repeat endoscopy a few days later revealed a stricture at the site of obstruction. Pill-induced dysphagia is a rare but potentially serious complication of medication use.
Strategies to prevent medication-induced esophageal injury

• Upright position

• Take medications with at least 100 mL of water (3.38 ounces)

• Take “bedtime” medications at least 30 minutes prior to sleeping

• Take one medication at a time

• Consult pharmacy before crushing tablets or opening capsules

• Consult pharmacy to request liquid forms of medications
Polypharymacy & Aspiration Pneumonia:

Is there a connection?
Predictors of Aspiration Pneumonia: How Important Is Dysphagia?

- Langmore, et al.
- Published in *Dysphagia* in 1998
- Landmark study
<table>
<thead>
<tr>
<th>Best Predictors of Asp Pna:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent for feeding</td>
</tr>
<tr>
<td>Dependent for oral care</td>
</tr>
<tr>
<td>Number of decayed teeth</td>
</tr>
<tr>
<td>Tube feeding</td>
</tr>
<tr>
<td>More than one medical diagnosis</td>
</tr>
<tr>
<td>Number of medications</td>
</tr>
<tr>
<td>Smoking</td>
</tr>
</tbody>
</table>
Predictors of Aspiration Pneumonia: How Important is Dysphagia?

- Langmore, et al.
- Published in 1998 in *Dysphagia*
Predictors of Aspiration Pneumonia in Nursing Home Residents

- Langmore, et al.
- Published in 2002 in *Dysphagia*
## Significant Predictors of Aspiration Pneumonia

<table>
<thead>
<tr>
<th>Significant Predictors</th>
<th>of Aspiration Pneumonia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suctioning</td>
<td>UTI</td>
</tr>
<tr>
<td>COPD</td>
<td>Mechanically altered diet</td>
</tr>
<tr>
<td>CHF</td>
<td>Dependence - eating</td>
</tr>
<tr>
<td>Feeding tube</td>
<td>Dependence - bed</td>
</tr>
<tr>
<td>Bedfast</td>
<td>Dependence - locomotion</td>
</tr>
<tr>
<td>Case mix index</td>
<td>Number of medications</td>
</tr>
<tr>
<td>Indicators of delerium/less alert</td>
<td>Age</td>
</tr>
<tr>
<td>Weight loss</td>
<td>CVA</td>
</tr>
<tr>
<td>Swallowing problem/dysphagia</td>
<td>Tracheotomy care</td>
</tr>
</tbody>
</table>
Clinical Resources
Reference book:

*Drugs and Dysphagia*

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epocrates app
Micromedex
Thank you for your attention!


Oral mucositis-what it is-what can you do about it-blue®m. www.bluemcare.com/oral-problems/oral-mucositis.


Xerostomia-dry mouth. www.juniordentist.com/xerostomia.html

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