I. Assessment:
   a. Impairment: modified barium swallow under video-fluroscopy
      i. DYMUS assessment for MS dysphagia
      1. 10-item questionnaire broken into two sub-questionnaires: dysphagia of solids and dysphagia of liquids
   b. Function: sip test; cough reflex

II. Early Stage: Signs and symptoms include incomplete oral function, leakage of oral content into the pharynx prior to swallowing, and penetration of food/liquids into larynx during or after swallowing
   a. Patient education
      i. Positioning using postural exercises and chin tilt to aid in swallowing by closing the airway.
         1. Patient to focus on swallowing and modulate cough
         2. Prolonged chewing; avoid change in food’s consistency
      ii. Change in diet: add thickening agent to water consistency liquids, moisten dry food with gravy or sauce.
      iii. Diet and Nutrition
         1. The aim is to maximize plasma levels of EFA’s, antioxidants, folate and Vit B12, and maintain a healthy gut
      iv. Eating habits: avoid speaking or rushing during meals
   b. Caregiver education
      i. First aid for conscious and unconscious choking victim
         1. Heimlich maneuver
   c. Intervention for Postural training
      i. Forward head position
      ii. Tight sternocledomastoid and pec stretches
      iii. Kyphosis

III. Middle Stage: Signs and symptoms are choking episodes, food retention in pharynx, leaking of oral content in pharynx and larynx, obstructive apnoea and acute pneumonitis due to aspiration of bolus into the bronchial tree.
   a. Patient education
      i. Dietary changes: softer diet through pureed or liquefied food, mash medications in food.
      ii. Consultation with nutritionist due to dehydration, anorexia or malnutrition complications.
b. Intervention (maybe co-treated with speech therapist)
   i. Lip closure = different diameter and length straws in liquid, balloon blowing (3 straws times 4 times each)
   ii. Tongue Movement = RI with tongue movement (4x12)
   iii. Jaw Control = Bite strength training (4x12)
   iv. Supraglottic swallowing = Patient is instructed to take a breath and hold it while swallowing and then cough after the swallow. This results in the voluntary closure of the vocal folds before, during and after swallowing.
   v. Speech therapy: sensorial tactile or thermic simulations of mouth and faucial isthmus (improve awareness of pharyngeal swallowing)
   vi. May need temporary nasogastric tube.
   vii. **NMES**
       Machine type: Myomed 134
       Frequency: 30 Hz
       Pulse Duration: 200us
       Ramp Up: .5s Ramp Down: .1s
       On/Off time: 5s/15s
       Duration: 2x20min/wk for 3wks
       Patients/subjects were instructed to swallow every time they felt the surging stimulus.
       Outcome Measures: Endoscopy, patient report
       → This study showed that the treatment of swallowing problems with NMES in the group of patients with severe MS was successful in reducing pooling of saliva and reducing aspiration. All 25 patients reported improvement in swallowing during follow up questionnaire. (Study was not randomized, no control, had different forms of bias; therefore warrants further research.)

IV. **Late Stage:** The impairment of oral and pharyngeal phases of swallowing is such that patients are prevented from oral feeding, and nutrition must be administered exclusively via an enteral tube.

   a. May need the insertion of a permanent feeding tube directly to the stomach (percutaneous endoscopic gastronomy) or by nasogastric tube.
   b. Hypersalivation can be successfully managed by anticholinergic drugs or botulinum toxin (BTX) injection into the major salivary glands.
   c. Maintain any residual oral functions
REFERENCES


