

Preliminary Findings on the Nature of Dysphagia in Patients with Chronic Obstructive Pulmonary Disease

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Abstract. Findings on 14 patients referred for swallowing evaluations from the pulmonary unit of a rehabilitation hospital are presented. Patients were admitted to the hospital with the primary diagnosis of chronic obstructive pulmonary disease (COPD). Thirteen patients had tracheostomy tubes, and five were ventilator-dependent. Each patient received a bedside evaluation to assess the oral phase of the swallow, as well as videofluoroscopy to examine the pharyngeal phase. Results indicated that nearly all of the patients experienced some difficulty with both phases of swallowing. Oral and pharyngeal transit times were consistently slower than normal. Most patients demonstrated diminished coordination and strength of the oral and pharyngeal musculature. The overall picture was one of reduced strength in all aspects of the swallow, coupled with a reduced ability to use pulmonary air to clear the larynx and ensure airway protection. Consistent aspiration was observed in only 3 of the 14 patients, but 10 of the patients were judged to have a moderate swallowing dysfunction.

Key words: Chronic obstructive pulmonary disease – Tracheostomy tubes – Videofluoroscopy.

Chronic obstructive pulmonary disease (COPD) is a term applied to a group of disorders having the common physiologic abnormality of airflow limitation. Two of the most important of these disorders are chronic bronchitis and emphysema. Chronic bronchitis is characterized by a long history of excessive production of mucus associated

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with cough and sputum production. Emphysema is characterized by an increase in the size of the airspaces distal to the terminal bronchioles, which is associated with destruction of the alveolar walls. In some patients one or the other diagnosis predominates; however, in the majority of patients emphysema and chronic bronchitis coexist, and precise classification is impossible. Thus, the generic term of COPD is commonly used (Gold 1985).

Individuals with COPD may be at risk for having some degree of swallowing impairment for two primary reasons. First, most patients with advanced COPD require tracheostomy tubes, which may interfere with normal swallowing patterns (Arms, Denes, and Tintzman 1974, Bonanno 1971, Butcher 1982). Second, swallowing and respiration are reciprocal functions; that is, respiration halts when the swallowing reflex is triggered. Therefore, when pulmonary function is compromised, as in COPD, the reciprocity between swallowing and respiration may also be disrupted.

This paper describes findings on a group of COPD patients referred for dysphagia evaluations from the pulmonary unit of Gaylord Hospital, a 121-bed rehabilitation facility.

Method

Subjects

Subjects studied were 14 patients with the primary diagnosis of COPD and no history of neurogenic disease or myopathy. All subjects were consecutively referred over an 18-month period because of suspected swallowing difficulties, to ascertain their readiness for PO feedings, or because of aspiration pneumonia. Each subject was considered to have advanced COPD and had demonstrated symptoms of the disease for several years. The group was comprised of 12 males and 2 females whose ages ranged from 53 and 85, with a mean age of 68.4. All of the subjects but one (Subject 4) had tracheostomy tubes, and five were ventilator-dependent at the time of the referral.

Table 1. Subject characteristics

Subject	Age	Sex	Tracheostomy tube	Ventilator-dependent	Method of feeding
1	74	M	+		G
2	73	M	+		PO
3	70	M	+	+	NG
4	64	M			PO
5	59	M	+	+	NG
6	57	M	+		PO
7	85	M	+		PO
8	75	M	+	+	NG
9	53	F	+	+	PO
10	77	M	+		PO
11	66	M	+	+	G
12	68	M	+		NG
13	58	F	+		PO
14	78	M	+		PO
Mean	68.4				
Range	53–85				

PO = oral; G = gastrostomy tube; NG = nasogastric tube

Respiratory capacity (forced vital capacity, forced expiratory volume, negative inspiratory force, etc.) for all patients was consistent with advanced COPD. Eight patients were on PO diets, four had nasogastric tubes, and two had gastrostomy tubes. Subject characteristics are presented in Table 1.

All subjects had been admitted from acute care hospitals for inpatient rehabilitation following exacerbation of this typically slowly progressive disease. Factors responsible for the exacerbation included upper respiratory tract infections and concomitant congestive heart failure.

Dysphagia Examination Procedure

All subjects were seen for a two-part dysphagia evaluation. In the first part, the patient's oral musculature as it related to bolus formation, control, and transit through the oral cavity was thoroughly examined.

The second phase of the dysphagia examination consisted of videofluoroscopy of the pharyngeal phase of the swallow. Following the modified barium swallow procedure described by Logemann (1983), patients were seated on a platform attached to the fluoroscopy table and viewed laterally. The focus of the examination was on the lips anteriorly, posterior pharyngeal wall posteriorly, the hard palate superiorly, and the division of the trachea and esophagus inferiorly. Patients were presented with three consistencies of materials to swallow: liquid barium, barium paste, and crackers coated with barium. The amount of each swallow was limited to one-third of a teaspoon of liquid barium or barium paste and approximately one-third to one-half of a cracker. Subjects swallowed each consistency twice. If a patient aspirated – that is, if material passed through the true vocal cords into the airway – the study was terminated.

All studies were recorded on a RCA 385 videocassette recorder and were analyzed to determine the nature of swallowing disorders and to measure swallowing transit times. According to Logemann (1983), oral transit time is normally of 1 s duration and is measured from the beginning of the posterior movement of the bolus by the tongue until the bolus passes the back of the tongue. The swallowing reflex should be triggered when the bolus passes the back of the tongue. Pharyngeal tran-

sit time, which is also normally 1 s, is measured from the point the bolus passes the back of the tongue and enters the pharynx until it passes the cricopharyngeus and into the esophagus.

In reviewing the recordings, various phases of the swallow were studied for specific problems: (1) the oral preparatory phase during which food is positioned in the mouth, masticated as needed, and formed into a bolus before the swallow; (2) the oral phase when the bolus is moved posteriorly by the tongue to the region of the anterior faucial arch where the swallowing reflex is triggered; (3) the pharyngeal phase when the swallowing reflex is triggered and the bolus is moved through the pharynx; and (4) the beginning of the esophageal phase, as the food passes through the cricopharyngeal port into the esophagus. The occurrence of aspiration and degree of aspiration were also noted where applicable.

Results

Table 2 summarizes findings from the 14 COPD patients seen for swallowing evaluations. These patients can be divided into three groups: those who consistently aspirated, those who demonstrated some swallowing dysfunction and no aspiration, and those who demonstrated functionally intact swallows.

Consistent Aspiration

Three of the 14 patients consistently aspirated materials that were swallowed. Of these three patients, one aspirated before the swallow because of a delayed swallowing reflex (Subject 6), one aspirated after the swallow because of decreased pharyngeal peristalsis (Subject 5), and one aspirated after the swallow because of an apparent cricopharyngeal/esophageal constriction (Subject 13). One of these patients (Subject 5) had an NG tube in place, and the other two (Subjects 6 and 13) were on PO diets. In two of these patients small amounts of the contrast material would drop onto the true vocal cords, and although they reported having the sensation of needing to cough, they were unable to generate a productive cough adequate for airway protection, even when their tracheostomy tubes were occluded. It is also important to note that in neither Subjects 5 nor 6 was aspiration or swallowing dysfunction observed to be attributable to a restriction of laryngeal movement because of the tracheostomy, which may have resulted in reduced glottal closure.

Management of Aspiration

To decrease the degree of aspiration noted during the videofluoroscopic evaluation, various management strategies were attempted. When Subject 6 lowered his chin before a swallow, thus widening

Table 2. Swallowing dysfunction observed in COPD patients

Subject	Aspiration	Dysfunction					
		Bolus control	Lingual peristalsis	Swallow reflex	Pharyngeal peristalsis	Laryngeal closure	Cricopharyngeal
1		+	+		+		
2			+		+		
3			+	+	+		
4							
5	+	+	+		+		
6	+	+	+	+	+		
7			+		+		
8		+	+		+		
9							
10		+	+	+	+		
11		+	+	+	+		
12							
13	+		+		+		
14							+
Totals	3 21%	6 43%	10 71%	5 36%	10 43%	0	1 7%

the vallecular space, aspiration was eliminated. When Subject 5 was presented with liquid and solid swallows alternately, aspiration was eliminated as well. In the third patient (Subject 13) compensatory positioning had no impact on aspiration. Medical intervention for the cricopharyngeal constriction was to be investigated for that individual.

Swallowing Dysfunction with No Aspiration

Swallowing dysfunction with no aspiration was observed in 7 of the 14 COPD patients. Of these seven, four demonstrated difficulties with bolus formation and control, four had delayed swallowing reflexes, and all seven patients exhibited problems with lingual and pharyngeal peristalsis. In all instances, the problems noted with bolus control and with lingual and pharyngeal peristalsis were the result of bilateral weakness and incoordination. These patients, as well as the three who aspirated, tired rapidly and often needed to rest in the midst of chewing foods. Their propensity for fatiguing rapidly while eating was consistent with their performance on other basic activities of daily living, such as washing and dressing. The delayed swallowing reflex observed in four of these patients was felt to be related to a lack of synchrony within the oral cavity during mastication and lingual transit of the bolus. In most instances, as general strength and endurance improved, the lingual and pharyngeal transit times approached the normal range, and promptness of the swallowing reflex improved.

Functional Swallows

Finally, 4 of the 14 patients examined demonstrated no swallowing dysfunction. These patients swallowed all three materials presented – liquid, paste, and cracker – without difficulty. One of these individuals (Subject 12) was receiving nourishment via an NG tube. Following the examination PO feedings were reintroduced to which the patient adjusted rapidly.

Discussion

Although there are a variety of reports in the literature pertaining to swallowing problems related to tracheostomy tubes (for example, Arms, Denes, and Tintzman 1974, Bonanno 1971, Butcher 1982), this paper is believed to be the first that deals specifically with dysphagia in patients with COPD. The findings reported are based on a small number of subjects, and all conclusions must be considered preliminary until additional data are compiled.

Incidence of Dysphagia in Patients with COPD

During the 18 months that the data were collected, 289 COPD patients were admitted to Gaylord Hospital's pulmonary unit. Of that number only 14 (5%) were referred for a swallowing examination. Of those 14, 3 (21%) aspirated, 7 (50%) demonstrated swallowing dysfunction but no aspiration, and 4 (29%) had functionally normal swallows. Therefore, during the 18-month period stud-

ied, the incidence of dysphagia among this group was 3%. It is difficult to judge retrospectively whether some of the COPD patients not seen could have benefitted from a swallowing examination. Videofluoroscopy has been used for assessing swallowing disorders at the hospital for approximately 2 years, and it is felt that the medical and nursing staffs of the pulmonary unit are now educated as to its usefulness. However, because the number of COPD patients referred for this procedure has not increased dramatically during that time, the 3% figure is felt to be a valid representation of the incidence of dysphagia in COPD patients, at least among those admitted to Gaylord Hospital. It is suspected that the incidence would be higher in an acute care hospital.

Nature of Dysphagia in COPD Patients

Ten of the 14 patients demonstrated some degree of dysphagia. Consistent aspiration noted in three of these patients was attributed to a delayed swallowing reflex in one, slowed pharyngeal peristalsis in another, and cricopharyngeal constriction in the third, which was most likely unrelated to the patient's COPD. The seven patients who demonstrated impaired swallowing but did not aspirate showed common problems with oral control of the bolus and sluggish lingual and pharyngeal peristalsis. All ten of these patients had bilateral weakness of the oral musculature and pharynx and excessive fatigue while eating, as well as in other self-care activities. This finding is consistent with Logemann's (1983) observation that swallowing disorders attributable to tracheostomy tubes are unusual.

It is important to stress that relatively minor modifications in these patients' feeding routines had a significant impact on their ability to eat. The nursing staff received inservice training about compensatory strategies for two of the patients who aspirated, and the dietary department was consulted regarding the need to provide soft diets

for those in the other group until their overall strength improved. By doing this, all nine patients were able to continue or resume PO diets, which was an important motivator in their rehabilitation program.

Use of Modified Barium Swallow with COPD Patients

Aspiration is typically easily detected in patients with tracheostomy tubes through the use of colored liquids and foods or methylene blue dye. However, the modified barium swallow procedure is a valuable adjunct with COPD patients suspected of having swallowing problems because it defines the physiology of the swallow. The procedure is safe in that minimal amounts of each material are presented to be swallowed. Furthermore, the entire examination can be completed in most instances in approximately 15 minutes.

Finally, the information that the procedure yielded regarding etiology and treatment guidelines of the swallowing dysfunction in both the group who aspirated and those who did not would not have been obtained from a methylene blue dye test or a traditional barium swallow procedure. This technique proved to be extremely useful and is recommended when dealing with dysphagia in COPD patients.

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