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Swallowing dysfunction in elderly trauma patients☆,☆☆

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ABSTRACT

Purpose: Newly diagnosed swallowing dysfunction is rare, with an incidence <1% in hospitalized patients. The purpose of this study was to evaluate the incidence and clinical characteristics of dysphagia in elderly trauma patients specifically.

Methods: Patients ≥75 years who had newly diagnosed swallowing dysfunction were identified by retrospective review of our institutional trauma database from 2009–2012. A comparison group without dysphagia was also identified that was matched by age, gender, injury mechanism, and injury severity score (ISS). Relevant demographics, injury characteristics, and potential factors associated with dysphagia were collected.

Results: 1323 patients met criteria. Of these, 56(4.2%) had newly identified dysphagia. Cases and controls were similar in regards to regional injury pattern (AIS). Patients with dysphagia had a mean Charlson Comorbidity Index (CCI) of 3.7 vs. 1.9 for patients without dysphagia ($p < 0.01$). Patients with dysphagia also had longer hospital (11.4 vs. 5.8 days, $p < 0.01$) and ICU LOS (5.6 vs 1.9 days, $p < 0.01$). On multivariable regression, CCI greater than 3 (OR 7.2, $p < 0.001$), in-hospital complications (OR 9.6, $p < 0.01$), and ICU LOS greater than 2 days (OR 1.5, $p < 0.05$) were independently associated with the diagnosis of dysphagia.

Conclusions: Elderly trauma patients with a high comorbidity burden or with prolonged ICU lengths of stay should be screened for dysphagia.

1. Background

Swallowing dysfunction is associated with longer hospital stays as well as increased morbidity and mortality [1]. The diagnosis is rare and large cross-sectional studies have shown the incidence to only approach 1% in all hospitalized patients greater than age 75 [2,3]. Swallowing dysfunction has been shown to be associated with increased age, increased hospital length of stay (LOS), trauma, stroke, cardiac surgery, tracheostomy and prolonged intubation [2,4-12]. We observed that many of our elderly trauma patients, who had injuries unrelated to the swallowing mechanism, developed or were diagnosed with dysphagia after admission. Little is known about the frequency of swallowing dysfunction in this particular cohort and therefore we aimed to better define this. Additionally, we wished to evaluate the clinical impact of newly diagnosed swallowing dysfunction in these patients and determine risk factors for dysphagia in order to identify patients that might benefit from screening.

2. Methods

After obtaining IRB approval, a retrospective review of our institutional trauma database from 2009–2012 was conducted. Injured patients ≥75 years that had swallowing dysfunction diagnosed by video fluoroscopic swallow study within 30 days of their index admission were identified.

All patients diagnosed with dysphagia first had a bedside swallowing evaluation with test food boluses administered by a Speech Language Pathologist (SLP) or Occupational therapist (OT). Clinical signs of oropharyngeal dysphagia, as defined by the American Speech-Language-Hearing Association (ASHA) [13], were observed during the bedside swallowing evaluation prompting video fluoroscopic swallow study per our intuitional protocol. Clinical signs of oropharyngeal dysphagia included mental status instability, abnormalities in dentition,

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abnormalities of motor mechanics of swallowing including jaw, tongue and lip movements, drooling, coughing, etc.

Video fluoroscopic swallow study was completed by a Speech Language Pathologist (SLP) or Occupational therapist (OT) and Radiologist. The evaluation is done in the upright sitting position. Varibar® barium sulfate is used at our institution which comes in pudding, honey, nectar and thin liquid consistencies. As the patient swallows barium, video fluoroscopy (Philips Easy Diagnost Eleva Digital Fluoroscopy system) records from the lateral and/or anterior positions to detect aspiration and dysfunction in the swallowing mechanism by radiographic evaluation of the oropharynx and proximal esophagus. This information is then interpreted to determine appropriate food textures and compensatory mechanisms (i.e. chin tuck) to avoid aspiration.

Due to the fact that demographics and injury characteristics may affect the rate of dysphagia, a comparison group was then identified from the patients in this age range without dysphagia that were similar in gender, injury mechanism, and injury severity score (ISS). No patient in the comparison group had clinical signs of dysphagia or video swallow study. Patients were excluded from the study cohort (dysphagia group) if they had previously diagnosed dysphagia on chart review within 5 years of their admission ($n = 3$). Relevant demographics and injury characteristics were collected along with potential factors associated with swallowing dysfunction. This included in-hospital complications as catalogued by the National Trauma Database (pneumonia, urinary tract infection, stroke, unplanned intubation, bleeding, deep vein thrombosis, pulmonary embolism, stroke, decubitus ulcer, myocardial infarction, cardiac arrest, and coagulopathy), length of stay, discharge disposition, and 30-day readmission rate. The Charlson/Deyo Comorbidity Index (CCI) was calculated after reviewing the medical record up to one year prior to admission. A CCI score of 0 indicates no qualifying comorbid conditions recorded, a score of 1 indicates 1 comorbid condition, and a score of 2 indicates ≥2 comorbid conditions [14]. A CCI ≥ 3 is commonly used to describe patients with a higher comorbidity burden compared to those with scores below 3 [15]. As such we also performed a subgroup analysis on patients with a CCI score ≥ 3.

2.1. Statistical analysis

The groups were compared using Fisher's exact test for categorical variables and the Wilcoxon rank sum for interval variables. Factors which were statistically significant ($p < 0.05$) on univariable analysis or which were clinically relevant were then used to create a multivariable regression model to evaluate independently associated risk factors for dysphagia. Analyses were performed using Stata12 (StataCorp, 2011. Stata Statistical Software: Release 12, College Station, TX: StataCorp, LP).

3. Results

In total, 1323 patients met age criteria. Of these, 56 (4.2%) had newly identified swallowing dysfunction. Demographic data are summarized in Table 1. A total of 66 patients were identified from the original cohort who were similar demographically and in regard to injury characteristics but who did not have newly diagnosed dysphagia. This group was used as the comparator group.

Table 1
Patient demographics.

	Dysphagia	No dysphagia	(p)
N	56	68	
% Male	68.0	61.0	p = 0.46
Age	84.3 (SD 4.5)	84.5 (SD 2.3)	p = 0.10
ISS	11.3 (SD 8.3)	11.8 (SD 3.5)	p = 0.90

Abbreviations: N: number, ISS: Injury Severity Score

Table 2
Pre-hospital characteristics.

	Dysphagia	No dysphagia	(p)
% fall as mechanism	85	85	p = 1.00
AIS head	3.0	3.1	p = 0.85
AIS C-spine	1.8	2.2	p = 0.55
AIS chest	2.8	2.7	p = 0.27
% TBI	31.0	37.0	p = 0.57
% stroke/impaired sensorium	13.9	15.1	p = 0.80
% COPD	21.7	10.4	p = 0.13
% Anticoagulated	26.3	21.2	p = 0.68
% Heart failure	5.8	1.7	p = 0.38
CCI	3.7	1.9	p < 0.001

Abbreviations: AIS: Abbreviated Injury Score, TBI: Traumatic Brain Injury, COPD: Chronic Obstructive Pulmonary Disease, CCI: Charlson Comorbidity Index.

3.1. Prehospital characteristics

On univariable analysis, cases and controls were similar in regards to regional injury pattern (AIS), frequency of traumatic brain injury (TBI) and individual pre-existing comorbidities (COPD, heart failure, etc.); summarized in Table 2. Although individual comorbidities did not differ between the two groups, patients with dysphagia had a significantly higher CCI (3.7 vs. 1.9, $p < 0.001$). On multivariable regression (Table 4), CCI score ≥ 3 was independently associated with the diagnosis of dysphagia (OR 7.2, $p < 0.001$, 95% CI 2.4–21)

3.2. In-hospital and discharge characteristics

The diagnosis of dysphagia was made at a mean of 8.2 days (±7.1) after admission. Patients with dysphagia spent nearly three times as long in the ICU (LOS 5.6 vs 1.9 days, $p < 0.01$) and twice as long in the hospital (LOS 11.4 vs. 5.8 days, $p < 0.01$). In-hospital complication rates were higher among patients with dysphagia and these patients had a lower rate of discharge home. In-hospital characteristics and comparison between the two groups are summarized in Table 3. Mechanical ventilation was required in 15.7% ($n = 9$) of patients with dysphagia and in 8.7% ($n = 6$) in patients without dysphagia ($p = 0.23$). Mean ventilator days were not significantly different in patients with and without dysphagia (4.2 vs. 2.6, $p = 0.23$). Only 7% ($n = 4$) of dysphagia patients were able to discharge home compared to 24% ($n = 16$) of patients without dysphagia ($p < 0.05$). As shown in Table 3, patients with dysphagia also had a significantly higher 30 day readmission rate. On multivariable regression, in-hospital complications (OR 9.6, $p < 0.01$, 95% CI 1.8–50.1) and ICU LOS greater than 2 days (OR 1.5, $p < 0.01$, 95% CI 1.08–1.42) were independently associated with dysphagia. In hospital and discharge characteristics are summarized in Table 3.

4. Discussion

To our knowledge, this is the first description in the literature of newly diagnosed swallowing dysfunction in elderly trauma patients. We found that elderly trauma patients had an incidence more than 6 times higher than that described in non-trauma patient populations

Table 3
In-hospital & discharge characteristics.

	Dysphagia	No dysphagia	(p)
% complications	42	14	p < 0.01
% pneumonia	15	4	p < 0.01
Tracheostomy	2	0	p < 0.01
Hospital LOS (days)	11.4	5.8	p < 0.01
ICU LOS (days)	5.6	1.9	p < 0.01
% discharged home	7	24	p < 0.01
% 30 day readmission	13	1	p < 0.05

Abbreviations: LOS: Length of Stay, ICU: Intensive Care Unit.