Prevalence of Dysphagia in Multiple Sclerosis and Correlation with Disability

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Background

- Dysphagia represents one of the current challenges in the management of Multiple Sclerosis (MS) patients (Solaro et al, 2013)

- Dysphagia is assumed to appear in the mildly impaired MS subjects (EDSS 2-3) and becomes increasingly common in the most severely disabled subjects (EDSS 8-9) (Abraham et al, 1997)

- The presence of dysphagia can potentially reduce quality of life, and increase the risk of dehydration and aspiration pneumonia

Background Continue

- The prevalence of dysphagia in patients with MS has been reported with discrepancies ranging from 10% to 90% based on the criteria and diagnostic techniques of identified dysphagia (Xiao-Li et al, 2015)

- In a systematic review and meta-analysis of 15 studies, published in 2015, at least one-third of MS patients are suffering from dysphagia (Xiao-Li et al, 2015)

- Identifying dysphagia is becoming standard of care for MS patients. However, there is no one best practice approach universally recognized to screen such patients

Objective

- Determine the prevalence of dysphagia in MS patients

- Compare two screening questionnaires to improve the identification and screening of MS patients with dysphagia

- Correlate the findings of the screening questionnaire scores, objective swallowing evaluation results, EDSS and type of Multiple Sclerosis

Methods

- 697 eligible MS patients were included in this study using a cross sectional design
- Adults, males and females, 18 years or older were included
- Two questionnaires were administered at the MS clinic: EAT-10 (Eating assessment tool-10) and DYMUS (DYsphagia in MUltiple Sclerosis)
- A score ≥3 on EAT-10, ≥2 on DYMUS was defined as positive screen

Methods Continue

- Those with a positive screen were referred to ENT clinic for further clinical swallow evaluation, direct laryngoscopy, transnasal fiberoptic endoscopic evaluation of swallowing (FEES) and/or modified barium swallow study (MBSS).
- Patients were defined as having dysphagia if any of the ENT, SLP clinical evaluation, FEES or MBSS indicated suspected dysphagia or dysphagia.

Results

- Overall, 46 patients were evaluated by ENT. Among these patients, 43 (93%) had positive screens for dysphagia on both EAT-10 and DYMUS

- At least 107 patients with positive questionnaires were referred to ENT clinic . Many patients declined referral or didn't show up for their appointments

Results Continue

- There was substantial agreement between the EAT-10 and DYMUS questionnaires (Kappa statistic 0.74 (95%CE 0.69, 0.8)) based on sample of 697 patients. Prevalence of positive screen was 21% for EAT-10 and 26% for DYMUS

Table of PositiveEAT10 by Positive DYMUS			
PositiveEAT10 Frequency	Positive DYMUS		
	<2	>=2	Total
<3	498	51	549
>=3	14	134	148
Total	512	185	697

Simple Kappa Coefficient	
Kappa (K)	0.7445
ASE	0.0297
95% Lower Conf Limit	0.6864
95% Upper Conf Limit	0.8026

Results Continue

- 48% of the MS patients who visited the ENT clinic were found to have dysphagia

- None of EAT-10, DYMUS or primary diagnosis (RRMS vs SPMS) showed significant association with having at least suspected dysphagia (using Fisher's exact test)

|	All		Dysphagia No		Yes	
	N	%	n	%	n	%
All	46	100.00	24	100.0	22	100.0
Sex						
Male	9	19.57	6	25.0	3	13.6
Female	37	80.43	18	75.0	19	86.4
Primary Dx						
RRMS	43	93.48	23	95.8	20	90.9
SPMS	3	6.52	1	4.2	2	9.1
EAT10						
<3	2	4.35	0	0	2	9.1
>=3	44	95.65	24	100.0	20	90.9
DYMUS						
<2	1	2.17	1	4.2	0	0
>=2	45	97.83	23	95.8	22	100.0

Table	P-value
Table female * dysphagia	0.463799
Table PrimaryDX * dysphagia	0.600000
Table PositiveEAT10 * dysphagia	0.223188
Table PositiveDYMUS * dysphagia	1.000000

Results Continue

- EDSS scores showed significant association with suspected dysphagia when comparing dysphagia and non-dysphagia groups among the patients who visited the ENT clinic (using Wilcoxon rank sum test).

- EAT-10 and DYMUS scores did not show significant association with suspected dysphagia.

	All					Dysphagia No					Yes				
	N	N missing	Median	Min	Max	n	n missing	Median	Min	Max	n	n missing	Median	Min	Max
Age (years)	45	1	49.0	24	72	24	0	50.5	24	69	21	1	49.0	25	72
EAT-10 score	46	0	11.0	1	31	24	0	10.5	3	30	22	0	12.0	1	31
DYMUS score	46	0	6.0	1	9	24	0	6.0	1	9	22	0	6.5	2	9
EDSS	46	0	3.0	0	7	24	0	2.3	0	6	22	0	4.3	1	7

Variable	P-value
age	0.803419
EAT10	0.677483
EDSS	0.019164
DYMUS	0.780557

Box plots for EDSS scores by dysphagia group
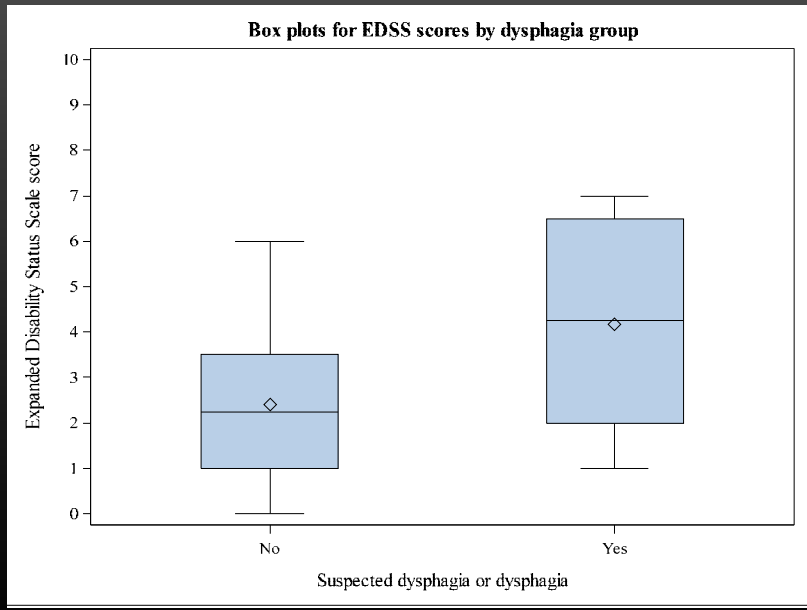
Results continue

- A one unit increase in EDSS score is associated with a 1.7 fold (95% CI: 1.2,2.4) increased odds of dysphagia, using logistic regression model. The area under the ROC curve is 0.71 (95% CI: 0.55, 0.86) which suggests fair discrimination.

Odds Ratio Estimates		
Effect	Point Estimate	95% Wald Confidence Limits
EDSS	1.668	1.158 2.405

ROC Curve for Model
Area Under the Curve = 0.7083
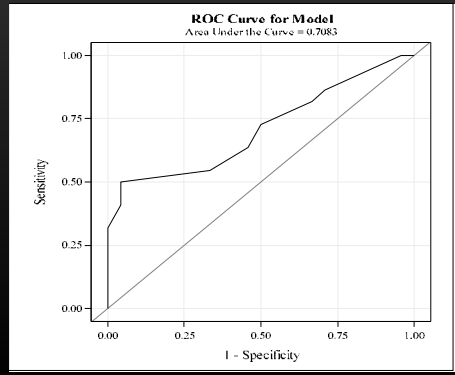
Results Continue

- Defining a cut-point at EDSS = 3 provided an optimal balance between sensitivity and specificity. (high EDSS scores is >= 3).
- At this cut-point :
  - Sensitivity is 0.64 (95% CI 0.41, 0.83)
  - Specificity is 0.54 (95%CI 0.33,0.74)
  - PPV is 0.56 (95%CI 0.35, 0.76)
  - NPV is 0.62 (95%CI 0.38, 0.82)

Table of high by dysphagia			
high(EDSS)	dysphagia(dysphagia)		
Frequency Col Pct	No	Yes	Total
<3	13 54.17	8 36.36	21
>=3	11 45.83	14 63.64	25
Total	24	22	46

Conclusions

- DYMUS and EAT-10 screening tools showed substantial agreement with each other but neither of them showed significant associations with dysphagia diagnosis by ENT evaluations
- Neither DYMUS or EAT-10 scores showed significant association with the diagnosis of dysphagia or suspected dysphagia. This makes their use as screening tools to determine prevalence questionable
- Primary diagnosis (RRMS vs SPMS) also showed no significant association with having at least suspected dysphagia
- In agreement with other authors, dysphagia seemed to correlate with rising overall disability

Conclusions

- EDSS score showed significant correlation with diagnosis of dysphagia and suspected dysphagia by ENT evaluation and had better results in our sample
- Using a cut-point of 3 yielded the best sensitivity and specificity, but these were still only moderate

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