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Do patient reported outcome measures accurately detect swallowing impairments after ACDF surgery? A case for considering separate constructs

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Background: Studies investigating swallowing disorders and dysphagia after Anterior Cervical Discectomy and Fusion (ACDF) often rely on patient reported outcome measures (PROs) to classify impairment. This study compared predictive abilities of four dysphagia PROs to identify the presence of objective swallowing impairment on videofluoroscopy (VF).

Research Question: (1) What is the difference in dysphagia incidence rates between PROs and objective VF measures? (2) Do PROs accurately detect swallowing impairment on VF?

Design: secondary analysis of a prospective cohort study

Methods: Data from 21 prospectively recruited participants undergoing primary ACDF was included. PRO and VF data were collected preoperatively and six-weeks postoperatively. PROs included the Bazaz Dysphagia Scale, the Eating Assessment Tool, the Swallowing Quality of Life Questionnaire, and the Hospitals for Special Surgery Dysphagia Index. The Dynamic Imaging Grade of Swallowing Toxicity (DIGEST) was used to classify impairment on VF.

Results: Statistical models for all outcome measures revealed a significant effect of operative timepoint, indicating worse outcomes across all swallowing measures postoperatively. There were postoperative increases in point-prevalence and incidence rates of dysphagia symptoms across all PROs and of swallowing impairment on VF. No PRO yielded an adequate balance of sensitivity and specificity for accurately screening physical impairment on VF using DIGEST.

Discussion: Both patient experience and physical function are important outcomes to capture postoperatively as both may influence recovery. PROs alone may miss cases of swallowing impairment after ACDF, delaying necessary referral to a swallowing specialist (such as a speech language pathologist or laryngologist). Future research investigating non-invasive, accessible tools to improve screening accuracy for swallowing impairment are needed.

Fig. 1**Table 1***Prevalence and incidence rates of swallowing impairment & dysphagia across measurement tools*

Measurement Tool	Classification Criteria	Pre-Op Prevalence		Post-Op Prevalence		Incidence	
DIGEST	cut off score of ≥ 1	4 cases	19%	13 cases	62%	10 cases	59%
Bazaz Dysphagia Scale	cut off score of ≥ 1	6 cases	29%	17 cases	81%	12 cases	80%
EAT-10	cut off score of ≥ 3	1 case	5%	15 cases	71%	14 cases	70%
HSS-DDI Dysphagia Index	cut off score of < 90	4 cases	19%	14 cases	67%	11 cases	65%
SWAL-QoL	MCID change of ≥ 16	2 cases	10%	10 cases	48%	8 cases	42%
	MCID change of ≥ 8	7 cases	33%	14 cases	67%	6 cases	43%

*DIGEST = Dynamic Imaging Grade of Swallowing Toxicity; EAT-10 = Eating Assessment Tool; SWAL-QoL = Swallowing Quality of Life Questionnaire; HSS-DDI = Hospitals for Special Surgery; MCID = minimal clinically important difference

Fig. 2**Table 2***Predictive abilities of patient reported outcome measures against DIGEST scores*

Outcome Measure	Classification Criteria	Sensitivity	Specificity	PPV	NPV
Bazaz Dysphagia Scale	cut off score of ≥ 1	0.846	0.250	0.647	0.500
EAT-10	cut off score of ≥ 3	0.692	0.250	0.600	0.333
HSS-DDI Dysphagia Index	cut off score of < 90	0.769	0.500	0.714	0.571
SWAL-QoL	MCID change of ≥ 16	0.308	0.500	0.500	0.308
	MCID change of ≥ 8	0.385	0.500	0.556	0.333

*DIGEST = Dynamic Imaging Grade of Swallowing Toxicity; EAT-10 = Eating Assessment Tool; SWAL-QoL = Swallowing Quality of Life Questionnaire; HSS-DDI = Hospitals for Special Surgery; MCID = minimal clinically important difference