

Table 17. Swallowing function measured by imaging techniques

				Intervention group				Control group				Comparison between groups	
Study	Measure	Timing of measurement	Comparison	N	Baseline Mean (SD)	Follow-up Mean (SD)	Difference Mean (95%CI)/ (SD)	N	Baseline Mean (SD)	Follow-up Mean (SD)	Difference Mean difference(95%CI)	Change Mean (95% CI)	CR
Dotevall, 2022	Endoscopic imaging:												
	<i>Murray secretion scale†</i>	Baseline (6 months post therapy) - 2 months after completing the exercise intervention	Exercise vs. usual care	23	2.0 (1.2)	1.8 (1.0)	-0.3 (-0.9; 0.3)	24	1.9 (1.1)	2.1 (1.2)	0.2 (-0.4; 0.8)	0.5 (-0.3; 1.3)	No
	<i>YPRS*, Residue in vallecula: thick 5 ml</i>	Baseline (6 months post therapy) - 2 months after completing the exercise intervention	Exercise vs. usual care	23	2.7 (0.6)	2.8 (0.7)	0.1 (- 0.2; 0.3)	24	2.9 (0.8)	2.8 (0.8)	- 0.1 (- 0.4; 0.2)	- 0.2 (- 0.5; 0.1)	No
	<i>YPRS*, Residue in pyriform sinus: thick 5 ml</i>	Baseline (6 months post therapy) - 2 months after completing the exercise intervention	Exercise vs. usual care	23	2.0 (0.6)	1.9 (0.5)	- 0.1 (- 0.3; 0.1)	24	2.3 (0.7)	2.1 (0.6)	- 0.1 (- 0.3; 0.2)	0.0 (- 0.3; 0.3)	No
	<i>Worst PAS overall‡</i>	Baseline (6 months post therapy) - 2 months after completing the exercise intervention	Exercise vs. usual care	23	3.9 (2.1)	3.8 (2.0)	0.0 (- 1.1; 1.0)	24	4.6 (1.9)	4.2 (2.1)	- 0.3 (- 1.3; 0.7)	- 0.3 (- 1.7; 1.0)	No
	<i>SPSS§</i>	Baseline (6 months post therapy) - 2 months after completing the exercise intervention	Exercise vs. usual care	23	3.7 (1.1)	3.4 (1.2)	- 0.3 (- 0.7; 0.1)	24	4.0 (1.4)	3.8 (1.3)	- 0.2 (- 0.7; 0.4)	0.1 (- 0.6; 0.8)	No
	Videofluoroscopic imaging:												

Tuomi, 2022	YPRS*, Residue in vallecula: thick 5 ml	Baseline (6 months post therapy) - 2 months after completing the exercise intervention	Exercise vs. usual care	25	3.2 (0.9)	3.3 (1.1)	0.1 (0.9)	27	3.4 (1.0)	3.3 (1.2)	-0.1 (0.9)	0 (NR)	No
	YPRS*, Residue in pyriform sinus: thick 5 ml	Baseline (6 months post therapy) - 2 months after completing the exercise intervention	Exercise vs. usual care	25	2.3 (0.9)	2.0 (0.7)	-0.2 (1.0)	27	2.6 (1.1)	2.6 (1.1)	0.0 (0.8)	0.2 (NR)	No
	Worst PAS overall†	Baseline (6 months post therapy) - 2 months after completing the exercise intervention	Exercise vs. usual care	25	4.3 (2.1)	3.4 (1.8)	-0.9 (2.4)	27	4.2 (2.1)	3.7 (1.7)	-0.5 (1.9)	-0.40 (-1.58, 0.78)	No
	SPSS§	Baseline (6 months post therapy) - 2 months after completing the exercise intervention	Exercise vs. usual care	25	3.6 (1.2)	3.2 (1.3)	-0.4 (0.9)	27	3.8 (1.5)	3.6 (1.5)	-0.2 (1.0)	-0.20 (-0.72, 0.32)	No
	kinematic variables												
	Anterior hyoid movement (mm) ††												
	3 ml thin liquid*	Baseline (6 months post therapy) - 2 months after completing the exercise intervention	Exercise vs. usual care	25	7.7(3.1)	7.7 (3.4)	-0.0 (2.1)	27	7.3 (3.3)	8.2 (3.3)	0.9 (3.1)	0.9 (NR)	No
	20 ml thin liquid drink freely*	Baseline (6 months post therapy) - 2 months after completing the exercise intervention	Exercise vs. usual care	25	7.7 (3.7)	7.6 (2.9) 7.4 (1.9; 12.8)	-0.12 (2.7)	27	9.0 (3.1)	8.2 (3.4)	-0.8 (2.4)	0.4 (NR)	No
	5 ml mildly thick liquid*	Baseline (6 months post therapy) - 2 months after completing the exercise intervention	Exercise vs. usual care	25	7.2 (4.1)	8.0 (3.9) 9.2 (- 1.4; 14.7)	0.8 (3.7)	27	8.2 (3.5)	8.3 (3.4)	0.1 (3.1)	0.7 (NR)	No

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	3 ml extremely thick*	Baseline (6 months post therapy) - 2 months after completing the exercise intervention	Exercise vs. usual care	25	8.5 (3.8)	8.1 (3.2)	-0.5 (2.8)	27	8.6 (3.6)	8.6 (3.6)	-0.3 (2.9)	0.2 (NR)	No
	Cookie*	Baseline (6 months post therapy) - 2 months after completing the exercise intervention	Exercise vs. usual care	25	9.3 (3.3)	9.3 (3.6)	-0.3 (2.2)	27	8.7 (4.0)	8.8 (3.2)	0.2 (3.5)	0.5 (NR)	No
Superior hyoid movement (mm) **													
	3 ml thin liquid	Baseline (6 months post therapy) - 2 months after completing the exercise intervention	Exercise vs. usual care	25	10.6 (4.2)	9.2 (3.3)	-1.4 (5.1)	27	11.8 (5.6)	11.8 (5.4)	0.0 (4.5)	1.4 (NR)	No
	20 ml thin liquid drink freely	Baseline (6 months post therapy) - 2 months after completing the exercise intervention	Exercise vs. usual care	25	8.6 (5.0)	9.3 (4.4)	1.1 (4.6)	27	12.9 (5.3)	12.0 (5.6)	-0.9 (5.0)	2 (NR)	Yes
	5 ml mildly thick liquid	Baseline (6 months post therapy) - 2 months after completing the exercise intervention	Exercise vs. usual care	25	10.6 (4.7)	10.8 (5.0)	0.6 (4.8)	27	13.6 (5.2)	11.7 (5.5)	-1.9 (5.7)	2.7 (NR)	Yes
	3 ml extremely thick*	Baseline (6 months post therapy) - 2 months after completing the exercise intervention	Exercise vs. usual care	25	11.2 (6.3)	10.2 (4.4)	-1.1 (5.2)	27	14.4 (7.6)	13.6 (8.2)	-1.0 (8.4)	0.1 (NR)	No
	Cookie*	Baseline (6 months post therapy) - 2 months after completing the exercise intervention	Exercise vs. usual care	25	13.2 (7.1)	12.4 (5.4)	-0.2 (8.6)	27	14.9 (6.6)	11.5 (5.6)	-2.9 (5.9)	2.7 (NR)	Yes

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Thyro-hyoid approximation (mm) [§]													
3 ml thin liquid	Baseline (6 months post therapy) - 2 months after completing the exercise intervention	Exercise vs. usual care	25	-12.3 (3.4))	-11.0 (3.6)	1.2 (2.9)	27	-10.1 (5.7)	-9.4 (4.6)	0.8 (3.8)	0.4 (NR)	No	
20 ml thin liquid drink freely*	Baseline (6 months post therapy) - 2 months after completing the exercise intervention	Exercise vs. usual care	25	-13.2 (4.2)	-12.3 (4.7)	0.9 (4.8)	27	-9.8 (4.7)	-10.6 (4.3)	-0.8 (4.7)	1.7 (NR)	Yes	
5 ml mildly thick liquid*	Baseline (6 months post therapy) - 2 months after completing the exercise intervention	Exercise vs. usual care	25	-12.2 (5.3)	-11.9 (5.1)	0.3 (4.9)	27	-10.6 (4.8)	-10.8 (4.8)	0.1 (3.3)	0.2 (NR)	No	
3 ml extremely thick*	Baseline (6 months post therapy) - 2 months after completing the exercise intervention	Exercise vs. usual care	25	-11.9 (3.3)	-12.6 (3.9)	-0.7 (3.2)	27	-10.1 (4.6)	-9.5 (6.7)	0.5 (4.7)	1.2 (NR)	Yes	
Maximal upper esophagus sphincter opening (mm) ^{††}													
3 ml thin liquid*	Baseline (6 months post therapy) - 2 months after completing the exercise intervention	Exercise vs. usual care	25	4.5 (2.0)	4.5 (1.6)	-0.1 (1.5)	27	4.4 (1.5)	4.5 (1.7)	0.0 (1.4)	0.1 (NR)	No	
20 ml thin liquid drink freely*	Baseline (6 months post therapy) - 2 months after completing the exercise intervention	Exercise vs. usual care	25	7.2 (2.1)	6.6 (2.2)	-0.4 (1.7)	27	6.8 (1.7)	6.9 (2.3)	0.1 (1.3)	0.5 (NR)	YesS	
5 ml mildly thick liquid*	Baseline (6 months post therapy) - 2 months after completing the exercise intervention	Exercise vs. usual care	25	5.8 (1.5)	5.9 (1.7)	0.2 (1.7)	27	5.4 (1.7)	5.6 (1.9)	0.2 (1.4)	0 (NR)	No	

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	3 ml extremely thick*	Baseline (6 months post therapy) - 2 months after completing the exercise intervention	Exercise vs. usual care	25	4.3 (1.4)	4.1 (1.5)	-0.2 (1.7)	27	3.8 (1.5)	4.6 (1.8)	0.7 (1.7)	0.9 (NR)	Yes
	Cookie*	Baseline (6 months post therapy) - 2 months after completing the exercise intervention	Exercise vs. usual care	25	3.9 (1.4)	4.0 (1.7)	0.1 (1.3)	27	3.7 (1.5)	3.8 (1.3)	-0.1 (1.8)	1 (NR)	Yes

CI, confidence intervals; CR, clinically relevant; MD, mean difference; N, number of patients; NR, not reported; SD, standard deviation

† Secretions before swallow (1–4): 1 indicates no visible or some transient bubbles of secretion in the vallecula and hypopharynx. A higher value indicates worse swallowing function.

*Yale Pharyngeal Residue Severity Scale (1-5): 1 indicates no residue in the vallecula and pyriform sinuses. A higher value indicates worse swallowing function.

‡PAS (1–8): 1 indicates swallowing without penetration/aspiration. A higher score indicates worse swallowing function.

§SPSS (1–7), a higher score indicates worse swallowing function. Grades 5–7 indicate dysphagia with aspiration.