

Table 10. 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 (SD)	N	Baseline Mean (SD)	Follow-up Mean (SD)	Difference Mean (SD)	Change Mean (95% CI)	CR
Fredslund Hajdu, 2021	Endoscopic imaging:												
	Penetration – aspiration (PAS)												
	<i>PAS - liquid</i>	2 month follow-up	Exercise vs. usual care	97	nr	nr	nr	97	nr	nr	nr	Difference in scores; 0.15 (-0.25 to 0.55)	No
		12 month follow-up	Exercise vs. usual care	90	nr	nr	nr	89	nr	nr	nr	Difference in scores; 0.28 (-0.14 to 0.70)	No
	<i>PAS – thickened liquid</i>	2 month follow-up	Exercise vs. usual care	97	nr	nr	nr	97	nr	nr	nr	Difference in scores; -0.02 (-0.02 to 0.17)	No
		12 month follow-up	Exercise vs. usual care	90	nr	nr	nr	89	nr	nr	nr	Difference in scores; 0.07 (-0.11 to 0.26)	No
	Pharyngeal residue (YPRS)												
	<i>Vallecula liquid</i>	2 month follow-up	Exercise vs. usual care	97	nr	nr	nr	97	nr	nr	nr	Difference in scores; 0.61 (0.10 to 1.12)	No
		12 month follow-up	Exercise vs. usual care	90	nr	nr	nr	89	nr	nr	nr	Difference in scores; 0.16 (-0.39 to 0.70)	No

	<i>Vallecula thickened</i>	2 month follow-up	Exercise vs. usual care	97	nr	nr	nr	97	nr	nr	nr	Difference in scores; 0.78 (0.19 to 1.37)	No
		12 month follow-up	Exercise vs. usual care	90	nr	nr	nr	89	nr	nr	nr	Difference in scores; 0.36 (-0.27 to 0.99)	No
	<i>Piriformis liquid</i>	2 month follow-up	Exercise vs. usual care	97	nr	nr	nr	97	nr	nr	nr	Difference in scores; 0.85 (0.19 to 1.51)	No
		12 month follow-up	Exercise vs. usual care	90	nr	nr	nr	89	nr	nr	nr	Difference in scores; -0.04 (-0.73 to 0.65)	No
	<i>Piriformis thickened</i>	2 month follow-up	Exercise vs. usual care	97	nr	nr	nr	97	nr	nr	nr	Difference in scores; 1.21 (0.41 to 2.01)	No
		12 month follow-up	Exercise vs. usual care	90	nr	nr	nr	89	nr	nr	nr	Difference in scores; 0.52 (-0.32 to 1.37)	No
Hsiang, 2019	Videofluoroscopic imaging:												
	Penetration – aspiration (PAS)												
	<i>Overall PAS score</i>	Baseline-3 months	Exercise vs. usual care	20	2.20 (1.72)	2.00 (1.70)	0.20 (0.40)	20	2.05 (1.88)	2.20 (1.91)	-0.15 (0.65)	0.35 (0.02 to 0.68)	No
	Oral residue												
	<i>10 ml thin liquid</i>	Baseline-3 months	Exercise vs. usual care	20	10.00 (7.75)	7.00 (7.14)	3.00 (4.58)	20	12.50 (9.42)	13.00 (10.05)	-0.50 (9.21)	3.50 (-1.01 to 8.01)	Yes
	<i>Nectar-like</i>	Baseline-3 months	Exercise vs. usual care	20	13.50 (8.53)	6.50 (5.72)	7.00 (8.43)	20	9.50 (8.05)	13.50 (9.63)	-4.00 (6.63)	11.00 (6.30 to 15.70)	Yes

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	<i>Honey-like</i>	Baseline-3 months	Exercise vs. usual care	20	15.50 (8.65)	6.00 (4.90)	9.50 (6.69)	20	11.00 (9.43)	14.00 (8.60)	-3.00 (5.67)	12.00 (8.16 to 15.84)	Yes
	<i>Pudding-like</i>	Baseline-3 months	Exercise vs. usual care	20	17.00 (9.54)	6.00 (6.63)	11.00 (9.43)	20	13.50 (9.10)	14.00 (9.70)	-0.50 (2.18)	11.50 (7.26 to 15.74)	Yes
	Pharyngeal residue												
	<i>10 ml thin liquid</i>	Baseline-3 months	Exercise vs. usual care	20	10.00 (8.94)	7.00 (7.81)	3.00 (5.57)	20	6.50 (8.53)	7.50 (8.87)	-1.00 (7.68)	4.00 (-0.16 to 8.16)	Yes
	<i>Nectar-like</i>	Baseline-3 months	Exercise vs. usual care	20	16.00 (7.35)	11.00 (5.39)	5.00 (5.00)	20	11.00 (10.44)	12.00 (10.30)	-1.00 (6.24)	6.00 (2.50 to 9.50)	Yes
	<i>Honey-like</i>	Baseline-3 months	Exercise vs. usual care	20	18.50 (6.54)	12.00 (7.48)	6.50 (6.54)	20	15.00 (10.25)	15.50 (10.23)	-0.50 (3.84)	7.00 (3.68 to 10.32)	Yes
	<i>Pudding-like</i>	Baseline-3 months	Exercise vs. usual care	20	20.00 (5.48)	13.50 (7.26)	6.50 (6.54)	20	16.50 (10.62)	17.00 (8.43)	-0.50 (6.69)	7.00 (2.90 to 11.10)	Yes
Study	Measure	Timing of measurement	Comparison	N	Baseline %	Follow-up %	Difference %	N	Baseline %	Follow-up %	Difference %	Change %	CR
Messing, 2017	Videofluoroscopic imaging:												
	<i>OPSE total score (seconds, percentage of abnormal)</i>	Baseline- 3 months post CRT	Exercise vs. no exercise/usual care	30	11%	15%	-4%	30%	29%	46%	-17%	13%	No
	<i>DOSS (percentage of abnormal)</i>	Baseline- 3 months post CRT	Exercise vs. no exercise/usual care	30	7%	40%	-33%	30%	11%	25%	-14%	19%	No
	<i>PAS penetration 2-5</i>	Baseline- 3 months post CRT	Exercise vs. no exercise/usual care	30	10%	21%	-11%	30%	29%	38%	-9%	2%	No
	<i>PAS aspiration 6-8</i>	Baseline- 3 months post CRT	Exercise vs. no exercise/usual care	30	7%	0%	7%	30%	7%	9%	-2%	9%	No
	Endoscopic imaging:												

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Kumar, 2016	PAS	3 months	Exercise vs. usual care	25	6%	16%	10%	25%	6%	20%	14%	4%	No
		6 months	Exercise vs. usual care	25	6%	8%	2%	25%	6%	16%	10%	8%	No

AD, absolute difference; CI, confidence intervals; CR, clinically relevant; DOSS, Dysphagia Outcome Severity Scale (dichotomized as 1–5 vs. 6–7, shows percentage of abnormal (1–5)); MD, mean difference; N, number of patients; nr, not reported; OPSE, Oral Pharyngeal Swallow Efficiency (OPSE total score: percentage of abnormal (≤ 50 total OPSE)); PAS, Penetration–Aspiration Scale (Penetration: Percentage of patients with penetration score of 2–5; Aspiration: Percentage of patients with aspiration score of 6–8); SD, standard deviation; YALE pharyngeal residue severity rating scale (1 = no residue to 5 = severe residue)