SUPPLEMENTARY METHODS

Pharyngeal electrical stimulation system

The pharyngeal electrical stimulation (PES) medical device (Phagenyx®, Phagenesis Ltd, Manchester, UK) comprises a nasogastric feeding tube-like stimulation catheter incorporating 2 specially designed electrodes and a base station for individual adjustment of the stimulation intensity to the patient's needs (Fig. S1). Treatment parameters are calibrated at the start of each session to deliver optimized PES therapy at each session. The current intensity of the stimulation ranges from 1 to 50 mA, for a stimulation frequency of 5 Hz, and a pulse width of 200 µs, as described previously (1). Each PES session lasts for 10 min, with treatment sessions repeated on consecutive days. Under the current CE labelling, a standard treatment cycle comprises 10 min of PES delivered on 3 consecutive days, and up to 2 treatment cycles can be delivered.

Quality of life

A Swallowing Quality of Life (SWAL-QoL) questionnaire, a validated and specific outcomes tool measuring the impact of dysphagia on QoL from a patient's perspective (2), was used pre-treatment (at day 67, admission to Manchester University Hospital Foundation Trust), directly post-PES treatment (at day 93) and 2 months post-PES treatment (at day 180, 59 days post-PES). The questionnaire items address the burden of dysphagia, desire for eating, dysphagia symptom frequency, mental health, social concerns related to swallowing problems, food selection and fear related to eating.

RESULTS

Quality of life

Table SI presents only the items that were relevant for this patient, considering his clinical picture; as the patient's feeding status was NBM at baseline assessment (day 67), many items did not contain any initial answer. Directly following the final PES session, the patient reported a considerable improvement in swallowing burden (increased in score from 2/10 at day 67 to 9/10 at day 93), which was further confirmed 2 months later (10/10 at day 180); dealing with his swallowing problem was not very difficult or a major distraction anymore. Whereas, upon his admission to MFT, the patient was very afraid of choking when eating/drinking or of getting pneumonia (score of 4/20), this was not the case following PES therapy, as his score increased to 19/20 immediately and to 20/20 2 months later. It is likely that his mental health was initially compromised (score 5/25 at day 67). The patient gained self-confidence and obtained a score of 24/25 on this item just after the final PES session. Overall, his total score on the SWAL-QoL questionnaire improved significantly directly after the PES therapy (from 11/55 to 52/55) because of his progress in swallowing.

Table SI. Summary of relevant Swallowing Quality of Life (SWAL-QoL) items*

	Assessment date		
Items linked to swallowing dysfunction	Day 67 (pre-PES treatment)	Day 93 (directly post-PES treatment)	Day 180 (2 months post-PES treatment)
Burden (sum)	2	9	10
Difficult dealing	1	4	5
Major distracting	1	5	5
Fear (sum)	4	19	20
Fear of choking (food)	1	4	5
Fear of choking (drink)	1	5	5
Fear of not knowing whether choking will occur	1	5	5
Fear of pneumonia	1	5	5
Mental health (sum)	5	24	25
Depressed	1	5	5
Annoyed	1	5	5
Discouraged	1	5	5
Frustrated	1	4	5
Impatient	1	5	5
Total score	11	52	55

1: strongly agree; 2: agree; 3: uncertain; 4: disagree; 5: strongly disagree; PES: pharyngeal electrical stimulation; *not all items were relevant as patient's feeding status was nil by mouth (NBM) at baseline assessment (day 67) and therefore baseline answers to some items were missing.

SUPPLEMENTARY REFERENCES

S1 Sasegbon A, Cheng I, Zhang M, Hamdy S. Advances in the use of neuromodulation for neurogenic dysphagia: mechanisms and therapeutic application of pharyngeal electrical stimulation, transcranial magnetic stimulation, and transcranial direct current stimulation. Am J Speech Lang Pathol 2020; 29: 1044–1064.

S2 McHorney CA, Robbins J, Lomax K, Rosenbek JC, Chignell K, Kramer AE, et al. The SWAL-QOL and SWAL-CARE outcomes tool for oropharyngeal dysphagia in adults: III. Documentation of reliability and validity. Dysphagia 2002; 17: 97–114.

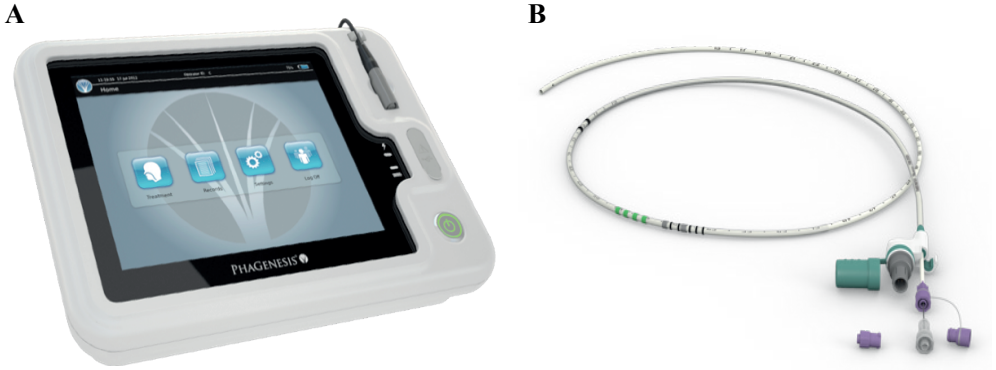

Fig. S1. Phagenyx® system. A medical device comprising of a base station with (A) touch-screen user interface and (B) a sterile single-patient use stimulation catheter that can also be used to deliver nutrition and hydration for up to 30 days after insertion.

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