

Efficacy of a Trunk-Driven Lever-Based Forearm Support Device for Assisted Feeding in Advanced ALS: A Case Report

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BACKGROUND

Amyotrophic lateral sclerosis (ALS) is an irreversible, progressively disabling neurodegenerative disease characterized by upper and lower motor neuron degeneration. As motor weakness progresses, patients gradually lose independence in activities of daily living, including self-feeding. Because denervation continues, restorative strengthening approaches are limited in advanced stages, emphasizing the need for compensatory strategies to preserve functional independence.

CASE DESCRIPTION

A 49-year-old woman with limb-onset sporadic ALS presented with progressive weakness. Motor function was evaluated using manual muscle testing (MMT) (Table 1). Both lower extremities showed complete paralysis, while the upper extremities showed proximal weakness with relatively preserved distal function. Although wrist and hand movement were retained, she was dependent for feeding.

Table 1. The patient's MMT

Muscle	MMT Rt.	MMT Lt.
Shoulder		
Flexor	P-	P-
Extensor	P	P
Adductor	F	F
Abductor	P	P
Elbow		
Flexor	P-	P-
Extensor	P	P
Wrist		
Flexor	F	F
Extensor	F	F
Pronator	F	F
Supinator	F	F
Hand		
Flexor	F	F
Extensor	F	F

A table-mounted forearm support system was implemented to compensate for proximal weakness (Fig. 1). The device integrates a commercially available forearm support with a rotational lever mechanism, in which trunk lateral flexion generates downward loading at the olecranon to produce distal forearm elevation without active elbow flexion. An adaptive utensil enabled stable grasp during feeding (Fig. 2).

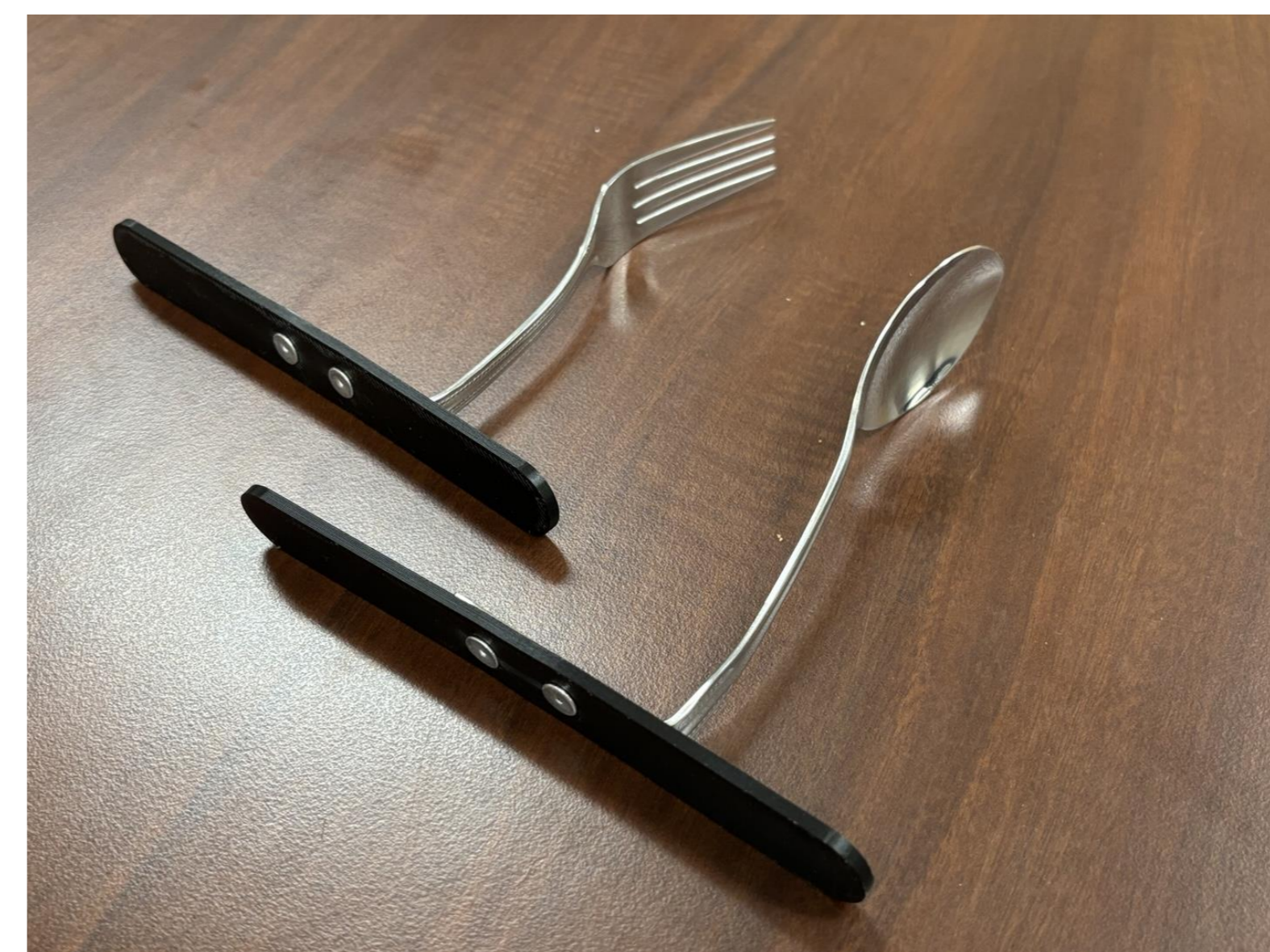


Fig2. Adaptive spoon and fork
 Enables stable grasp and maintains utensil alignment during feeding.

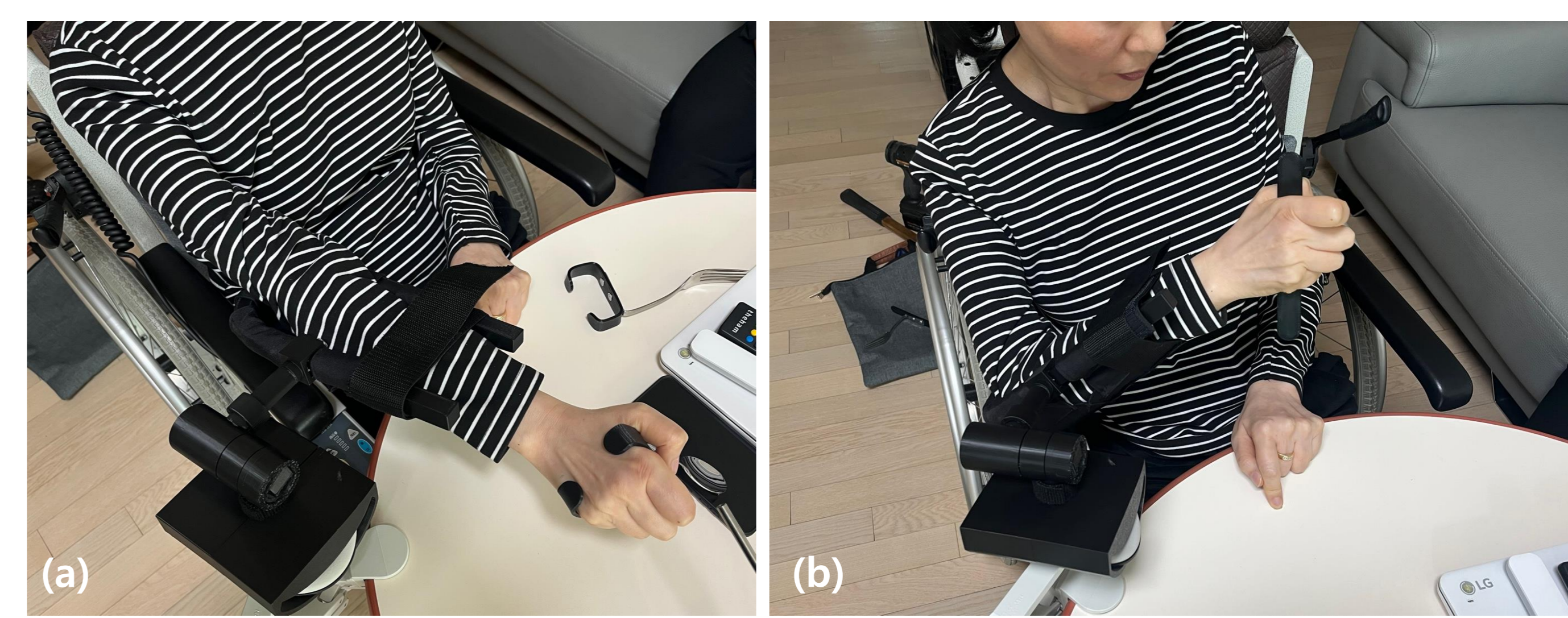


Fig3. Feeding using the device
 (a) Initial position (b) Lever-based forearm elevation

With the device in place, feeding improved from total dependence to moderate assistance, with the K-MBI feeding score increasing from 0 to 5. The total MBI score also improved from 27 to 32 (Fig. 4).

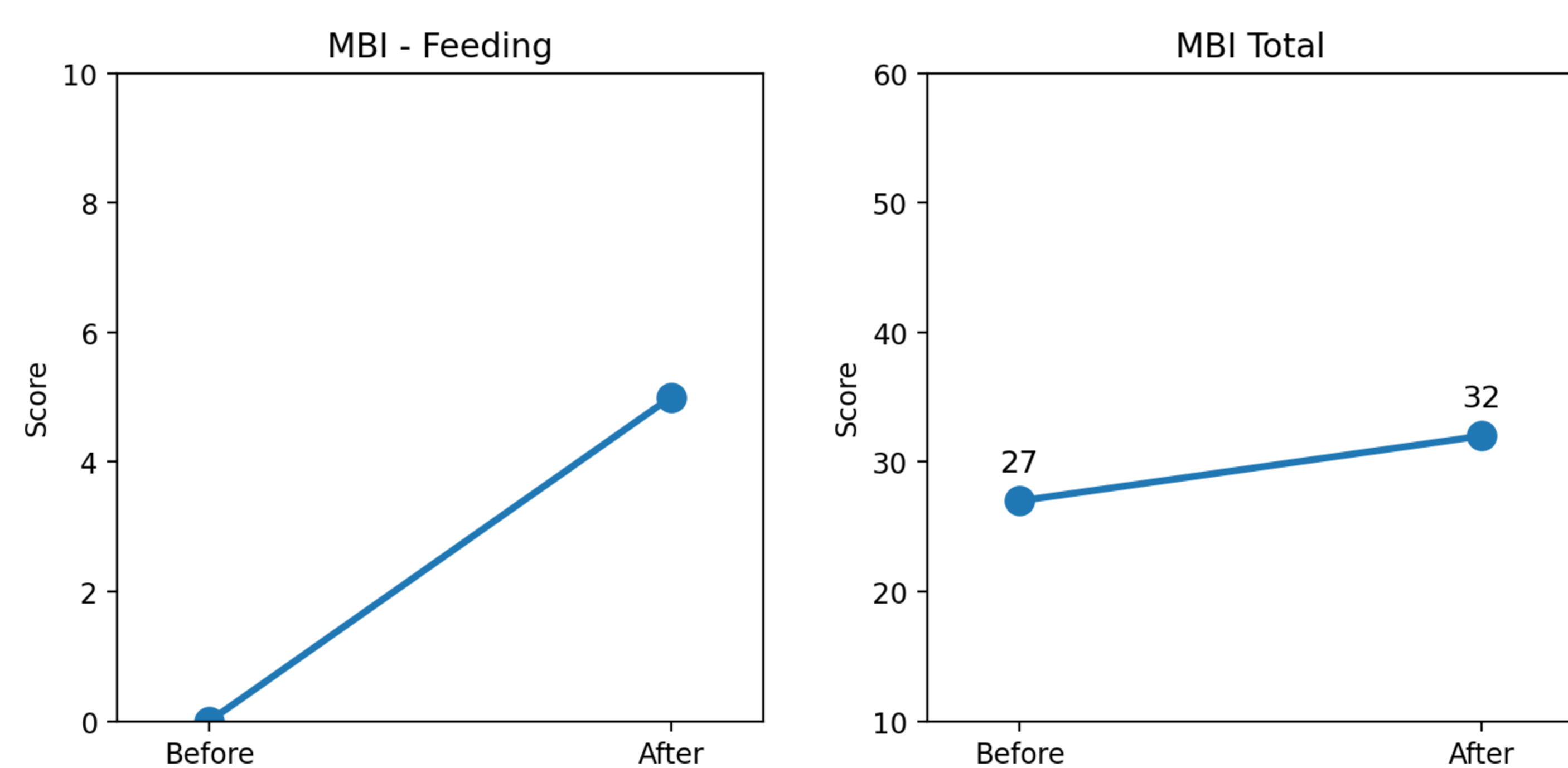


Fig 4. Modified Barthel Index (MBI)
 (a) Feeding score increased from 0 to 5.
 (b) The MBI score increased from 27 to 32.

CONCLUSIONS

In ALS, preserving residual function to maintain independence is a key goal of rehabilitation.

This trunk-driven, lever-based device enables functional reaching and feeding by leveraging residual trunk movement and forearm rotation. It may provide a practical and reproducible strategy to extend functional independence in advanced ALS.

Reference 1. Brown RH, Al-Chalabi A. Amyotrophic Lateral Sclerosis. *New England Journal of Medicine*. 2017

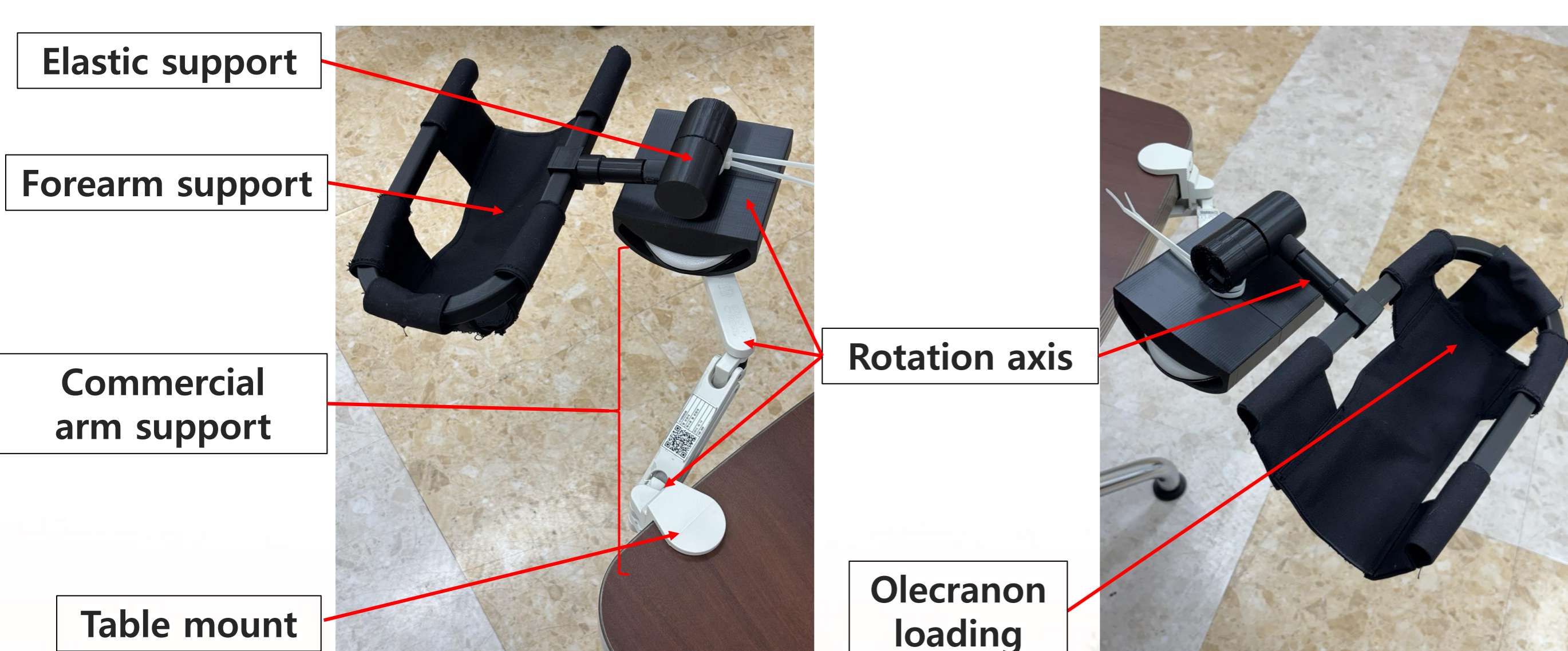


Fig1. Components of the forearm support device

The device consists of a commercially available arm support mounted on a table base and a forearm support structure. The system allows horizontal movement in a gravity-eliminated plane.