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Body Error!

Fatal exception in multiple body parts has occurred at several levels. Operating system has been stopped to prevent damage to your vital organs.

* Press any reinforcement key to terminate the disease.
* Press CTRL+ATL+DEL to restart your function, activity and participation.
* You will lose any nonrelevant point of view for all intents and purposes.

Press any key to survive _

SYSTEM-CRASH

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Swallowing therapy for people with multiple sclerosis

Dysphagia is a problem that receives too little attention

A contribution by Renata Horst and Alexander Dassel

People with multiple sclerosis have very different symptoms. Gait disorders are very common and must be treated with active therapy. Swallowing difficulties (dysphagia) are also more common than you might think and need to be treated in physiotherapy. A connection can even be established between gait and swallowing disorders.

For those in a hurry

A quarter to a third of those affected suffer from Difficulties with fluid management and food intake. Various questionnaires are available for the assessment. Compensatory gait strategies can also lead to increased tension in the supra- and infrahyal muscles. Manual swallowing therapy can be used to improve postural control, posture and the swallowing process. The mechanics of the structures in the neck area flow.

Multiple sclerosis (MS) or encephalo-myelitis disseminata (ED) is a chronic inflammatory neurological autoimmune disease.

immune disease whose progression and severity could not be more different. People with MS (Person with MS, PwMS) suffer from depending on the location of the central nervous system damage.

A case study illustrates the connection between gait and swallowing disorders and explains the procedure. way in therapy.

The main problem for 54-year-old Mr. H. is his gait disturbance. Since the first symptoms of MS and the diagnosis "secondary progressive multiple sclerosis" 23 years ago, walking has become slower, more unsteady and generally more strenuous. Nevertheless, there has been no deterioration for almost seven years. Mr. H. works full-time as a system administrator and works exclusively in a sitting position. He can concentrate well and has no cognitive deficits. What bothers him most in his everyday life is the furniture.

The symptoms of the disease include impaired vision and very rare visual disturbances, which usually last around 15 minutes. There are no sensory or vestibular impairments.

Main problem in everyday life: walking

The gait analysis (Fig. 1 and 2) shows that the left foot hangs slightly, as the plantar flexors are too weak to generate sufficient push-off. This also becomes clear when trying to stand on the toes. The heel barely comes off the ground on the left and the hindfoot deviates laterally in the sense of an inversion. This means that the

Mm. peronei are too weak to ensure a pronator screw connection for sufficient forefoot stability, which Mr. H. would need to push off from the left foot. There is also a lack of full plantar flexion in the upper ankle joint because the foot lifts are not sufficiently pre-stretched and are too weak overall. In addition, a strength deficit

Fig. 1 Aisle from lateral

Fig. 2 Aisle from ventral

of the knee flexors on the left side. When standing, Mr. H. cannot move his foot in the direction of Release the buttocks from the floor. To compensate Mr. H. shifts his weight far to the right over his standing leg in order to bring his left leg forward via circumduction. He has to shift his body weight to the right onto his walking stick, which results in a strong overload of the humeroscapular joint. At the same time, the left shoulder girdle muscles are tensed to generate momentum for the free leg.

Mr. H. uses two different leg orthoses on his left side. For everyday life, he uses a spiral orthosis that promotes push-off (Digiti Push). For longer walking distances, Mr.
H. wears a Knee Ankle Foot Orthosis (KAFO), which provides more stability when walking and standing, but is difficult to put on in everyday life and also has to be unlocked every time the knee is bent. Nevertheless, Mr H. can walk three kilometers with the full-leg orthosis and just under 500 meters with the spiral orthosis; the limiting factor in each case is the onset of shoulder pain.

Expected or current problem: Swallowing

One difficulty that Mr. H. is already suffering from, or may yet face, is dysphagia caused by illness. Dysphagia has often played a subordinate role in everyday clinical practice, although a good quarter to a third of PwMS suffer from difficulties with fluid and food intake. Special examinations reveal

Another picture emerges. Experts attest to clinically relevant dysphagia in four out of five PwMS, especially in progressive cases (1). During the therapeutic interview with Mr. H., his frequent clearing of the throat is noticeable, which may be an initial symptom of abnormalities in the structures relevant to the swallowing reactions. However, like many other PwMS, Mr. H. denies the question of whether he suffers from swallowing difficulties.

Various questionnaires are available on the subject of swallowing disorders in multiple sclerosis: Dysphagia in Multiple Sclerosis (DYMUS), Mann Assessment of Swallowing Ability (MASA), Eating Assessment Tool-10 (EAT-10) and the Dys- phagia-related QoL Questionnaire (Swallowing- Quality of Life). Reliable diagnostic evidence of a swallowing disorder can be obtained using video fluoroscopy (Fiberoptic Endoscopic Evaluation of Swallowing, FEES). This allows functional conditions of the oropharyngeal structures relevant to swallowing to be assessed (2). In everyday clinical practice, the swallowing movements can be tactilely

Photo: Renata Horst

Fig. 3 75 ml drinking test

and visually assessed. Neurological disorders lead to a decrease in drinking speed, which can be easily determined using a volume drinking test, for example the 75 ml drinking test used here (Fig. 3). If subjects can drink the same amount of fluid in a shorter time, an intervention has obviously had a positive effect on the structures and functions involved in the swallowing sequence (3).

Drinking speed is often reduced in neurological disorders.

Connection between gait and swallowing disorders

With the gait strategy that Mr. H. uses, it cannot be ruled out that there will be an increase in tension in the supra- and infrahyal muscles. This is a hindrance to the physiological process of the swallowing sequence, which must first be understood.

The transportation of the contents of the mouth, a so-called bolus, from the mouth to the stomach is called
Swallowing sequence (Fig. 4). Already

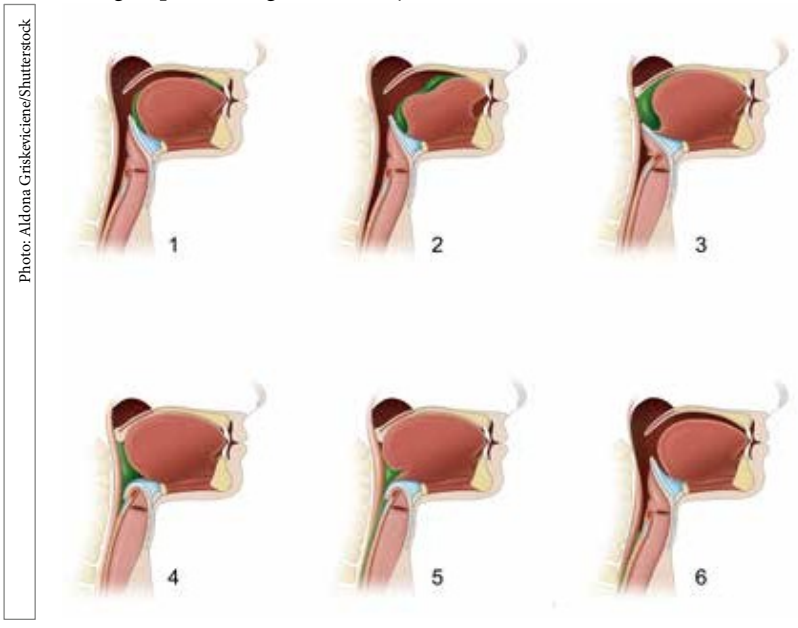

Photo: Aldona Griskeviciene/Shutterstock

Fig. 4 Overview of the swallowing sequence

Liquid and solid substances are sensory registered in the mouth, where coordinated central nervous processing takes place. The food is crushed and mixed with saliva. The bolus then passes through the oral cavity and the pharynx via the esophagus into the stomach. Short closing mechanisms are required one after the other to keep the bolus away from the respiratory tract. During oral transport, the soft palate and the back wall of the pharynx move towards each other and close the nasal passage. With the help of a peristaltic pharyngeal wave, gravity drives the bolus further towards the esophagus, whereby the trachea moves under the floor of the mouth as the tongue tenses and the hyoid moves in a ventral-cranial direction. The lifting movement of both the hyoid and the larynx relaxes and opens the upper oesophageal sphincter. The pharyngeal peristalsis presses the bolus against the sphincter. This opens and the bolus continues into the esophagus. At the end of the sequence, the bolus is in the stomach and the remaining structures move back to the resting position (4, 5).

During the oral During transportation, the soft palate and the posterior pharyngeal wall move towards each other.

PwMS with dysphagia complain of repeated swallowing and the associated frequent coughing or clearing of the throat; some of the drink enters the trachea, as is the case with Mr. H.. If the ability to perceive in this region is sufficient, a cough is triggered. Most of those affected initially unconsciously reduce the amount they swallow and increase the frequency of swallowing (6) or use compensatory strategies, for example certain movement maneuvers such as cervical flexion, -extension or rotation (7). In Mr. H., the observation of the swallowing process also revealed a paradoxical movement of the upper head joints.

The patient shows a para- doxic movement of the upper head joints during the swallowing process.

Under physiological conditions, an inclination is to be expected in which the upper and lower row of teeth approach each other; the lid moves onto the pot, so to speak. A short tooth contact creates a fixed point for forward and upward movement of the hyoid bone and larynx. However, Mr. H. moves his head into reclination.

Other triggers of swallowing disorders in PwMS can be sensory disturbances in the entire mouth and throat as well as in the laryngeal region. For example, if the bolus is perceived with too little intensity, there is a latency in bolus passage and possibly incomplete elevation of the larynx - resulting in incomplete closure of the trachea. Muscle weakness is also frequently observed in PwMS. Suprahyal muscles have a connection to the hyoid bone and hold or move it in the swallowing reaction. If these muscles are too weak, the larynx is not set in motion sufficiently (8). In the course of the disease, involuntary muscle activation can also lead to far-reaching problems. If swallowing difficulties persist over a longer period of time and sufferers increasingly use compensatory strategies, elasticity disorders also develop. This primarily affects the muscles that prevent the neck and head from moving into the correct swallowing position or are directly connected to the hyoid bone or larynx if they are unable to lengthen. These include the sternocleidomastoid, sternohyoid, omohyoid, digastric and scaleni muscles as well as the pharyngeal muscles. If there are mobility disorders of the diaphragm, this also has an effect on breathing-swallowing coordination and coughing. In the long term, conditions of malnutrition and dehydration can also occur; continuous aspiration can then also trigger pneumonia. Swallowing disorders are associated with significant morbidity and mortality (9-13).

Participation

Due to structural and functional deficits, even the procurement of food, but also the -preparation, the route to the restaurant or the way to the garden party can be an insurmountable obstacle. Restrictions in areas such as mobility, lifting and carrying work, fine motor skills and standing or sitting time, including on a cognitive level, occur more frequently in PwMS (14, 15). Although the actual process of food and fluid intake can be optimized by specifically avoiding unsuitable foods and drinks and changing their consistency, it is understandable if those affected do not want to participate in gatherings because they would have to practice abstinence or find it unpleasant to keep swallowing while eating and drinking, or if they have to take breaks (16).

Swallowing disorders should definitely be treated in a multi-professional therapeutic setting, as eating and drinking are elementary parts of living together in society for many people and are essential for maintaining quality of life.

The reduction of the tension-increasing compensatory mechanisms that Mr. H. uses for his walking reduces the tension within the infra- and suprahyal muscles. This means successful activation of the leg and trunk muscles.

The tongue's muscles facilitate swallowing.

Tab. 1 The exercises at a glance

Goals	How is the activity promoted?
Descend the stairs	
• Forefoot stability through concentric activation of the peroneal muscles, • eccentric function of the extensor synergy (quadriceps muscle, hip extensors), • Inclination of the upper head joints to promote the function of the digastric muscle, venter anterior, • increase cardiopulmonary endurance performance, • Breathing deepening to automate the swallowing process.	The therapist applies pressure with her left hand above the left thigh in the direction of the ball of the big toe to activate the peroneal muscles. She holds the pelvis with her right arm to promote stability of the pelvitrochanteric muscles and eccentric control of extensor synergy (Fig. 5).
Rolling from the supine position to the lateral position	
• reciprocal innervation of the suboccipital musculature, • Inclination of the upper head joints to promote the function of the digastric muscle, venter anterior, • increase cardiopulmonary endurance performance, • Deepening the breath to automate the swallowing process.	The therapist guides the patient's head into inclination and encourages hip and knee flexion (Fig. 6).
Transfer seat to seat via the left side	
• Forefoot stability, • vestibulospinal coordination support, • promote the eccentric function of the extensor synergy of the lower extremity, • Promote support activity of the upper extremities and shoulder blade stabilization, • reciprocal innervation of the suboccipital musculature, • Inclination of the upper head joints to promote the function of the digastric muscle, venter anterior, • increase cardiopulmonary endurance performance, • Deepening the breath to automate the swallowing process.	The therapist asks the patient to look to their right hand so that the lateral tilt and thus a weight shift to the left can occur automatically. She grasps the posterior axillary fold on both sides and accompanies the torso presentation so that the forefoot takes the weight (Fig. 7).
Promoting elasticity of the sternohyoid and omohyoid muscles: ability to straighten up with forced exhalation	
• Promotes elasticity of the sternohyoid and omohyoid muscles, • promote the eccentric function of these muscles, • Deepen your breathing, • Strengthen the tongue muscles, • Enable head control.	During the exhalation, the therapist accompanies the thoracic leg dorsally and caudally together with the patient, while both of them breathe in and out. Phonate "L". The head is actively held in the upright position (Fig. 8).

Climbing down the stairs increases your stamina, among other things.

During the transfer from seat to seat, reciprocal innervation of the suboccipital muscles occurs, among other things.

Fig. 5
position

Descending stairsFig. 6 Rolling from supine to lateral

Also important is the manual treatment of various Muscles.

Fig. 7 Seat to seat

transferFig. 8 Elasticity support
Mm. sternohyoideus and omohyoideus

Fig. 9 Elasticity promotion
M. sternocleidomastoideus

Fig. 10 Elasticity promotion digastric muscle, venter posterior

The diaphragm Breathing plays an important role in the regulation of sympathetic tone.

Fig. 11 Promoting elasticity of the pharyngeal muscles

Fig. 12 Promoting diaphragmatic breathing

Continued Tab. 1 The exercises at a glance

Promotion of elasticity of the sternocleidomastoid muscle: Change of gaze and exhalation	
• Promotes elasticity of the sternocleidomastoid muscle, • promote the eccentric function of this muscle, • Deepen your breathing, • Enable head control.	While the head and muscle belly are actively held in a lateral tilt, the therapist accompanies the movements of the clavicle and sternum in a dorsal and caudal direction during the exhalation phase (Fig. 9).
Promoting elasticity of the digastric muscle, venter posterior: change of gaze and tongue exploration	
• Promotion of elasticity of the digastric muscle, venter posterior, • promote the eccentric function of this muscle, • Enable head control so that the anterior part can lift the hyoid bone.	While the therapist fixes the hyoid bone, the patient looks sideways and upwards, causing the head to tilt to the opposite side (Fig. 10).
Promoting pharyngeal muscle elasticity: change of gaze	
• To promote the elasticity of these muscles so that the larynx can be lifted more easily and moved ventrally.	The patient looks sideways and upwards, creating a lateral tilt of the cervical spine, which the therapist accompanies. At the same time, she fixes the larynx in the central position (Fig. 11).
Promoting diaphragmatic breathing: exhalation	
• Breathing deepening, • Regulation of the sympathetic tone, • Mobility of the costotransverse joints, • promote preactive stability of the lower trunk, • Facilitates the passage of food through the esophagus.	The therapist's left hand fixes the lower left ribcage, the right hand accompanies the ribs to the front-up-outside during exhalation and to the back-down-inside during inhalation (Fig. 12).

Promoting elasticity is important for head control, among other things.

Manual swallowing therapy for PwMS

Manual swallowing therapy influences postural control, posture and the mechanics of the structures in the throat area. It promotes the gliding ability and mobility of muscles, nerves and connective tissue (4). Influencing postural flexibility and stability - i.e. the postural background - has a direct effect on swallowing activity, which is why methods for changing body position, rolling activities, postural control and functional straightening training are obvious (17). If, for example, the upper esophageal sphincter (oOS) is narrowed in PwMS, this impedes the bolus during esophageal passage. Although drug interventions are also used, mostly by means of Botox injections (18), to achieve dilation, non-drug measures are also available. Through the activation of suprahyal muscles by the oOS can also be relaxed (19-21). The development of the muscle mass as a whole correlates with the strength of the tongue (22, 23). During transfers, supporting and rolling movements, all large muscle groups are activated and the muscles close to the spine are also trained, which is why an increase in the strength of the tongue and therefore a more effective retraction ability of the tongue base can be expected (24, 25). The correlation between trunk and swallowing-relevant muscles is particularly evident in older people, for example. The stronger the trunk is, the better the muscles needed for eating and drinking work (26). During transfers, supporting and rolling movements, the entire spine is repeatedly stimulated to straighten up. This generally activates the neck muscles, which has been shown to promote cranial-ventral hyoid movement during the swallowing sequence (27). Respiratory training reduces the passage time in the pharynx and should therefore be a standard part of every swallowing program.

For transfers, support and rolling movements, all large muscle groups are activated.

for example, the people concerned can carry out rolling activities

treatment of PwMS (28, 29).

Table 2: Functional disorders and possible therapeutic interventions

Problem at functional level	Intervention options
Tongue control disorders	Tongue coordination exercises with toothbrush, spoon et cetera
Reduced retraction ability of the base of the tongue	Transfers, support activities, rolling, full-body training
Slowed/absent pharyngeal wave; reduced laryngeal closure	Hyolaryngeal release techniques
Decreased pharyngeal contraction; lack of relaxation; coordination disorder of the upper esophageal sphincter	Activation of the suprahyal muscles
Reduced perception in the pharyngeal/laryngeal region	Transfers, rolling, facial-oral stimulation

Table 2 provides an overview of the individual functional disorders and possible therapeutic interventions. Instead of working out compensation mechanisms with those affected and building up muscles to this end, the head and neck muscles responsible for the dynamic straightening and holding function should be activated (30). The practical approach then primarily involves promoting eccentric muscle function in this area. As a lack of exercise in PwMS leads to a change in physiological muscle function, this results in a loss of elasticity (31). If this affects muscles relevant to swallowing, the movements in the oropharyngeal region are not conspicuous in terms of either the extent or quality of movement. Measures to promote elasticity, including hyolaryngeal release techniques, can have a positive effect on mobility in the affected muscles and surrounding tissue (32). Immediately after the intervention, Mr. H. needed one sip less to drink the full 75 ml of water, i.e. two instead of three sips.

Important is the Activation of the head and neck muscles, which are responsible for the dynamic straightening and holding function.

Conclusion

The combination of whole-body training and specific promotion of the neuromyofascial mobility of the structures relevant to swallowing enables a reduction in swallowing disorders. N.A.P. therapy is based on the insight that activities shape body structures and influence bodily functions. This means that meaningful everyday activities that the patient can understand are chosen in order to have a positive effect on the structures involved in the swallowing sequence.

The static requirements are already created by a stable foundation, which is why the therapy sometimes starts at the foot. The feet are the pegs that must be anchored in the ground before the ropes can be tensioned. The eccentric function of all the muscles responsible for verticalization, including the neck muscles, must be ensured. Only then can the tent pole, i.e. the torso, the extremities and the head, be aligned vertically. –

Literature

1. Barzegar M, et al. 2021. Prevalence and risk factors of dysphagia in patients with multiple sclerosis. Dysphagia. Feb 12 [Online]
2. Dziewas R, et al. 2019. Safety and clinical impact of FEES - results of the FEES-registry. Neurol. res. pract. Apr 26 [Online]
3. Nathadwarawala KM, et al. 1992. A timed test of swallowing capacity for neurological patients. J. Neurol. Neurosurg. Psychiatry 55, 9: 822-825
4. Horst R. 2011. N.A.P. - Therapieren in der Neuroorthopädie. Stuttgart: Thieme
5. Nusser-Müller-Busch R, et al. 2021. Facial-Oral Tract Therapy (F.O.T.T.). 1st ed. Cham, Switzerland: Springer
6. Printza A, et al. 2020. Dysphagia prevalence, attitudes, and related quality of life in patients with multiple sclerosis. Dysphagia 35, 4: 677-684
7. Doeltgen SH, et al. 2017. biomechanical quantification of mendelsohn maneuver and effortful swallowing on pharyngoesophageal function. Otolaryngol. Head Neck Surg. 157, 5: 816-823
8. Di Pede C, et al. 2016. Dysphagia in the elderly: focus on rehabilitation strategies. Aging Clin. Exp. Res. 28, 4: 607-617
9. Aghaz A, et al. 2018. Prevalence of dysphagia in multiple sclerosis and its related factors: Systematic review and meta-analysis. Iran J. Neurol. 17, 4: 180-188
10. Guan XL, et al. 2015. prevalence of dysphagia in multiple sclerosis: a systematic review and meta- analysis. Neurol. Sci. 36, 5: 671-681

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11. Poorjavad M, et al. 2010. oropharyngeal dysphagia in multiple sclerosis. Mult. Scler. 16, 3: 362-365
12. Ekberg O, et al. 2002. social and psychological burden of dysphagia: its impact on diagnosis and treatment. Dysphagia 17, 2: 139-146
13. Fernandes AM, et al. 2013. oropharyngeal dysphagia in patients with multiple sclerosis: do the disease classification scales reflect dysphagia severity? Braz. J. Otorhinolaryngol. 79, 4: 460-465
14. Pilloni G, et al. 2020. gait and functional mobility in multiple sclerosis: immediate ettects of transcranial direct current stimulation (tDCS) paired with aerobic exercise. Front. Neurol. 5, 11: 310
15. Krishnan V, et al. 2008. hand function in multiple sclerosis: force coordination in manipulation tasks. Clin. Neurophysiol. 119, 10: 2274-2281
16. Vallons KJ, et al. 2015. The ettect of oral processing on the viscosity of thickened drinks for patients with dysphagia. Ann. Rehabil. Med. 39, 5: 772-777
17. Kagaya H, et al. 2011. body positions and functional training to reduce aspiration in patients with dysphagia. JMAJ 54, 1: 35-38
18. Restivo DA, et al. 2011. botulinum toxin improves dysphagia associated with multiple sclerosis. Eur. J. Neurol. 18, 3: 486-490
19. Kahrilas PJ, et al. 1998. upper esophageal sphincter function during deglutition. Gastroenterology 95, 1: 52-62
20. Logemann JA, et al. 2009. A randomized study comparing the Shaker exercise with traditional therapy: a preliminary study. Dysphagia 24, 4: 403-411

The complete bibliography can be requested from the authors.

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