

A multidisciplinary collaborative diagnosis and rehabilitation program for dysphagia in general hospitals

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SUMMARY Dysphagia is a common complication of various clinical conditions, with an increased incidence as age advances. Complications such as aspiration, malnutrition, and aspiration pneumonia caused by dysphagia significantly affect the overall treatment outcomes of patients. Scholars both domestically and internationally are increasingly focusing on early rehabilitation for dysphagia. This article summarizes common conditions causing dysphagia, clinical manifestations, complications, screening assessment, diagnosis, rehabilitation, and nutritional support related to dysphagia. It emphasizes the arrival at a multidisciplinary collaborative diagnosis and formulation of a rehabilitation management plan for dysphagia in general hospitals in order to provide strategic suggestions for establishing a multidisciplinary collaborative model for swallowing disorder management in general hospitals.

Keywords general hospitals, dysphagia, multidisciplinary collaboration, management

Swallowing is a crucial aspect of human physiology, serving not only as a means of ingesting nutrients and fluids but also as a result of the coordinated functioning of several organs, including the mouth, pharynx, and esophagus. However, dysphagia, a common and serious disorder, poses a significant challenge to the quality of life and overall health of patients. Dysphagia can be caused by a variety of factors, including neuromuscular disorders, anatomical abnormalities, neurological injuries, or post-surgical complications (1-4). Dysphagia can lead to serious complications, including aspiration pneumonia, malnutrition, and psychological and social interaction disorders. In severe cases, it can even be life-threatening (5).

Traditionally, physicians have relied on clinical experience and routine examinations to diagnose and treat dysphagia, but this approach has limitations. The diagnosis and treatment of dysphagia require multidisciplinary collaboration, involving specialists in otorhinolaryngology, neurology, rehabilitation medicine, nutrition, and speech-language pathology. This approach allows for a comprehensive understanding of the patient's condition and the formulation of personalized treatment plans to maximize the

improvement of the patient's swallowing and quality of life (6-9). Rehabilitation for dysphagia is crucial, particularly in countries like China where the aging population is increasing. Objective evaluations should be prioritized over subjective ones. This can help prevent complications such as aspiration and swallowing pneumonia, reduce medical expenses, and alleviate the burden on the social healthcare system. Moreover, focusing on rehabilitation for dysphagia can advance the development of related medical technology and equipment, enhance the effectiveness and quality of rehabilitation, and advance medical care.

One aim of the current work was to investigate the use of a multidisciplinary collaborative diagnosis and treatment model for the rehabilitation of patients with dysphagia in general hospitals. Another aim was to propose a detailed and effective diagnosis, treatment, and rehabilitation program by combining practical experience and clinical research (Figure 1). This program will serve as a valuable reference for assessing the quality of life and therapeutic outcomes of patients with dysphagia. In addition, it will offer practical guidance and inspiration for medical professionals and researchers in related fields.

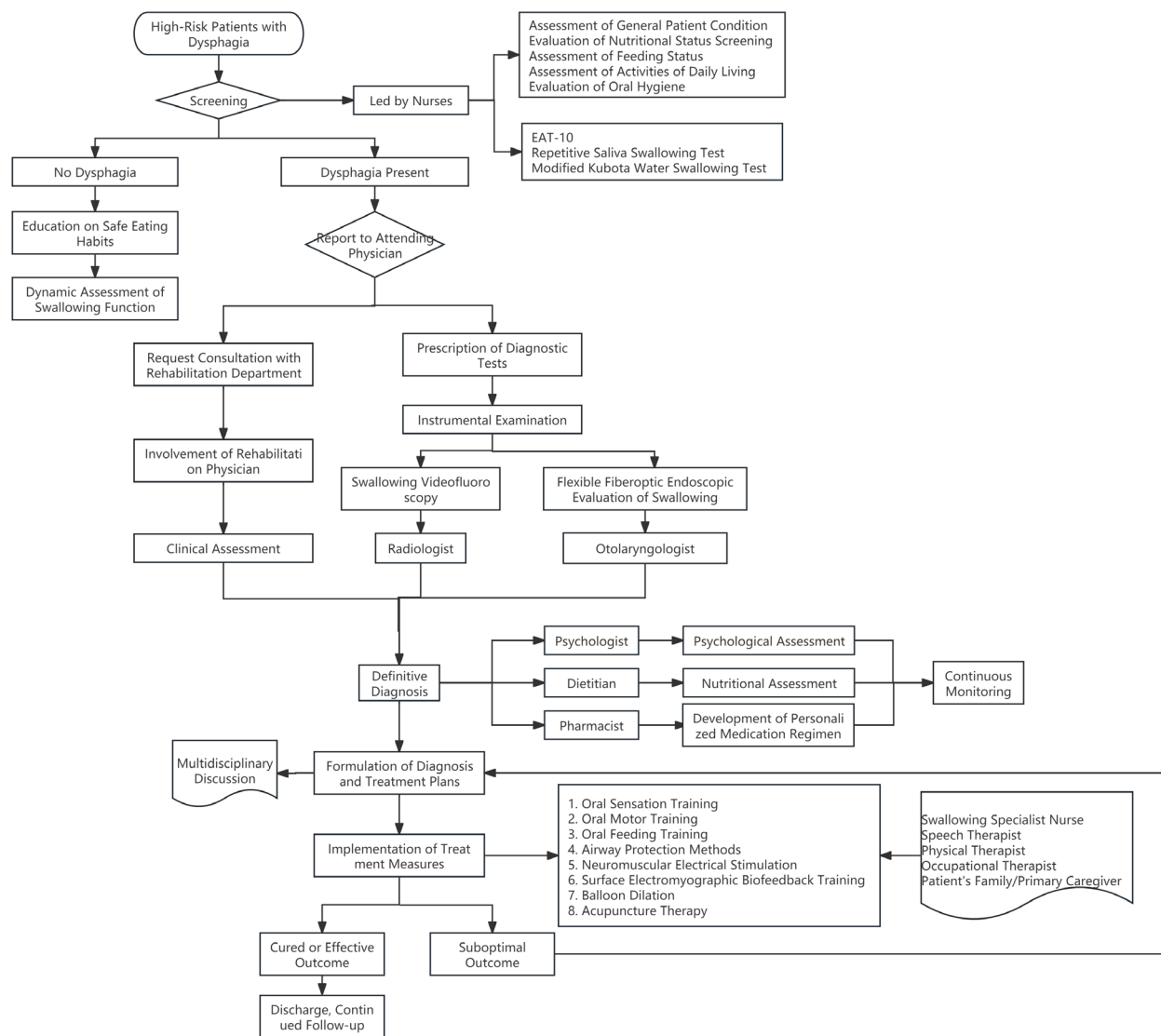


Figure 1. Multidisciplinary Collaboration Workflow for the Diagnosis, Treatment, and Rehabilitation of Dysphagia.

1. An Overview of Dysphagia

1.1. Definition

Dysphagia is a clinical manifestation resulting from structural and/or functional impairment of organs such as the mandible, lips, tongue, soft palate, pharynx, and esophagus, preventing the safe and effective passage of food from the mouth to the stomach. The broad concept of dysphagia should encompass behavioral and action abnormalities caused by cognitive, psychological, and mental issues leading to swallowing and feeding problems, known as feeding-dysphagia. Dysphagia typically meets the following criteria: (i) Difficulty in the passage of food or liquid from the mouth to the stomach; (ii) Impaired muscle control or coordination in the oral cavity and pharynx, resulting in malnutrition; and (iii) Accidental entry of food into the trachea, leading to recurrent pulmonary infections and aspiration

pneumonia. Dysphagia can be categorized based on different stages of development: a swallowing disorder in the oral preparatory phase, a swallowing disorder in the oral phase, a swallowing disorder in the pharyngeal phase, and a swallowing disorder in the esophageal phase.

1.2. Conditions Causing Dysphagia

Normal swallowing is a complex and coordinated process involving structures and their related nerves and muscles in the upper respiratory tract, oral cavity, pharynx, and esophagus. Any disease along the pathway from the mouth to the stomach can cause dysphagia. This includes central nervous system diseases, peripheral neuropathies, neuromuscular junction disorders, muscle diseases, structural lesions of the oropharynx, diseases of the digestive and respiratory

systems, as well as undergoing radiation therapy and surgery in the oropharyngeal region.

Common conditions causing dysphagia include:

Neurological diseases: Stroke, Parkinson's disease, multiple sclerosis, amyotrophic lateral sclerosis (ALS), and facial nerve paralysis.

Structural abnormalities: Dysphagia can also result from structural abnormalities in the oral cavity, pharynx, and esophagus. Examples include esophagitis, esophageal strictures, esophageal hiatus hernia, tumors, trauma, and surgery on the oral cavity and pharynx.

Muscle diseases: Such as myasthenia gravis, muscular dystrophy, and disorders of muscle tone.

Other conditions: These conditions include thyroid enlargement, hyperthyroidism, esophageal ulcers, and esophagitis.

1.3. Clinical Manifestations of Dysphagia

Common clinical manifestations include: drooling or food spillage from the mouth, food residue in the oral cavity, a foul taste in the mouth, nasal regurgitation, food sticking in the mouth or throat, coughing or choking while eating or drinking, wheezing, difficulty breathing, the sensation of choking, swallowing pain, changes in eating habits, inability to eat certain foods, needing extra fluids to moisten food or aid in swallowing, multiple swallows required to clear food, a hoarse voice, frequent mouth clearing, difficulty or pain while chewing, a hoarse voice after swallowing, recurrent pneumonia, an unexplained fever, malnutrition, weight loss, other digestive system symptoms such as decreased appetite or refusal to eat, belching, acid reflux, nausea, vomiting, and abdominal bloating.

1.4. Common Complications of Dysphagia

Dysphagia can lead to serious complications that significantly impact the health and quality of life of patients.

1.4.1. Aspiration

Aspiration refers to the inhalation of substances from the oral or pharyngeal region into the lower respiratory tract. Aspiration is the most common and immediately actionable complication of dysphagia. After aspiration, patients may experience immediate irritative coughing, shortness of breath, or even wheezing, known as overt aspiration. In covert aspiration (>1 min), patients do not exhibit external signs such as coughing for more than one minute after aspiration, so it often goes undetected.

1.4.2. Pneumonia

Inhalation of oral or pharyngeal secretions containing pathogens or food particles can introduce bacteria into the lungs, leading to bacterial colonization

and subsequent pulmonary infections. In addition, gastroesophageal reflux can introduce gastric contents into the trachea and lungs, causing chemical injury to the lungs and eventual mixed infections.

1.4.3. Malnutrition

Malnutrition refers to deficiencies or excesses of energy, protein, and other nutrients that adversely affect bodily functions and clinical outcomes, including undernutrition and obesity.

1.4.4. Psychological and Social Interaction Disorders

Patients may experience depression, social isolation, or other psychological symptoms due to an inability to eat orally or the use of nasal feeding tubes, leading to impaired language and communication skills in children.

2. Swallowing Disorder Screening and Assessment

Using methods such as the EAT-10 Swallowing Screening Scale, repetitive saliva swallowing test, and the modified Wakita water swallowing test for screening and assessment, the initial assessment identifies swallowing issues in patients. Based on the assessment results, dietary and treatment plans are formulated to prevent aspiration and aspiration pneumonia.

2.1. Pre-screening Assessment

The patient's consciousness, speech, cognition, head control ability, and cooperation level are assessed. The patient's nutritional status, intake route, oral condition, and psychological state are simultaneously evaluated. Screening is postponed for patients with impaired consciousness or elderly and frail patients who cannot cooperate with the process, and appropriate nutritional routes are selected as needed. Screening tools include:

2.1.1. EAT-10 Swallowing Screening Scale

Developed by Belafsky *et al.*, the EAT-10 can improve the sensitivity and specificity of screening when used in conjunction with the water swallowing test. A total score of 3 or higher is considered abnormal swallowing, requiring further examination and evaluation.

2.1.2. Repetitive Saliva Swallowing Test (RSST)

As a screening test for functional dysphagia (10), the RSST assesses induction of the patient's swallowing reflex by observing the initiation time, number of swallows, and extent of laryngeal elevation within 30 seconds. This method of assessment is simple, quick, and safe.

2.1.3. Modified Kubota Water Swallowing Test

Proposed by Toshio Kubota *et al.* (11), this water swallowing test screens for the presence and severity of

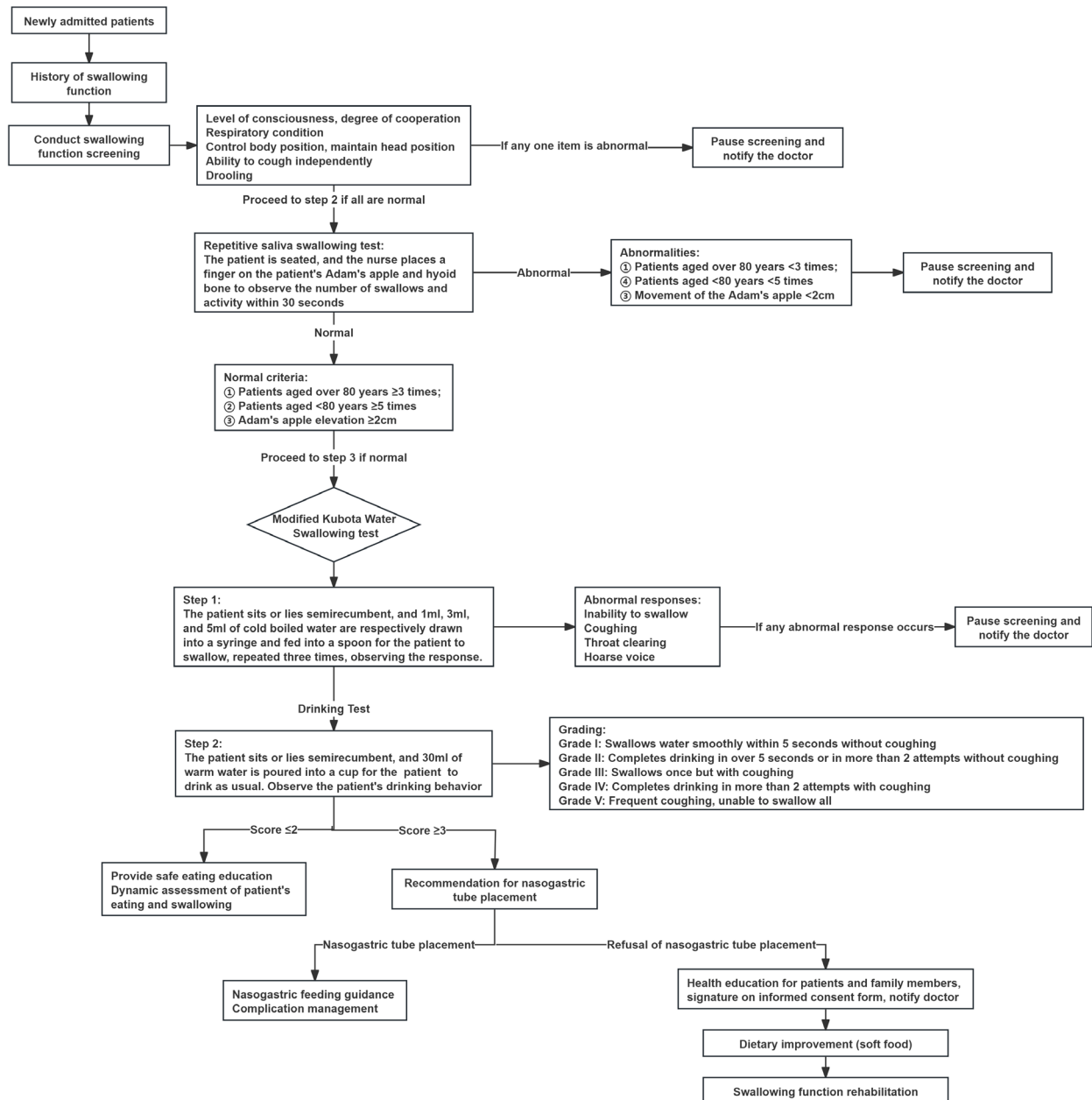


Figure 2. Swallowing Screening and Assessment Process.

dysphagia by having a patient drink 30 ml of water. The modified Kubota *et al.* water swallowing test involves administering 1 ml, 3 ml, and 5 ml of water before the actual test to reduce the risk of aspiration caused by screening. If the patient passes this pre-screening, the water swallowing test is continued to assess the presence and severity of dysphagia. This test can serve as a screening criterion for whether a patient can undergo swallowing imaging.

2.1.4. Swallowing Screening and Assessment Process

The swallowing screening and assessment workflow is shown in Figure 2.

2.2. Clinical Swallow Evaluation (CSE)

The CSE is an essential component of an intervention to diagnose or identify suspected dysphagia. It includes three main parts: a comprehensive medical history, a physical examination of oral and motor function, and assessment of food intake.

2.2.1. Medical History

This involves a comprehensive assessment of the patient's chief complaints, medical history, mental status, cognitive ability, treatment compliance, communication ability, nutritional status, oral hygiene,

respiratory function, and general motor function. It aims to further clarify the diagnosis of dysphagia and identify existing risks.

2.2.2. Bedside Feeding Evaluation

The volume-viscosity swallow test (V-VST) is used to evaluate bedside feeding. It observes the patient's swallowing to help choose the most appropriate volume and viscosity for fluid intake, ensuring the safety and effectiveness of feeding.

2.2.3. Direct Feeding Assessment

In addition to the V-VST, direct feeding is assessed in patients capable of oral intake, observing the process of the patient bringing food into his or her mouth. Key observations include the amount of food taken in one bite, swallowing time, coordination between breathing and swallowing, suitable shapes of food for safe swallowing, and assessment of oral medication.

2.2.4. Functional Oral Intake Scale (FOIS)

The FOIS is a tool used to assess a patient's ability to take food orally. It evaluates whether the patient can consume foods of different consistencies and maintain the correct posture and breathing during eating. This scale is suitable for adult patients with varying degrees of dysphagia and is used to assess the progress of treatment and rehabilitation outcomes in patients with a swallowing disorder.

2.3. Instrumental Assessment of Dysphagia

2.3.1. Videofluoroscopic Swallowing Study (VFSS)

The VFSS is a specialized imaging study conducted under X-ray fluoroscopy to assess swallowing movements of the mouth, pharynx, larynx, and esophagus. It dynamically and comprehensively evaluates swallowing in the upper aerodigestive tract, identifying the presence of aspiration and its causes. The VFSS is considered the "gold standard" for assessing dysphagia.

2.3.2. Fiberoptic Endoscopic Evaluation of Swallowing

The Fiberoptic Endoscopic Evaluation of Swallowing (FEES) involves the use of a flexible endoscope inserted through the nose to depict the structures of the nasopharynx, oropharynx, and larynx on a monitor. It allows direct observation of various physiological activities, including quiet breathing, forced breathing, coughing, speaking, and swallowing. The FEES assesses the condition of these structures during swallowing, identifies the location and amount of residue after swallowing, and detects signs of leakage, penetration, or aspiration. It can be repeated multiple times over a given period to evaluate the effectiveness of different swallowing strategies.

3. Treatment and Rehabilitation Plan for Dysphagia

3.1. Oral Phase Rehabilitation

3.1.1. Drooling

Forms of Rehabilitation (12-14):

3.1.1.1. Sensory perception training for the lips: Alternating cold and hot water stimulation.

3.1.1.2. Massage therapy for the orbicularis oris muscle to improve muscle strength and tone.

3.1.1.3. Lip rounding exercises: Pronouncing syllables such as "i-l-i," "u-U-u," and "i-I-U-1" (combined with rhythm training).

3.1.1.4. Jaw opening and chewing exercises (can be combined with a chewable device).

3.1.1.5. Neuromuscular low-frequency electrical stimulation.

3.1.1.6. Traditional Chinese acupuncture to treat drooling: The main acupuncture points include the Lianquan acupoint, Chengjiang acupoint, Dicang acupoint, and Jiache acupoint (15-17).

3.1.2. Prolonged Oral Phase

Forms of Rehabilitation:

3.1.2.1. Sensory stimulation training: Ice stimulation, sour stimulation, etc.

3.1.2.2. Tongue massage therapy and tongue movement exercises.

3.1.2.3. Simulated chewing and bolus propulsion training for the tongue.

3.1.2.4. Compensatory treatment: Placing the bolus at the base of the tongue, eating with the head tilted back, and consuming smooth and thin liquid boluses.

3.1.3. Inadequate Tongue Elevation

Forms of Rehabilitation:

3.1.3.1. Compensatory strategies

Choosing foods with a thin, liquid texture, using a head-backward tilt, or placing the bolus at the base of the tongue.

3.1.3.2. Indirect strategies

Passive and active tongue movement exercises (14), resistance exercises for tongue elevation, and bolus propulsion exercises.

3.2. Pharyngeal Phase Issues

3.2.1. Delayed Pharyngeal Initiation

Forms of Rehabilitation (12-13):

3.2.1.1. Compensatory strategies: Increasing the viscosity of liquids (nectar-like fluids) or adopting a forward head tilt.

3.2.1.2. Indirect strategies: Thermal tactile stimulation.

3.2.2. Insufficient Laryngeal Elevation (12-13)

Forms of Rehabilitation:

3.2.2.1. Compensatory strategies

Increasing the viscosity of liquids (thin to moderately thick) or adopting a forward head tilt.

3.2.2.2. Indirect strategies

Singing therapy: Singing from low to high pitches, maintaining a high pitch for several seconds; the Mendelsohn maneuver (18). Laryngeal neuromuscular electrical stimulation at a low frequency (19).

3.2.3. Weak Pharyngeal Contraction

Forms of Rehabilitation:

3.2.3.1. Compensatory strategies (12-13)

Alternating between solid and liquid foods, preferring liquids; for unilateral pharyngeal muscle weakness, tilting the head towards the unaffected side; for bilateral pharyngeal muscle weakness, adopting a lateral recumbent position.

3.2.3.2. Indirect and direct strategies

The Mendelsohn maneuver; effortful swallowing.

3.2.4. Residue in Pharyngeal Recesses (Valleculae Residue, Piriform Sinus Residue)

3.2.4.1. Treatments for Valleculae Residue

(i) Compensatory strategies: Reducing bolus viscosity (thin liquids), adopting a forward head tilt.

(ii) Indirect strategies: The Masako maneuver (12-14); base of the tongue movement training.

(iii) Direct strategy: Effortful swallowing.

3.2.4.2 Treatments for Piriform Sinus Residue

(i) Compensatory strategies: Reducing bolus viscosity (water-like liquids), performing head turns during swallowing.

(ii) Indirect strategies: The Mendelsohn maneuver; the Shaker exercise; occasionally, cricopharyngeal dilation may be necessary.

3.3. Aspiration

3.3.1. Treatment of Pre-swallowing Aspiration

3.3.1.1. Compensatory strategies: Increasing bolus viscosity (nectar-thick liquids, reducing powdered foods such as biscuits); adopting a forward head tilt; adjusting the volume and speed of intake (small sips).

3.3.1.2. Indirect strategies

Enhancing orofacial sensory perception.

3.3.2. Treatment of Mid-swallowing Aspiration

3.3.2.1. Compensatory strategies

Chin down, head turned towards the affected side; increasing bolus viscosity.

3.3.2.2. Indirect strategies

Training to promote glottal closure (12-14).

3.3.2.3. Direct strategies

Supraglottic swallow (12-14).

3.3.3. Treatment of Post-swallowing Aspiration

3.3.3.1. Compensatory strategies

Reducing bolus viscosity (water-like liquids); head turn during swallowing.

3.3.3.2. Indirect strategies

The Mendelsohn maneuver; effortful swallowing (12-14); if necessary, cricopharyngeal dilation (12-13). Individualized application of non-invasive central nervous system stimulation techniques such as transcranial magnetic stimulation and transcranial direct current stimulation based on the patient's condition.

4. Nutritional Management of Dysphagia

Dysphagia is closely related to malnutrition. Once diagnosed, patients with dysphagia undergo nutritional risk screening. Screening tools include Nutritional Risk Screening (NRS-2002), the Malnutrition Universal Screening Tool (MUST), and the Mini-Nutritional Assessment (MNA). A score of ≥ 3 on the NRS-2002 indicates nutritional risk; if the score is < 3 , reassessment is performed after one week. Nutritional assessment and therapy are provided for patients at nutritional risk.

For patients with mild swallowing difficulties who have undergone safety and efficacy testing or instrumental assessments without obvious aspiration or significant residue, oral intake is the preferred route of nutritional intake. Foods that are easily chewed, swallowed, or modified in texture may be chosen (20). Food texture should adhere to the following principles: 1. Hard foods should be softened; 2. Thin liquids should be thickened; 3. Avoidance of heterogeneous mixtures; and 4. Food should be homogeneous and smooth. When oral intake cannot meet nutritional needs, provided the patient's intestinal function is normal, enteral nutrition preparations or specialized medical foods adjusted for food texture are recommended for oral administration.

For patients with severe swallowing difficulties, continuous or intermittent enteral nutrition preparations or specialized medical foods adjusted for food texture *via* tube feeding should be selected. When enteral nutrition cannot meet 60% of nutritional requirements, supplementation with parenteral nutrition should be considered.

Regular nutritional monitoring is necessary during the implementation of nutritional therapy to assess current eating status, gastrointestinal symptoms, nutrient intake, and nutritional status in order to promptly modify the nutritional treatment plan.

5. Swallowing Disorder Rehabilitation Management

5.1. Risk Management

5.1.1. Informed consent

An adequate explanation should be provided to and

consent should be obtained from patients and their families before assessment and treatment, following standardized medical recording procedures and relevant requirements. For high-risk procedures or treatments, informed consent forms must be signed according to regulations.

5.1.2. Emergency management

Emergency plans for aspiration and choking.

5.2. Multidisciplinary Consultation and Case Discussions

The rehabilitation team holds regular case conferences where the focus is on reporting the patient's eating status. Other team members provide opinions, raise questions, and propose solutions. The attending physician compiles and determines the treatment plan, which is then implemented according to each team member's responsibilities.

5.3. Communication

Timely communication and exchanges of information among members of the multidisciplinary team can be facilitated through regular case conferences, phone calls, or messaging apps like WeChat. A dedicated communication platform for diagnosis, treatment, and rehabilitation of a swallowing disorder can ensure the prompt exchange of opinions on treatment.

5.4. Discharge Follow-up and Continuation of Rehabilitation Guidance

Upon discharge, patients and their families should be provided with guidance on home treatment, rehabilitation, and care, including knowledge and skills in preventing aspiration, self-management, caregiver abilities, food selection and portion control, eating posture, and knowledge of medication. Regular follow-up visits after discharge should be scheduled, with home visits conducted when necessary.

6. Conclusion

In summary, dysphagia is receiving increasing attention. This article has provided an overview of comprehensive management of dysphagia at a tertiary hospital, including screening and assessment, rehabilitation programs, nutritional management, multidisciplinary collaboration, risk prevention and control, and discharge follow-up. The aim is to promote the restoration of swallowing, reduce complications, and improve quality of life. Multidisciplinary collaboration is particularly important in the diagnosis and treatment of dysphagia, and it plays a significant role in enhancing the level of diagnosis and treatment and improving the quality of

life for patients.

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