

Successful Treatment of Dysphagia in Postoperative Medulloblastoma: A Case Study

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ABSTRACT

Aim: The aim of this study was to document the assessment and therapeutic management of dysphagia in a case of postoperative medulloblastoma.

Background: Medulloblastoma is a highly malignant and rapidly growing central nervous system (CNS) tumor that arises from the cerebellum, the lower and rear portion of the brain. The tumor causes hydrocephalus and symptoms of increased intracranial pressure (ICP) as well as affected functions like problem in controlling balance, posture, and complex motor functions such as finer hand movement, speech, and swallowing as noted on examination also nystagmus and papilledema. Patients with neurosurgical conditions like medulloblastoma exhibit serious swallowing problem mainly in oral transit, pharyngeal, and esophageal stage such as delayed or even absence of pharyngeal trigger, restricted tongue, and laryngeal movement with no true pharyngeal swallow.

Case description: A 35-year-old male was diagnosed with pharyngoesophageal dysphagia and was advised for swallowing therapy. The swallowing therapy including the oromotor exercises included Masako or tongue hold, and Shaker and modified Shaker exercises along with the swallowing maneuvers included effortful swallow, Mendelsohn maneuvers, and super-supraglottic swallow. The therapy was provided twice a week for the duration of 45 minutes.

Conclusion: This study concluded that early intervention or early implementation of swallowing therapy plays a significant role in triggering the rate of improvement and helps the patient to experience an improved quality of life.

Clinical implication: A combination of swallow therapy techniques with each technique aimed to treat specific impairment has the ability to boost the rate of recovery. In 15 sessions, the feeding tube was removed and the patient was able to swallow safely and efficiently.

Keywords: Aspiration, Dysphagia, Medulloblastoma, Swallowing, Swallowing therapy.

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BACKGROUND

Medulloblastoma is a highly malignant and rapidly growing central nervous system (CNS) tumor that arises from the cerebellum, the lower and rear portion of the brain, consisting of small blue cells. The tumor located in cerebellum is called "infratentorial" tumors, which means that the tumor is located below the tentorium. Because of its location in posterior fossa, medulloblastoma often produces hydrocephalus and symptoms of increased intracranial pressure (ICP) as well as affected functions like problem in balance, posture, and complex motor functions such as finer hand movement, speech and swallowing along with nystagmus and papilledema. Histologically medulloblastoma is of various types: classic medulloblastoma, desmoplastic nodular medulloblastoma, medulloblastoma with extensive nodularity, large cell medulloblastoma, melanotic medulloblastoma, and medulloblastoma. Treatment of medulloblastoma depends on the grade of tumor, tumor, lymph nodes, metastasis (TNM) stage, and it is widespread. So the treatment options for medulloblastoma are radiation therapy, surgical removal, radiation, and chemotherapy. Treatment of medulloblastoma also has various side effects that can be long-term like "posterior fossa mutism syndrome" and cerebellar mutism and short-term like nausea, hair loss, double vision, ataxia, speech and swallowing difficulty, loss of appetite, weight loss, fatigue, and voice problem. Dysphagia that is difficulty in swallowing or hampered act of deglutition can be simply defined as difficulty in moving food from mouth to stomach which can occur in various stages of life from infancy to older ages and due to various reasons.¹ Classically, the act of deglutition is described in four phases which are oral

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preparatory, oral phase, pharyngeal phase, and esophageal phase. Patients with neurosurgical conditions like medulloblastoma exhibit serious swallowing problem mainly in oral transit, pharyngeal, and esophageal stage such as delayed or even absence of pharyngeal trigger, restricted tongue, and laryngeal movement with no true pharyngeal swallow. Surgical removal of such tumor may cause damage to cranial nerve IX, X, XII, and VII, and sometimes due to the spread of lesion, the VIII cranial nerve may also be affected. Affected cranial nerve IX may lead to delayed pharyngeal trigger and swallow.

Need of Study

Documentation of assessment and management of dysphagia in such rare case is important as it is often seen that the patients with dysphagia secondary to postoperative infratentorial tumor experiences difficulty in pharyngeal swallow or having difficulty in

pharyngoesophageal stage of swallowing and hence need feeding tube, like Ryle's tube or percutaneous endoscopic gastrostomy (PEG) tube. In this context, documentation of a case, providing evidence of improvement of dysphagia by a course of swallowing therapy, will be helpful for the management of dysphagia caused by medulloblastoma or other neuroblastoma and neurosurgeries.

Aim

Aim is to document a successful dysphagia management in case of postoperative medulloblastoma. The objective of this study is to document the perceptual assessment of pharyngoesophageal dysphagia and therapeutic management using suitable maneuvers and exercises in a case of pharyngoesophageal dysphagia in a case of postoperative medulloblastoma.

CASE DESCRIPTION

Patient's Background

A patient aged/sex 31 years/male came to AJNISHD, RC, Kolkata on 23/8/2018 with difficulty in swallowing and severe risk of aspiration. He had been intubated with nasogastric feeding tube for nutritional support after craniotomy and excision of medulloblastoma. The patient was highly oriented and aware about his problem and condition and was able to give sufficient report regarding the exact nature of his swallowing difficulty including information, like how did the problem started and worsened after a sudden onset.

Six months prior to the surgery, the symptoms of medulloblastoma like nystagmus, double vision, loss of appetite, vomiting, and drowsiness appeared that worsened over time as reported by the patient. Surgical biopsy was done in which the nature of specimen taken was multiple gray matter white bits measuring 0.8 × 0.5 cm; impression—classic medulloblastoma, WHO grade IV; posterior fossa location. Impression of MRI report suggested T2/FLAIR mild hyperintensities and T1 mild hypointensities in left cerebellum, vermis, cerebellar peduncle, and left side of medulla with restricted diffusion infarction.

Craniotomy with near total excision of the lesion was done under general anesthesia on May 2018. Postoperative impression of MRI showed evidence of suboccipital craniotomy with focal area of hyperintensity in the anterior vermis region. Smear cytopathology report after surgery suggested no malignancy. Postoperative radiological management was taken. Patient had undergone total 20 sessions of radiotherapy after operation.

Assessment

Subjective assessment was done using Logemann's four-finger test that suggested delayed pharyngeal trigger and slow laryngeal elevation with pooling of saliva on bilateral pyriform fossa followed by penetration, aspiration, and coughing. The oral transit time was recorded to be more than 1 second and the pharyngeal trigger time more than 10 seconds. Mann assessment for swallowing ability (MASA) was administered and score showed 134 suggestive of severe dysphagia and aspiration. Abrupt fluctuation of SpO₂ value in pulse oximeter was also noted during swallowing. Dysarthria assessment suggested nondysarthric speech and oromotor skills were assessed using Frenchay dysarthria assessment (FDA), which documented absence of swallow reflex and laryngeal functions were mildly affected. Patient exhibited ataxic components like balancing problem while walking, sitting, and standing from sitting and lying position. Cranial nerve assessment suggested affected functioning of glossopharyngeal nerve (IX) and vagus

nerve (X). Voice assessment was done which revealed hoarse voice in Dr Speech and GRBAS score showed (G2R3B2A3S2). Cervical auscultation of swallowing using stethoscope heard was weak, unclear, and gurgly. Also, changes in the sounds of respiratory cycle of swallow before and after the swallow were heard, suggestive of presence of secretions in the airway post an attempt of swallow that indicates presence of aspiration. Electroglottography (EGG) test showed slightly delay in glottal closure time. Finally, the subject was diagnosed with pharyngoesophageal dysphagia and was advised for dysphagia therapy.

Management

The goal of therapy was to achieve oral intake of food and effortless swallow without aspiration and removal of nasogastric feeding tube. The therapy techniques like oromotor exercises included Masako or tongue hold, Shaker, and modified Shaker exercises along with muscle strengthening maneuvers, which were used to change the timing and strengthen the particular movement of swallowing. The swallowing maneuvers included Mendelsohn maneuver and super-supraglottic swallow. The therapy was provided twice a week for the duration of 45 minutes.

Oromotor Exercises

The Masako or tongue hold helps to propel the food and is a successful tool in improving strength of movement of muscles of base of tongue. This exercise was performed by protruding his tongue, holding it in place by gently biting down on the anterior portion of his tongue, and maintaining this posture while swallowing.

The Shaker technique is introduced for patients who exhibit reduced superior and anterior movements of the hyolaryngeal complex. The subject was asked to lie in supine position thereby keeping the shoulders on the bed/mat. The clinician applied resistance on his forehead and was asked to raise his head to look at his toes while exerting pressure from head against the resistance. The patient had to maintain this position for 60 seconds and then repeat this two more times.

Modified Shaker technique was also used for the same purpose of hyolaryngeal excursion and opening of upper esophageal sphincter, and he was asked to sit comfortably on a chair. Clinician applied resistance on the client's forehead and he extended the head against the resistance applied on the forehead.

Swallowing Maneuvers

The super-supraglottic swallow, which is designed to close the entrance to the airway voluntarily by tilting the arytenoid cartilage anteriorly to the base of epiglottis before and during the swallow and closing the false vocal cords tightly. For this maneuver, the subject was instructed to inhale and hold the breath tightly, bearing down, and was instructed to make attempts of swallow by holding the breath and bearing down and then to cough when he had finished swallowing. The bearing down helps to tilt the arytenoid forward, close the false vocal fold, and close the entrance to the airway.

The Mendelsohn maneuver was used to increase the extent and duration of laryngeal elevation and thereby increase the duration and width of cricopharyngeal opening as well as to improve the overall coordination of the swallow.² The subject was instructed to pay attention to the neck while swallowing and feel the Adam's apple lift and lower. The patient was then asked to attempt dry swallow and hold the Adam's apple at the lifted position around 2–3 seconds.

Relaxation Exercises

Since the patient exhibited radiation therapy induced stiffness in neck and laryngeal region, laryngeal manual therapy (LMT) was used to relax the tension in laryngeal musculature. Palpatory evaluation was done before starting the therapy to determine sites and levels of muscle tension and resistance in the perilaryngeal musculature. The LMT was done in three steps namely rotational massage, kneading, and stretching the perilaryngeal muscles. The patient is needed to be silent during this therapy. The therapist massaged the laryngeal area from behind using circular and descending movements to knead and stretch each muscle group. The patient was requested to breathe quietly, relax his shoulder and jaw, and unclench his teeth during the procedure. Starting from the least-tensed area of sternocleidomastoid, massage was done along the length of the sternocleidomastoid. Suprahyoid muscles were kneaded (upward and backward from midpoint of the mandible) using clinician’s dominant hand and other hand cradles the patient’s occiput. Bilateral pressure was applied to thyroid-hyoid muscle.

RESULTS

Within 13 sessions of therapy, patient was able to swallow safely and efficiently and the nasogastric feeding tube (Ryle’s tube) was removed on the 15th session. Post-therapy assessment of swallowing suggested adequate pharyngeal trigger, proper laryngeal elevation, and smooth swallowing in all consistencies of food. MASA score was 175, suggesting no abnormality in swallowing. The oral transit time and the pharyngeal transit time were within normal limits which was within 1 seconds. Stable SpO₂ value at around 98% in pulse oximeter suggested no aspiration during swallowing. Cranial nerve assessment suggested normally functioning glossopharyngeal (IX) and vagus nerve (X). Dysarthria assessment suggested no dysarthric components in speech; however, the subject still exhibited some balancing problem while walking. FDA showed normal swallow reflex and laryngeal function and adequate tongue strength. Impression of Dr Speech and GRBAS in voice assessment showed normal voice. Cervical auscultation during swallowing was assessed with stethoscope and adequate click and clunk sound, and respiratory sounds were heard before and after swallow which is associated with normal swallow.

DISCUSSION

The aim of this case study was to document the assessment and management of dysphagia in a patient with postoperative medulloblastoma. This case study documented the improvement of pharyngoesophageal dysphagia by a course of swallowing therapy using combination of swallowing maneuvers and oromotor exercises. However, this brought several challenges. First, the patient came after the surgery and was under the course of radiotherapy. Due to which he exhibited weakness, also had a significant amount of weight loss, and had balancing problem, which made it difficult for the patient to undergo any exertion. Also, the patient had severe rate of aspiration and coughing that he used to cough out the saliva and sputum spontaneously and simultaneously at a very rapid period of time. Hence, swallowing therapy was started and the maneuvers were performed and practiced using dry swallow at the initial phase of therapy. The number of therapy sessions required for achieving safe and efficient oral intake of solid food was 15 in totality, by the frequency of twice per week and the duration of the sessions was 45 minutes. For first 3 sessions, the patient was asked

Table 1: The level of consistencies of food and their amounts throughout sessions

<i>Number of sessions</i>	<i>Consistency of food</i>	<i>Amount of food</i>	<i>Examples</i>
1–3	Dry swallow	Nil	Dry swallow
4–5	Thick liquid	2.5 mL	Soup and vegetable stew
5–7	Thick liquid, higher viscosity	5 mL	Denser soup and vegetable stew
7–9	Semisolid	5 mL	Stewed apple and mashed porridge
9–12	Solid	Piece of solid food (bite-sized)	Chunks of fruits like apple and papaya
12–15	Thin liquid	Sip from cup/ glass	Water/tea

to make attempts of dry swallow, that is, by saliva only, using the swallow maneuvers. After 3 sessions, food of thick liquid consistency of amount 2.5 mL that is about half tablespoon was introduced and continued for 7 sessions and the amount was increased from 2.5 mL to 5 mL, about one tablespoon. After 7 sessions, semisolid food was given and finally solid and liquid consistencies of food were given from 9th session onward. The level of consistencies of food and their amounts is shown in Table 1.

Ryle’s tube was removed after 15 sessions and the patient could swallow safely and efficiently using the maneuver.

Simning and Simning stated that the assessment, treatment, and outcome are reported alongside suggestions for best practice in the treatment of dysphagia in hospital settings. Timely instrumental assessment, interdisciplinary management, and postdischarge follow-up were needed to provide optimum care and to achieve a positive outcome for patients with life-threatening dysphagia.³

Patients with malignant brain tumor often experiences signs of dysphagia. Study conducted by Mei and Morgan suggested that the incidence of dysphagia involving all stages of swallowing: postposterior fossa tumor surgery is very high that about 89% (about 8/9 patients) presented dysphagia.⁴

The speech and language therapist has a responsibility to use his/her specialist skills to evaluate the swallowing process thoroughly, to provide the multidisciplinary team with the results of such procedures, to participate in the decision-making process regarding management, and to implement appropriate intervention strategies as agreed by the medical team.⁵

CONCLUSION

Even though there are many studies and researches on the occurrence and incidence of dysphagia in brain tumors like medulloblastoma, till date literature does not review any studies on detailed therapeutic management of dysphagia in such cases and hence lacks record on course of treatment nature and duration of improvement. This study concluded that early intervention or early initiation of swallowing therapy plays a significant role in triggering the rate of improvement and helps the patient to experience an improved quality of life. This article also created numerous recommendations for future studies. As the combination of these maneuvers and exercises were highly effective in this case, the findings can be generalized by a randomized control trial to determine the efficacy of combination of these set of maneuvers and exercises in a large group of subjects with postoperative

medulloblastoma. It can also be implemented in dysphagia caused by other types of brain tumors, cortical, and subcortical lesions, etc.

CLINICAL SIGNIFICANCE

Medulloblastomas are rare tumors with a very aggressive behavior, characterized by a noticeable tendency to metastasize. This case report was aimed to highlight the therapeutic management of dysphagia secondary to postoperative medulloblastoma that can be successfully treated by choosing the correct combination of exercises. Use of super supraglottic maneuver, Mendelsohn's maneuver, Masako, Shaker, and modified Shaker exercise was found to be effective in this case. It has been seen that patients with pharyngoesophageal dysphagia secondary to medulloblastoma and neurosurgeries depend on feeding tube until complete recovery. A combination swallow therapy techniques with each technique aimed to treat specific impairment has the ability to boost the rate of recovery.

REFERENCES

1. Jacob P, Kahrils PJ, Logemann JA, et al. Upper esophageal sphincter opening and modulation during swallowing. *Gastroenterology* 1989;97(6):1469–1478. DOI: 10.1016/0016-5085(89)90391-0.
2. Bartolome G, Neumann S. Swallowing therapy in patients with neurological disorders causing cricopharyngeal dysfunction. *Dysphagia* 1993;8(2):146–149. DOI: 10.1007/BF02266995.
3. Simning I, Simning A. Severe idiopathic dysphagia in an acute hospital setting: assessment, management, and outcome. *J Med Speech Lang Pathol* 2013;21(3):3.
4. Mei C, Morgan AT. Incidence of mutism, dysarthria, and dysphagia associated with childhood posterior fossa tumor. *Childs Nerv Syst* 2011;27(7):1129–1136. DOI: 10.1007/s00381-011-1433-x.
5. Kennedy GD. The role of the speech and language therapist in the assessment and management of dysphagia in neurologically impaired patients. *Postgrad Med J* 1992;68(801):545–548. DOI: 10.1136/pgmj.68.801.545.