Swallowing Difficulty due to Hypothyroid Myopathy - A Case Report -

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Musculoskeletal symptoms, such as muscle weakness, stiffness and pain, are observed frequently in patients with hypothyroidism. In theory, hypothyroidism can cause weakness of the swallowing muscles, but dysphagia associated with hypothyroidism-associated myopathy has not been reported. The present case involved a 51-year-old man who experienced acute onset of severe dysphagia with aspiration pneumonia. A video fluoroscopic swallowing study and fiberoptic endoscopic evaluation of swallowing revealed pharyngo-laryngeal function impairment. With a prior history of subclinical hypothyroidism and clinical symptoms such as proximal limb weakness, further evaluation involving a hormonal study, electrodiagnostic study, and histopathology assessment revealed myopathy. Hormone replacement therapy was started and the patient recovered within three weeks of treatment and was taking a regular diet.

In conclusion, this study suggests that it is necessary to consider further evaluations to determine if hypothyroid myopathy is involved in the case of unknown origin dysphagia accompanied by hypothyroid myopathy. (JKDS 2018;8:126-131)

Keywords: Deglutition disorder, Myopathy, Hypothyroidism

INTRODUCTION

Hypothyroidism is the state in which thyroid gland does not produce enough thyroid hormones, causing cold intolerance, weight gain, depressed mood, constipation, and etc. In addition, hypothyroidism often induce muscular symptoms, such as weakness of proximal limbs, decreased muscle endurance, stiffness, and myalgia. When only the muscular symptoms are prominent among the various symptoms of hypothyroidism, it could be called hypothyroid myopathy (HM). HM patients may have difficulty walking up stairs and performing daily activities like brushing hair, dressing up, washing face, and so on.

Pathophysiologic findings of HM include alterations of cellular metabolism, oxidative phosphorylation, actin-myosin unit, and glycosaminoglycans metabolism by decreased serum T3. If these pathologic changes also occur to swallowing muscles, theoretically it could result in swallowing difficulty. However, no study has yet dealt with a direct linkage between hypothyroid myopathy and swallowing difficulty.
hypothyroidism and swallowing difficulty in pharyngeal stage of swallowing. Here we report a case of histologically identified swallowing difficulty due to HM with a full recovery after levothyroxine administration.

CASE REPORT

A 51-year-old man was referred to our hospital for worsening swallowing difficulty over the previous 2 months. The patient had been complaining of cough, sputum and sweating for 2 months. Afterwards, he reported foreign body sensation on throat and progressive difficulty with swallowing during mealtime. One month later, he has been admitted to other hospital for high fever. A chest computed tomography revealed aspiration pneumonia, and he received antimicrobial therapy.

After the recovery of aspiration pneumonia, the swallowing difficulty has continued, so he was referred to our rehabilitation center. For the evaluation of dysphagia, we conducted videofluoroscopic swallowing study (VFSS) and fiberoscopic endoscopic evaluation of swallowing (FEES). At first FEES revealed inability to clear material from valleculae, pyriformis or endolarynx and mild saliva pooling around posterior pharyngeal walls and laryngeal vestibules. Incomplete airway closure resulted in liquid aspiration with score 8 of penetration aspiration scale.\(^2\) (Fig. 1) In addition, VFSS showed decreased laryngeal elevation and weakness of pharyngeal contraction.\(^2\) (Fig. 2)

A brain magnetic resonance imaging (MRI) was performed to determine the cause of the swallowing difficulty, but no abnormal findings were found. To identify the dysphagia of unknown origin, we checked over the past history. He told us that he lost more than 10 kilograms in six months. We also found out from previous medical record that during his past hospitalization for aspiration pneumonia, he was diagnosed with subacute hypothyroidism incidentally. Meanwhile, it was also revealed that he was complaining of dry mouth and subtle weakness of both upper and lower proximal limbs recently.

At first, considering the symptoms of dry mouth and recently identified hypothyroidism, autoimmune disease with hypothyroidism from thyroiditis and sicca syndrome seemed to be the cause of swallowing difficulty. The laboratory data and autoantibody profile did not produce any unusual finding. Salivary gland scan and biopsy were also performed, but there was no remarkable finding. No abnormal result was found in Schirmer’s test as well.

In the next step, dysphagia with muscle disorder such as endocrine myopathy was suspected because he had weight loss and subtle muscle weakness. Although serum creatine kinase (CK) level was not elevated, the thyroid hormone test showed a low level of serum free T4 \((4.90 \, \text{pmol/L})\) and an elevated serum thyroid-stimulating hormone \((52.3 \, \mu\text{IU/ml})\). Electrodiagnostic study (EDX) was conducted to determine

Fig. 1. FEES performed during the patient evaluation revealed (A) aspiration of blue dye liquid past the vocal folds due to delayed airway closure (blue arrow), (B) saliva and secretion pooling around the posterior tongue base and (C) the piriform sinuses (white arrows).
Fig. 2. VFSS showed decreased laryngeal elevation and weakness of pharyngeal contraction.

| Muscle                        | Fib | PSW | Amplitude of MUAP | Duration of MUAP | Recruitment |
|-------------------------------|-----|-----|-------------------|------------------|-------------|
| Rt Tongue                     | None| None| Normal            | Normal           | Early       |
| Rt Masseter                   | None| None| Normal            | Normal           | Full        |
| Rt C4-T1 paraspinal muscle    | None| None| Decreased         | Short            | Early       |
| Rt Upper trapezius            | None| None| Normal            | Normal           | Full        |
| Rt Deltrid                    | None| None| Normal            | Normal           | Full        |
| Rt Extensor digitorum communis| None| None| Normal            | Normal           | Full        |
| Rt Thoracic paraspinal muscle | None| None| Decreased         | Short            | Early       |
| Rt L3-S1 paraspinal muscle    | None| None| Normal            | Normal           | Full        |
| Rt Iliopsoas                   | None| None| Decreased         | Short            | Early       |
| Rt Gluteus maximus            | None| None| Normal            | Normal           | Full        |
| Rt Vastus medialis            | None| None| Normal            | Normal           | Full        |
| Rt Gastrocnemius              | None| None| Normal            | Normal           | Full        |

Rt: right, Fib: fibrillation, PSW: positive sharp wave, MUAP: motor unit action potential.

HM despite the lack of serum CK elevation typically seen on myopathy. There was no abnormal finding in nerve conductions study in upper and lower extremity nerves. Needle electromyography examination showed early recruitment patterns of motor unit action potentials (MUAPs) in proximal limbs in upper and lower extremity and tongue muscles. Increased insertional activities at rest in lower cervical paraspinal and proximal limb muscles in upper and lower extremity were also observed with decreased amplitudes and short durations of MUAPs in the needle exam. However, there was no marked fibrillation or positive sharp waves. (Table 1) Above EDX findings are suggestive of myopathy.

Though CK levels were not elevated in this patient, it was necessary to discriminate other potential causes of myopathy such as inclusion body myositis, polymyositis which may also cause swallowing diffi-
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Donggyun Sohn, et al.

Fig. 3. On histopathologic evaluation of deltoid muscle, Hematoxylin–eosin stain suggested myopathy with mild mononuclear cell infiltration in the endomysium (white arrows). (A) Adenosine triphosphatase (ATPase) stain showed usual fiber typing. (B) Nicotinamide adenine dinucleotide (NADH) stain also showed usual fiber typing. (C) Gomori trichrome stain showed no ragged red fiber. (D) Periodic acid–Schiff (PAS) stain showed no glycogen storage. (E)

困难。如果吞咽困难的原因是这些障碍，应使用皮质类固醇治疗而不是替代激素治疗。为了做出准确的诊断并决定适当的治疗，我们决定在开始替代激素治疗之前进行三角肌和臀大肌肌肉活检。

组织病理学评估显示，外周肌小血管内有轻微的单核细胞浸润，与肌病一致。（图3）激素替代治疗（左旋甲状腺素0.15 mg/天）开始后，吞咽困难的VFSS检查在治疗后3周进行，发现咽部牵引能力和吞咽改善。患者能够进食改良的吞咽饮食。治疗后一年的VFSS检查显示，吞咽困难完全缓解，没有吸入迹象。

我们得出结论，HM没有血清CK升高，基于EDX和组织病理学结果与临床过程相关。

DISCUSSION

Here we report a case of swallowing difficulty due to HM which was identified by hormone level, EDX and the muscle biopsy. The thyroid hormone regulates muscle contraction and relaxation which was not only directly caused by the transcription of the gene, but also mediated by energy metabolism, Ca2+ signaling indirectly3. Impaired metabolic function like protein turnover and carbohydrate metabolism is the leading cause of HM4. Even in patients with subclinical hypothyroidism, neuromuscular symptoms occur more frequently than in healthy subjects, but impaired muscular performance could be improved reversibly after hormone replacement therapy5.

Hypothyroidism can occur frequently because thyroid hormone deficiency is not only caused by primary hypothyroidism, but also after overdose administr-
tion of anti-thyroid medication, and after thyroid surgery. Hypothyroidism could exhibit functional symptoms of deterioration in the gastrointestinal tract. For example, it is already known that hypothyroidism causes a decline in esophageal relaxation, resulting in a decreased esophageal motility. However, there are few studies containing swallowing function deterioration caused by myopathy.

At first, laboratory study was performed if HM is suspected. However, laboratory results including thyroid hormone profile, antithyroid antibody, and CK does not reflect the intensity of clinical signs accurately. For that reason, it is useful to perform EDX for differential diagnosis in patients who are suspicious of HM, EDX can be especially useful in differential diagnosis when HM is suspected from clinical symptoms without conclusive laboratory evidence, as in this case. Nerve conduction study usually found to be normal or slightly delayed conduction velocity, but it is likely that electromyographic study shows myopathic pattern such as short duration. Similarly, EDX showed myopathic patterns in proximal limb muscles in this case, so we were able to determine that muscle biopsy and histopathologic evaluation should be carried out.

When HM is suspected along with or without biochemical laboratory and EDX findings, histopathologic examination with muscle biopsy could be helpful to confirm the HM. As seen earlier, HM is associated with type 2 muscle fiber atrophy, and it could be actually observed in typical histopathologic exam of HM. Loss of type 2 muscle fiber was found in adenosine triphosphatase (ATPase) stained light microscopy. Abnormal inclusion could also be observed in periodic acid-Schiff (PAS) staining, and if symptoms are severe, lipid and glycogen are accumulated in subsarcolemmal mitochondria and membrane structures. Although such common histopathologic finding is not observed in our exam, the mild infiltration of mononuclear cells in the endomysium was observed in hematoxylin–eosin stain. Mononuclear cell infiltration including lymphocyte can also be observed histologically in hypothyroidism such as Hashimoto’s disease with skeletal muscle alterations. So we concluded the pathologic findings to be related to hypothyroidism associated myopathy.

In this case, HM was confirmed with the mononuclear cell infiltration in the endomysium in deltoid and gluteus maximus muscles. And by the improvement of swallowing difficulty and muscle strength after hormone replacement therapy (levothyroxine 0.15 mg/day) at the same time, we concluded that swallowing difficulty originated from HM.

In terms of its reversibility, it would be helpful to consider HM induced dysphagia for the differential diagnosis in circumstances where it is not possible to make a definite diagnosis of swallowing difficulty. It is assumed that there are a number of cases in which HM induced dysphagia was not diagnosed at the actual clinical setting. We think this case report is clinically worthy of discussion in that swallowing difficulty is recovered reversibly in the patient with dysphagia of unknown origin accompanied by hypothyroidism.

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