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Rehabilitation approaches to dysphagia that was developed for a patient who attempted to commit suicide by hanging: a case report

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We report our experience with a case of attempted suicidal hanging presenting with dysphagia, in which rehabilitation approaches resulted in improvement. A 36-year-old man was discovered collapsed at home. From the finding of a broken cord nearby, attempted suicide by hanging was suspected. He was transported to hospital after 40 minutes, and regained consciousness after emergency treatment. There were no noteworthy findings on brain magnetic resonance imaging, cervical spine computed tomography, or vocal cord examination. There were no noteworthy psychiatric disorders or cognitive abnormalities. On hospital day 10, he showed signs of dysphagia. Videofluoroscopic examination of swallowing revealed piriform sinuses residue and aspiration after ingestion of jelly in any posture. Rehabilitation approaches were started based on the diagnosis of dysphagia due to impaired transit through the piriform sinuses. The patient achieved independent oral intake by 40 days after the injury. In this case, dysphagia was considered attributable to compression of the vagus nerves running along the lateral aspects of the neck by the cord used in the hanging. If compression is brief, full functional recovery can be expected. Implementation of rehabilitation approaches is also important in this situation.

KEY WORDS: Suicide - Deglutition disorders - Vagus nerve - Rehabilitation.

In Japan, the annual number of suicide victims has exceeded 30,000, with death by hanging accounting for 60% or more of these cases.[1] Hanging, which has been reported in other countries besides Japan,[2] is believed to be a relatively easy method of achieving the goal of suicide. This may be attributable to the fact that instant cessation of cerebral blood flow with hanging makes survival unlikely.[3] Even if victims of suicide attempts by hanging are saved, they often show consciousness disturbances due to cerebral hypoxia. Therefore, there are only a few reports on physical disabilities in such patients.[3]

We report a patient who attempted to commit suicide by hanging. He was discovered soon after the incident and regained consciousness after emergency treatment. Although dysphagia was observed, it was relieved by timely and aggressive rehabilitation approaches.

Case report

Our patient is a 36-year-old man. A few minutes after having an argument with his wife at home, he was discovered in a collapsed state on the floor. It was suspected that he had attempted to commit suicide by hanging because there was a broken cord lying nearby. After 40 minutes, he was transported to the emergency medical center, and was administered emergency treatment, along with endotracheal intubation. The patient self-extubated on day 2 of hospital admission. Following self-extubation, he remained medically stable and

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Figure 1.—A compression scar caused by a cord was observed on the neck.

demonstrated improved neurological function, scoring 15/15 on the Glasgow Come Scale (4, eye opening; 5, verbal response; 6, motor) as assessed by medical/nursing staff. When an emergency physician allowed the patient to drink 3 mL of water to schedule the start of oral intake on hospital day 9, the patient choked and was referred to the department of rehabilitation.

The patient was alert and oriented. With regard to his mental health status and cognitive functions, a clinical examination at the mental healthcare center during the hospital stay showed no previous or current history of any noteworthy mental disorders or cognitive abnormalities. Examination of the major cranial nerves showed no asymmetry in movement of the soft palate. Although no hoarseness was observed, the patient complained of difficulty in producing a high-pitched voice. The findings on swallowing are described below. There was neither deviation nor atrophy of the tongue. With regard to motor functions and activities of daily living, no abnormalities of motor functions of the limbs or trunk were observed, and he could walk unassisted in the ward. Moreover, there was a compression scar on the neck, evidently caused by a cord (Figure 1). There were no abnormalities on brain magnetic resonance imaging, cervical spine computed tomography, or vocal cord examination.

The patient choked when he ingested 3 mL of water in the sitting position during a bedside examination. An endoscopic swallowing examination revealed no asymmetry in the movement of the vocal cords, however increased accumulation of saliva before swallowing was observed at the piriform sinuses. Saliva remained even after the swallowing reflex was elicited, and some saliva was observed to have entered the larynx (Figure 2). An endoscopic swallowing examination was performed by otolaryngologists. They did not use anesthetics during the procedure and only targeted saliva swallowing. A

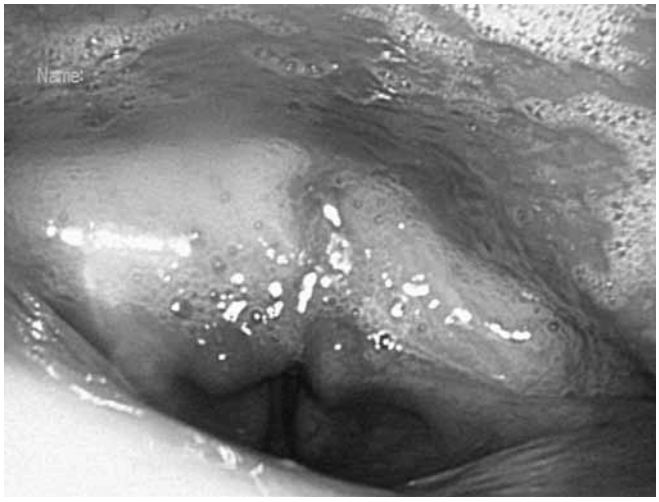

Figure 2.—Findings of an endoscopic swallowing examination. Saliva remained even after the swallowing reflex was elicited, and some saliva was observed to have entered the larynx.

videofluoroscopic examination of swallowing was performed with ingestion of barium-containing jelly in any posture, while an 8Fr nasogastric tube was inserted. During the videofluoroscopic examination of swallowing, the patient was fed 1 teaspoon of jelly in any posture, and was fed 1 teaspoon of jelly with assistance. After swallowing, serious residues of barium-containing jelly were observed at the piriform sinuses (Figure 3). Even repeated saliva swallowing did not resolve the residues. Aspiration and choking were observed in mid-swallow and post-swallow from the residue. Based on these findings, the patient was diagnosed as having dysphagia due to impaired transit through the piriform sinuses.

The following rehabilitation techniques were started: basic exercise, including forward and backward movement of the tongue and neck rotation;[4] the masako maneuver;[5] head raising exercise.[6] After videofluoroscopic examination of swallowing, conducted 12 days after the start of rehabilitation approaches (hospital day 21), we confirmed that the patient could ingest jelly with the head kept elevated by tilting the stretcher to 60°. Jelly-ingestion training was started in this position, with the head elevated by raising the head end of the bed to 60 degrees in the ward. The second videofluoroscopic examination of swallowing, intended to confirm improvement in swallowing function, was performed when the patient exhibited no coughing or choking while swallowing saliva with the head elevated by raising the head end of the bed to 60°. We used this degree of elevation because it enabled our patient to swallow the jelly without assistance. On hospital day 22, he was transferred to a rehabilitation hospital for further rehabilitation approaches. He was discharged home after normal oral intake of food and water had become established by 40 days after the injury.

We gained verbal consent from the patient upon submission of the case report.

Figure 3.—Findings of a videofluoroscopic examination of swallowing. An examination was performed with the head elevated by tilting the head end of the stretcher to 30° (An 8Fr nasogastric tube was inserted. The examination was performed with ingestion of barium-containing jelly with the head elevated by tilting the stretcher to 45°, 60°, and 90°). The patient ingested jelly containing barium. His main symptom was that some of the jelly remained in the pharynx after swallowing.

Discussion

While aspiration pneumonia has been reported in some cases of survival after hanging,[2] dysphagia is considered as one of pathological conditions predisposing to pneumonia.[7]

Dysphagia in our case was considered attributable to compression of the vagus nerves running along the lateral aspects of the neck, by a cord wrapped around the neck. Although the influence of endotracheal intubation/self-removal of the endotracheal tube was considered in the beginning, an endoscopic swallowing examination did not reveal any edema or injury of the vocal cords or larynx. Therefore, the cause of the dysphagia was injury of the vagus nerves due to compression of the neck by the cord used in the attempted hanging.

The mechanism underlying the impaired transit of a bolus through the pharynx may be as follows. Compression of the pharyngeal branches of the vagus

nerves or the pharyngeal plexus derived from the pharyngeal branches causes reduced muscle power of the pharyngeal constrictor supplied by these nerves. This leads to an inability to propel the bolus.[8] Based on the complaint by the patient that he was unable to produce a high-pitched voice, we suspect that compression of the superior laryngeal nerves branching from the vagus nerves may have reduced the tension of the cricothyroid muscles, which are supplied by the superior laryngeal nerves.[9]

Previously reported symptoms in survivors of suicide attempts by hanging include hypoglossal nerve paralysis, accessory nerve paralysis,[3] laryngeal edema, limited elevation of the larynx,[7] and bilateral vocal cord paralysis.[10] There is no consistent characteristic symptom. Our case showed impaired transit through the piriform sinuses due to injury of the vagal branches, inability to produce a high-pitched voice. These symptoms are different from those in previous reports. This indicates that various symptoms may occur depending on the site and severity of compression of the neck. Management of survivors of suicide attempts by hanging includes careful observation.

Impaired swallowing function can be restored by previously reported dysphagia rehabilitation approaches caused by injury of the vagus nerves (including the recurrent laryngeal nerve).[4-6] Our patient was able to swallow jelly by 12 days after the start of the rehabilitation approaches (hospital day 21), and normal oral intake of foods were established by approximately 40 days after the injury.

In cases of brief compression, as in our case, full functional recovery may be expected.[10] Therefore, it is important to implement timely and aggressive rehabilitation approaches for such cases.

Conclusions

We reported our experience with a case of attempted suicidal hanging presenting with dysphagia, in which rehabilitation approaches resulted in improvement.

In this case, dysphagia was considered attributable to compression of the vagus nerves running along the lateral aspects of the neck by the cord used in the hanging. If compression is brief, full functional recovery can be expected. Implementation of rehabilitation approaches is also important in this situation.

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