

# Unusual Cause of Dysphagia in a Patient With Cervical Spondylosis

Eric Chun Pu Chu<sup>1</sup> , John Sing Fai Shum<sup>2</sup>  
and Andy Fu Chieh Lin<sup>1</sup>

<sup>1</sup>New York Chiropractic & Physiotherapy Centre, New York Medical Group, Hong Kong, China.

<sup>2</sup>Hong Kong Advanced Imaging, Hong Kong, China.

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**ABSTRACT:** A variety of age-related problems, including salivary secretory disorders, poor oral motor coordination, neuromuscular weakness, neurodegenerative diseases, stroke, and structural changes, can result in swallowing disorders. Given that causes of dysphagia differ from patient to patient, individualized treatment plans tailored toward patients' specific conditions are needed. Here we present a case of an elderly woman with upper neck stiffness and dysphagia sought chiropractic treatment. Radiographic findings suggested cervical spondylosis with a vertical atlantoaxial subluxation. Following 20 sessions of chiropractic treatment, the patient experienced complete relief from neck problems and difficulty in swallowing. Rhythmic swallowing movements are controlled by a central pattern-generating circuit of the brain stem. In this case, the brain stem could have been compressed by the odontoid process of the axis due to C1/2 instability. Cervicogenic dysphagia is a cervical cause of difficulty in swallowing. Cervical complaints in the context of dysphagia are mostly under-estimated. A high degree of clinical suspicion is pivotal in timely intervention.

**KEYWORDS:** Brainstem, cervical spondylosis, chiropractic treatment, dysphagia, vertical subluxation

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**CORRESPONDING AUTHOR:** Eric Chun Pu Chu, New York Chiropractic & Physiotherapy Centre, New York Medical Group, 41/F Langham Place Office Tower, 8 Argyle Street, Hong Kong, China. Email: eric@nymg.com.hk

## Introduction

Cervical spine disorders which can cause swallowing difficulties (cervicogenic dysphagia [CGD]) are chronic multisegmental/MS dysfunction of the facet joints, changes in physiological curvature of the cervical spine, degenerative changes (anterior osteophytes, anterior disk herniation, osteochondrosis, osteoarthritis), inflammatory rheumatic diseases, diffuse idiopathic skeletal hyperostosis, injuries, complications of anterior cervical spine surgery, congenital malformations, and tumors.<sup>1</sup> Given that the cervical spine has close proximity to the oropharynx and esophagus, presence of any structural changes and functional dimensions adversely affecting the dimensions of the pharynx and cervical esophagus can possibly disturb the normal swallowing process.<sup>1,2</sup> The possible mechanisms of CGD include direct compression of the esophagus, impeded closure of the laryngeal inlet due to epiglottic tilt, paraesophageal inflammation, and cricopharyngeal (upper esophageal sphincter) spasm.<sup>3</sup> Dysphagia is frequently seen in geriatric individuals, occurring in approximately 15% of the elderly population due to normal changes in the mechanism of swallowing function. The main concern is mortality due to aspiration-induced pneumonia, dehydration, and malnutrition. Aged-related changes in the cervical spine, including cervical instability, anterior osteophytes, herniated disks, osteoarthritis, and altered cervical curvatures, have been linked to swallowing difficulties, which are diagnosed as CGD.<sup>1</sup> Moreover, postural deviations, such as kyphosis, lordosis, scoliosis, and others, could also be causing dysphagia or contributing to its symptoms.<sup>2</sup> Mostly, the C2/3 and C3/4 are the main segments responsible for dysphagia, due to the close proximity of the

retropharyngeal space (C2-C4) to the adjacent pharyngeal constrictor muscles. The predisposing factors are increasing age, short stature, and spinal abnormalities. Given that CGD results from cervical spine disorders or postural deformities, therefore treatment for CGD should be more focused on the cervical problems.

## Case Report

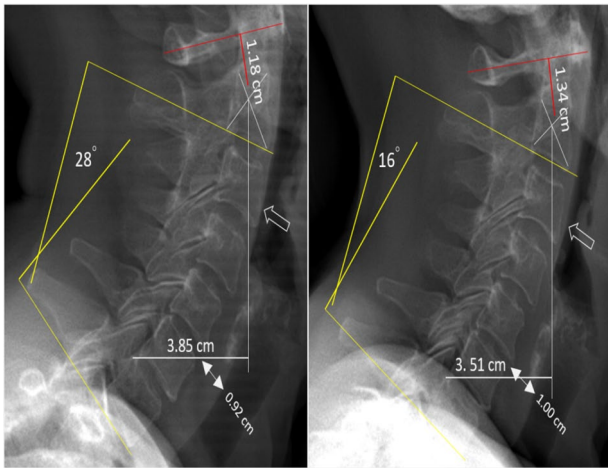
A 70-year-old woman presented with of neck stiffness and swallowing problems. Difficulty in swallowing solid foods started about 3 years prior, and for the last year, she often choked even on liquids. Medical history and neurological examination were unremarkable. She reported no prior history of major trauma. A family doctor diagnosed her with laryngitis. Subsequently, a fiberoptic endoscopic evaluation of swallowing (FEES) was performed by an ENT (ears, nose, and throat) physician. The result displayed salivary pooling in the vallecula and pyriform sinuses indicative of a weak pharyngeal swallow. No structural disorder was found. She had been receiving weekly speech therapy for 2 months and weekly acupuncture for over 4 months, which did not seem to help much. The patient then sought chiropractic care for neck symptoms and a progressive dysphagia.

The patient presented with moderate thoracic kyphosis. The cervical range of motion was limited to 10° at cervical extension (normal reference >60°) and 40° at rotations (normal reference >80°). Spinal palpation revealed restriction at C2/3, C5/6, T3/4, T4/5, and T7/8 vertebral segments; moderate hypertonicity of the upper trapezius; scalene; and cervical paraspinal muscles. Imaging studies (Figure 1, left) revealed



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**Figure 1.** (Left) Sagittal imaging before treatment showed C1/2 vertical subluxation (Ranawat index of 1.18 cm, normal range: 1.5 cm), ankylosis of the C2/3 facet joint, osteophytic lipping of the cervical vertebrae, especially at C4 to C6 levels, narrowing of the C3 prevertebral soft-tissue contour (*hollow arrow*), Cobb angle of 28° (normal range: 20°-35°) and forward misalignment as measured by the increase of C2 to C7 sagittal vertical alignment (SVA 3.85 cm, normal range <2.13 cm). (Right) In the third month after treatment initiation, the parameters of cervical morphology, including cervical spine curvature, prevertebral soft-tissue contours, Cobb angle, Ranawat index, and C2 to C7 SVA were all improved.

Ranawat index of 1.18 cm (normal reference >1.5 cm), ankylosis of the C2/3 facet joint, osteophytic lipping of the cervical vertebrae, especially at C4 to C6 levels, narrowing of the C3 prevertebral soft-tissue contour (*hollow arrow*), and forward misalignment as measured by increased C2 to C7 sagittal vertical alignment (SVA). She was given the diagnosis of cervical spondylosis with a vertical atlantoaxial subluxation.

Initial chiropractic intervention had consisted of stabilizing cervical subluxation and restoring joint mobility, with emphasis on cervical mobilization and strengthening exercises. The neck strengthening exercises consisted of isometric exercises, chin tucks, and shoulder rolls. Cervical isometric (no movement) exercise is a form of neck strengthening with the neck held in a non-moving or stable position and the hands are used to apply resistive force to the head to strengthen the targeted muscles. By maintaining the chin tuck position, this facilitates the activity in the deep neck flexors and overall proper neuromotor control of the cervical spine. Shoulder rolls are a great mobility exercise for the shoulders, scapula, and upper back. After 3 treatment sessions in the first week, her neck stiffness and swallowing problems were mostly resolved. Cervical spine manipulation in prone position was additionally applied for the correction of forward shifting of the vertical alignment. Treatment sessions were carried out twice weekly for 2 months. Radiographs were repeated after treatment completion, parameters of the cervical morphology, including cervical curvature, Cobb angle, Ranawat index, and C2 to C7 vertical alignment were all improved (Figure 1, *right*). At the 6-month telephone follow-up, the patient

reported no symptoms of dysphagia and was able to take in normal diets without choking or choking sensation.

## Discussion

Dysphagia refers to difficulty in swallowing. Swallowing is a complex sensorimotor function that is controlled by central pattern-generating circuit of the brain stem (the medulla oblongata) and peripheral reflexes of the pharynx and esophagus.<sup>4,5</sup> The esophageal peristalsis consists of inhibition (called deglutitive inhibition) followed by excitation. Dysphagia due to weakness of peristaltic contractions or to impaired deglutitive inhibition causing non-peristaltic contractions and impaired sphincter relaxation is called motor dysphagia, whereas dysphagia caused by a large bolus or luminal narrowing is called mechanical dysphagia.<sup>6</sup> Aspiration, pneumonia, and malnutrition are the significant consequences of dysphagia.

This case study provides circumstantial evidence of an association between dysphagia and neurological compromise which caused by upper cervical subluxation. This elderly woman with cervical spondylosis complained of progressive swallowing difficulty for 3 years. Cervical radiograph showed ankylosis of the C2/3 facet joint, and a vertical subluxation of the axis (the C2 vertebra) as defined by the Ranawat index <1.3 cm. It is suggested that the occurrence of bony ankylosis of the facet joints of the upper cervical spine is a risk factor for instability of atlantoaxial joint and subaxial instability.<sup>7</sup> Vertical subluxation of the axis has been linked to CGD,<sup>8,9</sup> attributable to an upward compression of the brain stem by the odontoid process (the dens), causing a disturbance of the swallowing pattern generators.

Postural deficits do negatively affect the normal mechanism of swallowing. The occurrence of ankylosis of the C2/3 facet joint which is seen in this patient caused the neck to be extended backward conducive to preserve forward gaze. An accentuated bend in the cervical spine could possibly lead to esophageal narrowing, incomplete epiglottic closure, and swallowing problems. The C6 prevertebral soft-tissue thickness of the patient was about 0.92 cm (normal reference: 1.8 cm) shown on her pre-treatment radiograph. This could imply that her upper cervical esophagus was excessively stretched due to the forward head posture, thus resulting in dysphagia. Furthermore, thoracic kyphosis increased cantilever loads from the center of gravity of the head, with an increase in sagittal vertical axis of 3.85 cm (SVA, normal reference <2.13 cm), resulting in an abnormal stress environment of the cervical musculature and a disturbance of swallowing actions.

The therapeutic options in patients with CGD are usage of medicine, physical therapy, manual therapy, and therapeutic exercises. Medications can be used to relax spasms in the esophagus. The aim of the manipulative therapies in patients with CGD is to improve the swallowing capacity (eg, stretching of the shortened muscles, passive and active mobilization of the facet joints).<sup>1</sup> Surgical decompression is only required in

a minority of patients. It must be emphasized that, manipulative therapies should be applied with great caution in patients with atlantoaxial instability. Although this is rarely accepted, it has been claimed that patients with dysphagia and cervical subluxation responded very well to chiropractic adjustment.<sup>10</sup> The aim of chiropractic treatment tailored for this patient was to relieve the brainstem compression, stabilize the joint subluxation, stretch the shortened muscles, and mobilize the joint stiffness. It is possible that our patient recovered through spontaneous remission. However, the long-term clinical course before chiropractic intervention and a significant improvement of clinical symptoms and of radiographic parameters after 20 treatment sessions weigh against such coincidental effects. Further comparison with more existing therapeutic regimens is warranted.

### Author Contributions

ECPC drafted the manuscript. JSFS contributed to the radiographic reading. AFCL provided a detailed review of the contents and structure of the manuscript. All the authors have read and approved the final manuscript.

### Informed Consent

A copy of the written consent is available for review by the Editor-in-Chief of this journal.

### ORCID iD

Eric Chun Pu Chu  <https://orcid.org/0000-0002-0893-556X>

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