# Management of Cricopharyngeus Muscle Dysfunction

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**KEYWORDS**

- Dysphagia • Cricopharyngeal muscle • Cricopharyngeus muscle
- Pharyngoesophageal segment • Upper esophageal sphincter
- Cricopharyngeal muscle dysfunction • Cricopharyngeus muscle dysfunction

**KEY POINTS**

- The cricopharyngeus muscle (CPM) is one component of the upper esophageal sphincter, and the failure of its coordinated relaxation or expansion is termed *cricopharyngeus muscle dysfunction* (CPD).
- Many conditions cause CPD; the clinical manifestations vary from asymptomatic to profound dysphagia.
- The diagnosis of CPD may be accomplished with a combination of clinical and instrumental swallowing evaluations, including flexible endoscopic evaluation of swallowing, video-fluoroscopic swallow study, and high-resolution manometry.
- The success of intervention at the CPM relies heavily on the accuracy of diagnosis, which is often challenging.
- Patients with dysphagia with CPD who retain sufficient pharyngeal strength and hyolaryngeal elevation will fair best with interventions targeting the CPM.
- Interventions include nonsurgical, pharyngoesophageal segment dilation, botulinum toxin injection, and cricopharyngeus myotomy.

## INTRODUCTION

The upper esophageal sphincter (UES) is a 2.5- to 4.5-cm high-pressure zone extending from the distal pharynx to the proximal esophagus. This anatomic region is also referred to as the *pharyngoesophageal segment* (PES). The cricopharyngeus muscle (CPM) is positioned in the transition zone between the inferior pharyngeal constrictor and cervical esophageal musculature, which compose the PES. The CPM is 1 to 2 cm wide and C shaped, attaching to the lateral portions of the cricoid cartilage without a median raphe. It is composed of a horizontal portion termed the *pars fundiformis* and an oblique portion known as the *pars oblique*. Uniquely composed of skeletal muscle and abundant connective tissue, the CPM small fibers originate and insert within the

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| Abbreviations: Cricopharyngeus Muscle Dysfunction | |
|---|---|
| BTx | Botulinum toxin |
| CPB | Cricopharyngeus muscle bar |
| CPD | Cricopharyngeus muscle dysfunction |
| CPM | Cricopharyngeus muscle |
| FEES | Flexible endoscopic evaluation of swallowing |
| FOSS | Functional outcome swallowing scores |
| HRM | High-resolution impedance manometry |
| PCR | Pharyngeal constriction ratio |
| PES | Pharyngoesophageal segment |
| PSM | Pharyngeal squeeze maneuver |
| RLN | Recurrent laryngeal nerve |
| UES | Upper esophageal sphincter |
| VFSS | Video-fluoroscopic swallow study |

fibroelastic connective tissue.[1] The CPM contains mostly slow type 1 muscle fibers but also fast type 2 fibers enabling baseline tonicity as well as rapid reflexive relaxation or tightening. Anatomic studies have demonstrated that the CPM receives dual innervation from the ipsilateral pharyngeal plexus and the recurrent laryngeal nerve (RLN). Sensory information is carried along the glossopharyngeal nerve and cervical sympathetics.

At rest, the tonically contracted UES protects against aspiration of refluxed gastric contents as well as aerophagia during respiration. Reflexive tightening of the UES is induced by esophageal distention or acid exposure, pharyngeal stimuli and emotional stress.[2–5] During deglutition, eructation and vomiting, the UES reflexively opens. During swallowing, opening of the PES relies on CPM relaxation, anterosuperior movement of the hyolaryngeal complex, pharyngeal contraction, and distension by the passing bolus.[6] Although the CPM is only one component of effective PES function, it is the only portion that actively participates in all reflexive relaxation and tightening activities. Consequently, the CPM is an important target for therapy in several disease processes affecting the UES. Cricopharyngeus muscle dysfunction (CPD) describes impaired or uncoordinated PES relaxation or expansion and results from a variety of causes as listed in **Table 1**.

## EVALUATION OF CPD

Accurately diagnosing CPD is challenging but essential for therapeutic decision making. Individuals with poor CPM relaxation but intact laryngeal elevation and pharyngeal contraction generally respond well to surgical CPM intervention. However, those demonstrating intact CPM behavior with impaired pharyngeal strength or hyolaryngeal elevation are more appropriate candidates for therapy than surgery. Dysphagia clinicians rely on several diagnostic tools to identify and differentiate pharyngeal weakness, poor hyolaryngeal elevation, loss of PES elasticity, and impaired CPM relaxation. Available tools include the clinical swallow evaluation, flexible endoscopic evaluation of swallowing (FEES), video-fluoroscopic swallow study (VFSS) and manometry of the pharynx, and UES.

### *Clinical Swallow Evaluation*

Information gathered during the clinical swallow evaluation is useful for generating a hypothesis for the cause or site of dysphagia and for choosing a potential instrumental tool