

Unveiling Novel Surgical Treatments for Facial Synkinesis: Myectomy of the Posterior Belly of Digastric and Stylohyoid Muscle

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Summary: Facial synkinesis manifests as involuntary muscle movements alongside volitional facial actions and is typically managed with a combination of neuromuscular retraining, botulinum toxin injections, and in some cases, selective neurectomy. Some patients with synkinesis describe persistent neck tightness or pain at the level of the mandibular angle and horizontally towards the midline, similar to the anatomic course of the posterior belly of digastric (PBD) and stylohyoid muscles. There are limited studies exploring the involvement of the PBD and stylohyoid muscles in facial synkinesis and the use of chemodenervation as treatment. Herein, we present 2 patients with facial synkinesis and ipsilateral neck tightness and pain who underwent novel surgical treatment in the form of the standard selective neurectomy procedure along with a myectomy of the PBD and stylohyoid muscles. Following completion of the standard steps of selective neurectomy, the PBD and stylohyoid muscles were carefully dissected and separated from the surrounding structures. Both muscles were divided using bipolar electrocautery. Both patients reported improvement of neck pain and tightness immediately after the intervention and at the 6.5-month follow-up visit. These preliminary results show promise in aiding a subset of patients with synkinesis-related neck pain and tightness. (*Plast Reconstr Surg Glob Open* 2025;13:e6677; doi: 10.1097/GOX.0000000000006677; Published online 2 April 2025.)

NOVEL TREATMENT APPROACH FOR POSTFACIAL PARALYSIS SYNKINESIS

Introduction

Facial synkinesis manifests as involuntary muscle movements alongside voluntary facial actions. This results in distorted facial expressions and impairment in social interactions, and is frequently associated with face and neck tightness and pain. Treatment strategies, such as neuromuscular retraining, botulinum toxin injections, and selective neurectomy, aim to mitigate involuntary muscle contractions

and improve facial function and tightness.¹⁻⁴ A subset of synkinesis patients may present with prominent neck pain and tightness, usually attributed to platysma muscle hyperactivation of excessive contraction. In some patients, these symptoms improve with platysma muscle chemodenervation or myectomy, but others continue to experience treatment-refractory tightness and pain. The pain often localizes to the level of the mandibular angle extending horizontally towards midline, paralleling the anatomic course of the posterior belly of digastric (PBD) and stylohyoid muscles (Fig. 1). There are limited studies exploring the involvement of the PBD and stylohyoid muscles in facial synkinesis.⁵⁻⁷ This study describes our experience with 2 facial synkinesis patients presenting with synkinesis-related neck pain and tightness. Based on clinical and ultrasound evaluation, synkinetic contraction of the PBD and stylohyoid muscles was suspected as a potential cause of their symptoms.

Case 1

Two patients were included in this study. Patient 1 was a 39-year-old woman with history of left facial paralysis

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following vestibular schwannoma resection 3 years ago who developed facial synkinesis. In the past, she underwent left upper eyelid gold weight placement and botulinum toxin injections with limited improvement of her synkinesis symptoms. The patient described left neck tightness as well as pain and discomfort below the mandibular angle and inferior border of the mandible. Ultrasound imaging demonstrated hypertrophy of the left PBD muscle (Fig. 2). Additionally, dynamic muscle tugging and tightening with smiling and eyelid closure as well as spontaneous muscle spasms were observed. (See Video 1 [online], which displays muscle activation and spasm of the PBD muscle while the patient is asked to blink.) Therefore, the patient was selected for PBD and stylohyoid myectomy in addition to selective neurectomy.

Takeaways

Question: Can myectomy of the posterior belly of the digastric (PBD) and the stylohyoid muscles safely improve neck pain in patients with postfacial paralysis synkinesis?

Findings: Preoperative sonography of both muscles demonstrated hypertrophy and synkinetic muscle contraction. Myectomy of the PBD and stylohyoid significantly improved the clinical symptoms of neck tightness and discomfort. No complications were reported in regard to the myectomy.

Meaning: Myectomy of the PBD and stylohyoid muscles is a safe new technique to permanently improve neck pain in patients with postfacial paralysis synkinesis.

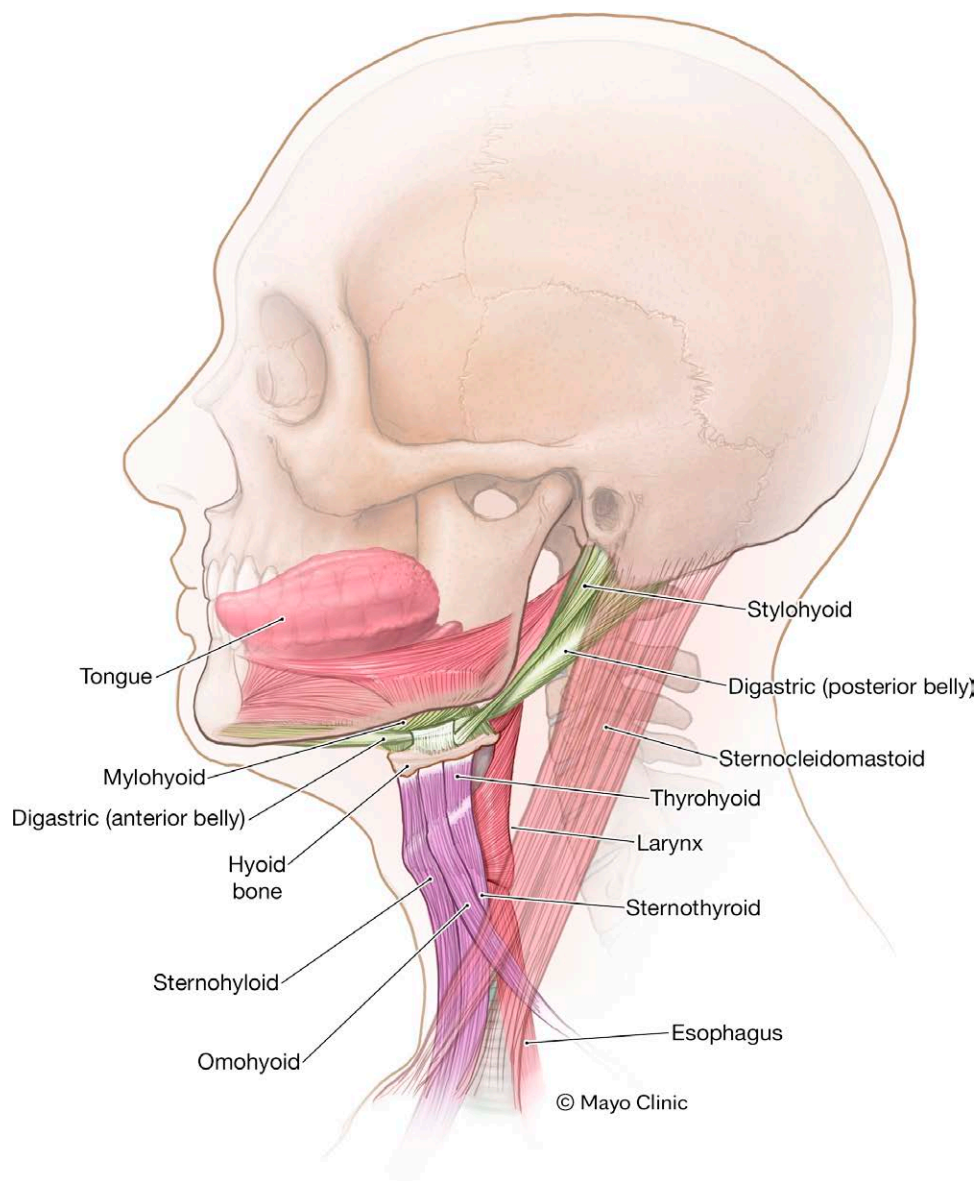


Fig. 1. Schematic drawing of the supra- and infrahyoid musculature. Used with permission from Mayo Foundation for Medical Education and Research, all rights reserved.

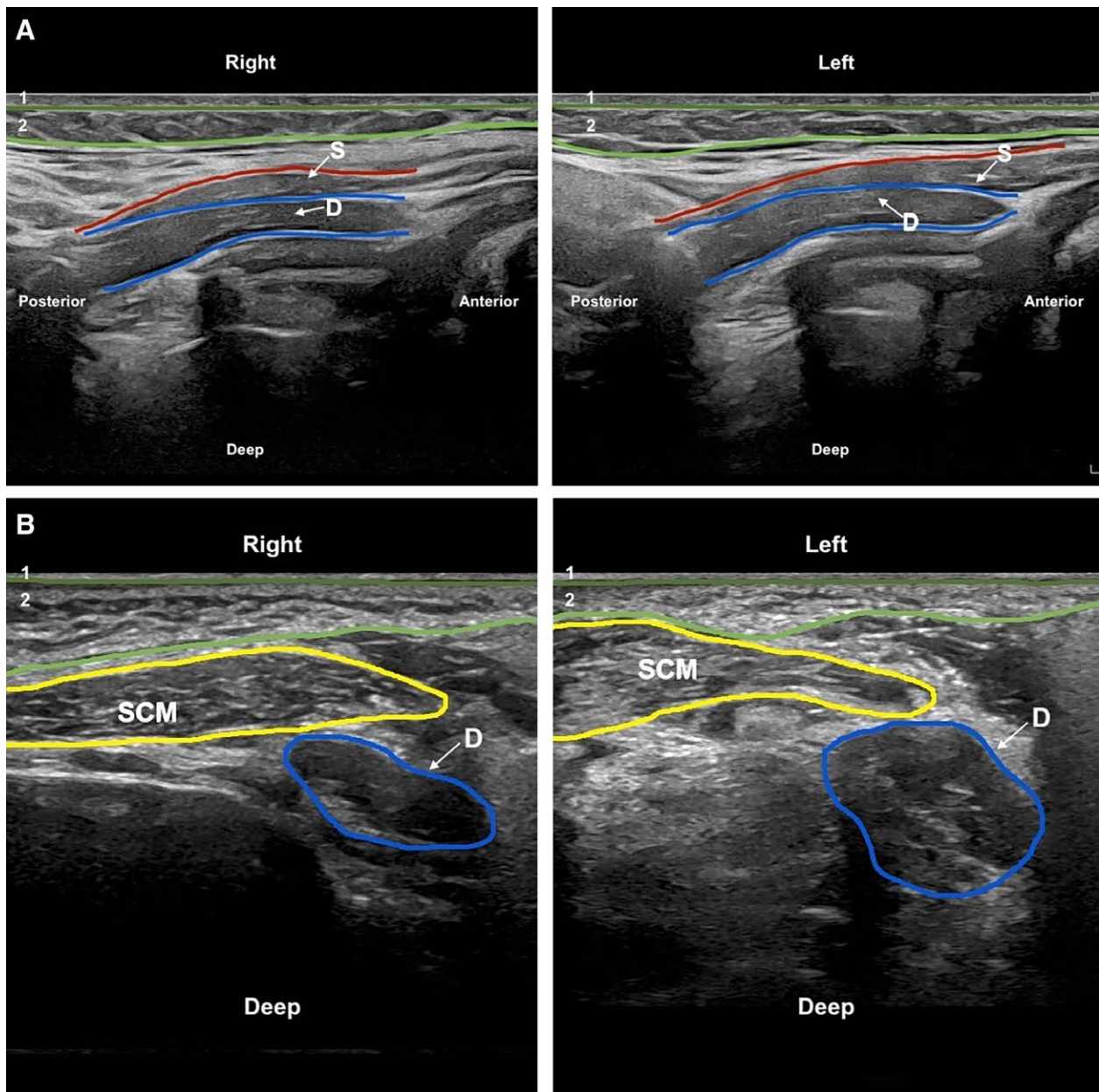


Fig. 2. Neck ultrasound. A, Ultrasound image in a longitudinal view demonstrating the hypertrophy of the posterior belly of the digastric muscle (D) on the left side compared with the unaffected muscle on the right side. The skin (1) and the subcutaneous tissue (2) are marked in green, the stylohyoid muscle is indicated in red (S). B, Ultrasound images in a transverse view demonstrate the hypertrophy of the posterior belly of the digastric (D) on the left side clearly compared with the unaffected muscle on the right side. SCM, sternocleidomastoid muscle.

At 3 months follow-up, she was free of her neck pain without experiencing any difficulties swallowing or chewing.

Case 2

Patient 2 was a 51-year-old woman with a history of right Bell palsy 3 years ago who developed synkinesis after spontaneous recovery of her flaccid facial palsy. Despite onabotulinumtoxinA injections in the platysma muscle, the patient continued to experience persistent neck tightness and pain along the inferior border of the mandible, extending from the mastoid region to the midline. To

provide relief of her ongoing symptoms, selective neurectomy with PBD and stylohyoid myectomy was performed.

At 3 months follow-up, the patient reported full resolution of her neck pain. Additionally, she described a transient period of subjective slower swallowing on the affected side compared with the unaffected side that resolved within a few weeks of the surgery and never led to choking or difficulties with food intake.

Surgical Technique

Both patients underwent PBD and stylohyoid myectomy, in conjunction with selective neurectomy. A

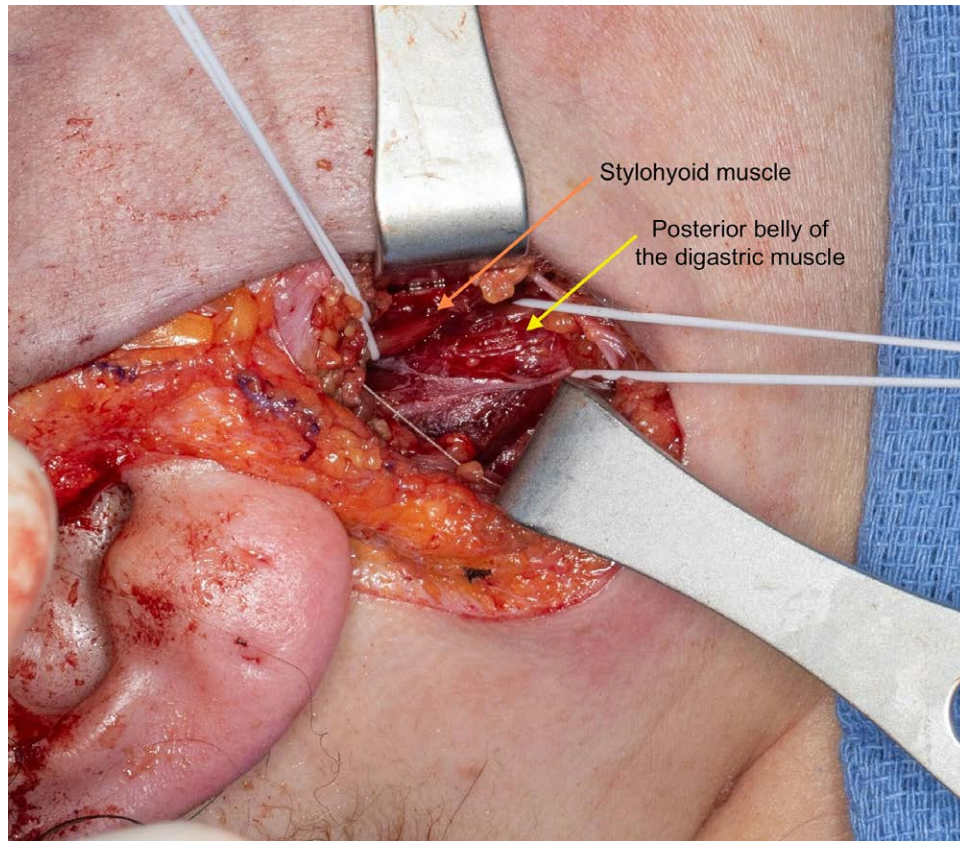


Fig. 3. Intraoperative dissection of the hypertrophic stylohyoid (orange arrow) and posterior belly of the digastric muscle (yellow arrow). Caution must be taken to prevent injury to the hypoglossal nerve while cutting the muscles.

preauricular incision was made, and the facial nerve branches were exposed for standard selective neurectomy. After neurectomy, including the distal cervical branches with preservation of the branches to the medial platysma and depressor labii inferioris, a myectomy of the lateral platysma was performed. The dissection then continued deeper towards the PBD and stylohyoid muscles at the level of the mandibular angle. Identification of the PBD and stylohyoid muscles was performed close to their origin by entering the sub-superficial musculoaponeurotic system plane slightly inferior to the parotid tail. Muscle identity was confirmed by electrically stimulating the facial nerve root and observing muscle contraction. (See Video 2 [online], which displays the intraoperative exposure and verification of the PBD and stylohyoid muscle by stimulating the facial nerve trunk.)

Both muscles were circumferentially dissected and isolated using a vessel loop. Intraoperative findings that suggest synkinesis involving both muscles included muscle hypertrophy (Fig. 3) and observation of PBD and stylohyoid muscles contraction when stimulating the zygomatic branch anterior to the parotid gland using a bipolar nerve stimulator (Checkpoint, Independence, OH). (See Video 3 [online], which displays intraoperative exposure and verification of the PBD and stylohyoid muscle by stimulating the zygomatic branch of the facial nerve.) After confirmation of synkinesis, the muscles were divided using

bipolar cautery to ensure hemostasis while minimizing the risk of injury of the hypoglossal nerve.

DISCUSSION

Previous studies have demonstrated that patients with facial synkinesis involving the suprahyoid muscles experience improvement following botulinum toxin injections.^{5,6} However, botulinum injection offers only a temporary solution, as its effects last approximately 3–6 months after treatment.⁸ Moreover, the suprahyoid muscles are located deeper than the mimetic muscles and, therefore, injections within these muscles carry greater technical challenges and risks.

For patients undergoing selective neurectomy, PBD and stylohyoid myectomy is a simple procedure that can be safely performed alongside the selective neurectomy and through the same incisions. Symptoms of neck pain and tightness resolved completely by performing PBD myectomy in addition to transecting the platysma muscle. Our patients underwent platysma chemodenervation several months before surgery with continued pain and discomfort below the angle of the mandible and inferior border. Also, ultrasound was performed on these patients, demonstrating muscles that contract with eye closure and are larger than the contralateral normal side. Based on our clinical experience, PBD pain has a different clinical presentation than platysma tightening, with patients

localizing the pain to below the angle of the mandible. We have seen several patients who underwent selective neurectomies in the past who reporting continued pain and discomfort below the angle of the mandible. These patients also reported complete resolution following ultrasound guided botox injections into the PBD. PBD and stylohyoid myectomy has the potential of providing long-term symptom resolution, eliminating the need for frequent botox injections. Despite our short follow-up of 3 months, patients reported synkinesis improvement, and complete resolution of neck pain. We recommend sonographic evaluation to identify muscle hyperactivation when PBD and stylohyoid muscle synkinesis is clinically suspected.

Possible surgical complications related to the procedure include local hematoma and injury to the hypoglossal nerve, external carotid artery, or internal jugular vein. None of these complications were noted. Additionally, as the PBD and stylohyoid muscle assist with chewing and swallowing,⁹ myectomy of these muscles could potentially carry a risk of functional impairment. Indeed, one of our patients reported mild transient discomfort with swallowing with no difficulty eating that resolved within a few weeks of surgery. The cause of swallowing discomfort was unclear; however, it could have resulted from the PBD dissection or the intubation. No concern exists for permanent difficulties.

This study is limited by a small sample size and short duration of follow-up. Nonetheless, the preliminary results are promising and could potentially provide a long-lasting solution for the subset of patients presenting with synkinesis-related neck pain. PBD and stylohyoid myectomy is a novel approach for synkinetic tightness and can provide symptom improvement with minimal to no complications. Clinical evaluation and ultrasonographic evidence of digastric and stylohyoid muscle hypertrophy provides evidence of involvement in the synkinesis process.

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DISCLOSURE

The authors have no financial interest to declare in relation to the content of this article.

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