Potential Role of Coronoidectomy for Stroke-Induced Spastic Trismus Patients with Botulinum Toxin Insensitivity: A Case Report

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ABSTRACT

Background: Trismus is a consequence of muscle spasticity, often secondary to stroke, leading to compromised oral functions and increased aspiration pneumonia risk. However, in some cases, the patient does not respond to conservative treatment such as rehabilitation procedures, medication, and botulinum toxin injection.

Objective: To evaluate the efficacy of coronoidectomy in managing spastic trismus unresponsive to conventional and botulinum toxin treatments post-stroke.

Case description: A 40-year-old man, with post right middle cerebral artery (MCA) infarction presented with spastic trismus, exhibiting an incisor gap of 1 cm. The patient remained non-responsive after receiving 25 units of botulinum toxin serotype A in the bilateral masseter muscles and consequently suffered an aspiration pneumonia episode. Computerized tomography (CT) imaging identified left temporomandibular joint (TMJ) ankylosis. A bilateral coronoidectomy and interposition gap arthroplasty on the left condyle expanded the mouth opening to 5 cm. Post-surgical management included intensive swallowing rehabilitation and a dental splint to preserve the achieved incisor gap.

Conclusion: Coronoidectomy can be a potential therapeutic intervention for stroke-induced trismus, particularly when non-responsive to conservative therapies.

Keywords: trismus, dysphagia, stroke, coronoidectomy, botulinum toxin

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Introduction

Spastic trismus, a condition marked by reduced mouth opening due to muscle spasticity, can result from various underlying conditions, including head and neck cancers, temporomandibular joint (TMJ) disorders, trauma, and neurological events such as stroke. Among stroke patients, trismus prevalence ranges from 2-8%, highlighting it as a notable sequela that can severely impact post-stroke recovery and quality of life. Despite standard rehabilitation efforts, including jaw exercises, hot packs, ultrasound diathermy, and muscle relaxant medications, some studies indicate that approximately 20-30% of patients may experience limited or no improvement with conservative treatment alone.[1] This lack of response underscores the need for alternative therapeutic strategies.

The consequences of trismus in stroke patients extend beyond oral difficulties. Restricted jaw movement impairs speech, reduces the efficiency of oral feeding, and leads to inadequate nutrition and dehydration. Furthermore, trismus significantly increases the risk of aspiration pneumonia, as compromised oral hygiene can lead to bacterial accumulation, which, when aspirated, causes respiratory complications.[1]

While conventional treatments such as perioral massages, muscle stretches, and other physical modalities such as hot packs and ultrasound diathermy primarily focus on reducing muscle spasticity and improving mouth opening, botulinum toxin injections have shown promise for patients unresponsive to initial interventions. Botulinum toxin treatment is typically reserved for patients with severe muscle spasticity who fail to respond to conservative therapies.[2,3] In these cases, persistent, high-intensity muscle contraction in the jaw and limited progress in traditional treatment approaches often justify botulinum toxin as a supplementary intervention. Further diagnostic imaging, such as computerized tomography (CT) scans, may be essential for non-responders to conventional and botulinum treatments to assess TMJ pathologies like ankylosis or osteoarthritis, which contribute to limited jaw movement.[4] In cases of structural abnormalities or when all other options fail, surgical interventions, such as coronoidectomy, are considered to restore oral function and enhance the patient's quality of life.[5]

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This case report aims to raise awareness of spastic trismus as a common yet often overlooked complication in stroke patients, to review current literature and conservative treatment failure rates, and to propose a management pathway that includes both conventional and advanced interventions. This report seeks to contribute to the understanding of trismus management and to support the development of improved treatment protocols for affected patients. The case report was conducted in accordance to the CARE guideline.

Patient information

A 40-year-old male suffered a middle cerebral artery (MCA) infarction in 2017, which led to left spastic hemiparesis. Treatment included a right craniotomy, cranioplasty, and a ventriculoperitoneal (VP) shunt. Medical history revealed chronic atrial fibrillation (AF) with left atrial (LA) thrombosis, prompting left atrial appendage (LAA) occlusion in 2019. Concurrently, he had Graves' disease and hypertension, both diagnosed at the stroke's onset and managed with medication. Total dependency on activities of daily living (ADL) and wheelchair sitting were noted. The summarized timeline is shown in Table 1.

The first admission to rehabilitation was in 2020.

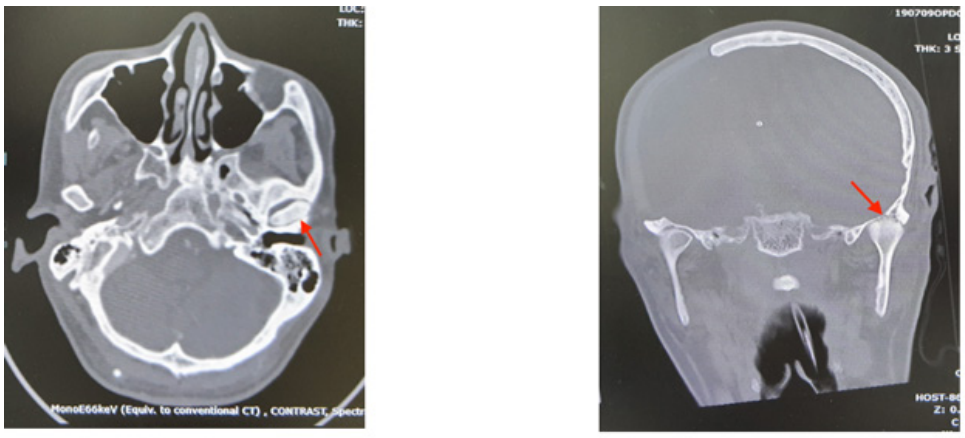
The patient was admitted for intensive stroke rehabilitation 2.5 years post-stroke onset. The focus was enhancing ADL and removing the nasogastric (NG) tube. The swallowing assessment revealed a restricted mouth opening (1 cm incisor gap), an inability to evaluate tongue range of motion, a delayed swallowing triggering response, favorable laryngeal excursion, and successful performance during 5-ml and 10-ml water swallowing tests without the presence of a wet voice or cough. This restriction in mouth opening was linked to an irregular left TMJ and muscle atrophy on the right side, as identified by a CT scan in 2019 (Figure 1). The mouth opening remained limited despite undergoing muscle relaxation procedures in 2019. During this admission, treatments included perioral massages, muscle stretches, and other physical modalities such as hot packs and ultrasound diathermy, which were administered one session per day on a working day and with a care-giver performed a hot pack, oral massage, and stretching to the patient. EMG detected spasticity in the bilateral masseter muscles, which was subsequently treated with botulinum toxin injections (BoNT/A), with each muscle receiving 25 units.

A week later, some improvements were observed, though the mouth opening increased only marginally. A subsequent Fiberoptic Endoscopic Evaluation of Swallowing (FEES) produced positive results, highlighting the absence of pharyngeal secretions, sufficient glottic closure, and slightly decreased pharyngeal sensation. Bolus tests demonstrated successful consumption of 4 ml, 10 ml, and straw-drinking of mildly thick liquid (International Dysphagia Diet Standardization Initiative 2, IDDSI 2) without residue in the pharynx, laryngeal penetration or aspiration. Only minimal residue was seen at the left pyriform sinus after ingesting 4 ml of slightly thick liquid (IDDSI 1) which was cleared by repetitive swallows. Following the FEES, the patient participated in direct swallowing training

Table 1. Summarized timeline

Time	Event
2017	MCA infarction results in hemiparesis and cognitive deficits.
2019	LAA occlusion was performed.
2020	Initial rehabilitation admission for ADL improvement and nasogastric tube removal. Incisor gap 1 cm.
Mid-2020	Administration of BoNT/A (25 units to each masseter muscle). Incisor gap 1.5 cm.
One month later	Readmission for aspiration pneumonia; surgical evaluation. Incisor gap 1 cm.
Late-2020	A bilateral coronoidectomy was performed, achieving a 5 cm incisor gap.

MCA, middle cerebral artery; LAA, left atrail appendage; ADL, activities of daily living; BoNT/A, botulinum toxin injections



1a 1b

Figure 1. The computerized tomography imaging of the facial bone shows an irregular left temporomandibular joint (indicated by the red arrow).

using a 300 ml blenderized diet (BD), first with a spoon and then gradually using a straw with minimal BD per sip. The NG tube was removed after he reached acceptable nutrition and hydration, 1,800 Kcal per day. Given the absence of trismus-related complications, the patient continued using a straw to drink with a 1.5 cm mouth opening. The home program, including oral and swallowing exercises, was recommended to be performed by a caregiver at least one session per day.

The second admission and aspiration pneumonia incident in 2020

Four months post-discharge, the patient developed aspiration pneumonia. FEES performed after the pneumonia subsided found significant saliva pooling in the pyriform sinuses and stains on the posterior tongue. Still, the 4 ml mildly thick and clear liquids exhibited no residue in the pharynx and no laryngeal penetration and aspiration. The reduced mouth opening to 1 cm and complications from aspiration led to a multidisciplinary meeting involving a physiatrist, plastic surgeons, dentists, and the patient's family members, to consider surgical intervention. The patient and his family acknowledged the risks and benefits of the procedure, including impaired oral closure, damage to the facial nerve, potential limitations in chewing ability, and the necessity of prolonged oral splint use. After deliberation, a decision was made for coronoidectomy.

Surgery in late-2020 disclosed left TMJ ankylosis. A preoperative incisive opening of 4 mm improved to 5 mm postmuscle relaxation. The surgical approach included partial mandibulectomy and temporomandibular arthroplasty, which resulted in a post-operative incisive gap of 50 mm.

Post-operative care emphasized feeding via NG tube, mobilization, bite block usage, and oral hygiene for 1 month. Then, a post-surgery FEES assessment highlighted residual mild pooling but no laryngeal penetration. Bolus challenges arose with 4 ml and 10 ml mildly thick liquid (IDDSI 2), and pureed food (IDDSI 4) showed slight residue at the pyriform sinus without laryngeal penetration and tracheal aspiration, which cleared with repeated swallowing. The occupational therapist and caregiver applied rehabilitation strategies based on FEES outcomes.

Follow-up and outcomes

Upon discharge, the patient's mouth opening improved, though limited due to pain. A dental examination showcased significant oral hygiene issues. Prescribed treatments included range of motion exercises, chewing exercises, and dietary progressions from pureed (IDDSI 4) to minced and moist food (IDDSI 5).

A multidisciplinary team's year-long follow-up, at one to three-month intervals, revealed improved dietary habits but decreased mouth opening (3 cm). Future considerations include another BoNT/A injection, contingent on the severity of the mouth opening limitation.

Discussion

This case report highlights the complexity of managing spastic trismus in a post-stroke patient, particularly when non-responsive to botulinum toxin injections. Severe trismus, while less common than milder forms, occurs in approximately 10-15% of stroke patients.[1,7] Severe trismus can sometimes result from anatomical factors, such as hypertonicity in the jaw-closing muscles and stroke-related neural damage affecting specific muscle groups. The primary risk factors for severe trismus include prolonged jaw immobilization, increased spasticity, poor oral care, and, potentially, secondary fibrosis from muscle contracture.

Trismus is considered non-responsive to conservative or botulinum toxin treatment when there is minimal to no improvement in jaw opening after repeated interventions over a specified period, typically around 3-6 months.[2,3] In this case, the patient showed no response to an initial conservative approach and subsequently limited improvement following botulinum toxin injections, necessitating further intervention.

The protocol for botulinum toxin injection in the trismus typically targets the masseter and temporalis muscles. Dosage often ranges between 25 and 100 units per muscle, depending on the severity and patient tolerance.[2] In this case, the patient received a standard initial dose, but it proved insufficient to elicit a marked response, suggesting the need for either higher dosing or alternative treatment approaches.

CT imaging is typically indicated when conservative treatments fail or anatomical abnormalities are suspected.[4] For this patient, the CT scan was essential to rule out TMJ ankylosis or osteoarthritic changes, which could impact treatment choices.

This case report highlights the complexity of managing spastic trismus in a post-stroke patient, particularly when unresponsive to botulinum toxin injections. It emphasizes the importance of CT scans for diagnosing TMJ ankylosis and determining the suitability of surgical interventions like coronoidectomy. Dysphagia management in such patients should be comprehensive, targeting oral intake, hygiene, and secretion clearance to prevent complications like aspiration pneumonia.[8]

Failed conservative treatments prompted the need for a surgical solution,[5] in this case, the coronoidectomy, executed via a multidisciplinary approach involving physiatrists, plastic surgeons, dentists, and occupational therapists. Surgical intervention, while beneficial for severe trismus unresponsive to other treatments, carries a risk of potential side effects, including infection, nerve damage, and joint instability. Careful surgical techniques, aseptic protocols, and post-operative care are essential to prevent these complications. Clear patient instructions for exercises and follow-up care can further minimize these risks. The post-operative care was focused on avoiding re-contracture through intensive rehabilitation, including jaw exercises, physical modalities, and oral and dental splints.

Persistent oversight of mouth-opening capabilities and periodic swallowing evaluations, both clinical and instrumental, are vital. Should the need arise, administering botulinum toxin injections remains an option.

Patient perspective

The patient and family expressed satisfaction with the post-surgical improvement in oral function, noting that it significantly reduced the risk of aspiration pneumonia and enabled a better quality of life. They appreciated the multidisciplinary approach and regular follow-ups, which supported the patient's functional progress.

Conclusion

This case report illustrates the importance of a multifaceted approach to managing severe trismus in post-stroke patients. Patient outcomes may be significantly improved through early intervention, comprehensive diagnostic imaging in non-responsive cases, and a structured escalation from conservative to advanced treatments. Establishing a multidisciplinary team and developing a dedicated management protocol for severe trismus could provide clinicians with a robust framework for addressing this challenging condition.

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Conflict of interest declaration

The authors confirm that there are no known conflicts of interest associated with this publication, and no significant financial support has been received that could have influenced the results or conclusions of this work.

Finding

The authors declare that no funding was received for this study.

Data availability

The authors confirm that the data supporting the findings of this study are available within the article.

References

1. Seo JH, Kim DK, Kang SH, Seo KM, Seok JW. Severe spastic trismus without generalized spasticity after unilateral brain stem stroke [Internet]. Ann Rehabil Med. 2012 Jan [cited 2023 Nov 15];36(1):154-8. Available from: https://www.e-arm.org/journal/view.php?number=2402
2. Fietzek UM, Kossmehl P, Barthels A, Ebersbach G, Zynda B, Wissel J. Botulinum toxin B increases mouth opening in patients with spastic trismus [Internet]. Eur J Neurol. 2009 Dec [cited 2023 Nov 15];16(12):1299-1304. Available from: https://www.onlinelibrary.wiley.com/doi/full/10.1111/j.1468-1331.2009.02751.x doi: 10.1111/j.1468-1331.2009.02751.x
3. Spillane KS, Shelton JE, Hasty MF. Stroke-induced trismus in a pediatric patient: long-term resolution with botulinum toxin A [Internet]. Am J Phys Med Rehabil. 2003 Jun [cited 2023 Oct 16];82(6):485-8. Available from: https://journals.lww.com/ajpmr/pages/default.aspx
4. Dijkstra PU, Kalk WW, Roodenburg JL. Trismus in head and neck oncology: a systematic review [Internet]. Oral Oncol. 2004 Sep [cited 2024 May 11];40(9):879-89. Available from: https://www.sciencedirect.com/science/article/abs/pii/S1368837504000592
5. Bhrany AD, Izzard M, Wood AJ, Futran ND. Coronoidectomy for the treatment of trismus in head and neck cancer patients [Internet]. Laryngoscope. 2007 Nov [cited 2023 Nov 20];117(11):1952-6. Available from: https://onlinelibrary.wiley.com/doi/10.1097/MLG.0b013e31813e0a02 doi: 10.1097/MLG.0b013e31813e0a02
6. Nedeljak J, Armijo-Olivo S, Hernandez IA, Nayar S, McNeel ML. A scoping review of physiotherapeutic interventions for trismus in head and neck cancer: where is the manual therapy? [Internet]. Physiother Can. 2021 Jun [cited 2023 Nov 15];74(2):173-83. Available from: https://pubmed.ncbi.nlm.nih.gov/34010559/ doi: 10.3138/ptc-2020-0039
7. Hägg M, Anniko M. Lip muscle training in stroke patients with dysphagia [Internet]. Acta Otolaryngol. 2008 Sep [cited 2023 Nov 16];128(9):1027-33. Available from: https://pubmed.ncbi.nlm.nih.gov/18568596/ doi: 10.1080/00016480701786983
8. Yoneyama T, Yoshida M, Ohrui T, Mukaiyama H, Okamoto H, Hoshiba K, et al. Oral care reduces pneumonia in older patients in nursing homes [Internet]. J Am Geriatr Soc. 2002 Mar [cited 2024 Jan 10];50(3):430-3. Available from: https://pubmed.ncbi.nlm.nih.gov/11943042/