***Case report***

Bulbar Palsy as a presentation of Medullary Ischemic Stroke: An educational case report.

**ABSTRACT:**

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| **Aims:** Medullary ischemic strokes are uncommon and often present with complex neurological symptoms. The clinical characteristics of bulbar palsy, which can be a common presentation for other diseases, add to the difficulties in diagnosing and treating such cases. The primary aim of documenting this case is to highlight the diagnostic and management challenges of this complex presentation.  **Presentation of case:** We report a case of a 45-year-old male with a personal history of long-term smoking and alcoholism, who experienced tongue deviation, difficulty swallowing, dystonia, and epigastric pain. Magnetic resonance imaging confirmed an acute medullary infarct without hemiparesis. The patient was managed with non-pharmacological and pharmacological therapy. The patient’s improvement in outcome was assessed with the use of the National institute of health stroke scale score. He also showed gradual improvement in symptoms throughout admission.  **Discussion:** The patient presentation mimicked bulbar palsy but imaging and cranial nerve examinations helped in accurate diagnosis and treatment.  **Conclusion:** This case highlights the importance of early neuroimaging in atypical neurological presentation and also underscores the need for thorough cranial nerve assessment. |

***Keywords:*** *Bulbar palsy, Hemibulbar syndrome, Medullary ischemic stroke, Cranial nerve involvement, Case report*

1. **INTRODUCTION:**

Ischemic stroke refers to the clinical condition where the supply of blood to the brain is restricted due to narrowing or blockage of the arteries supplying the brain. It can lead to localized brain ischemia, hypoxic damage and other related neurological impairments [1]. Worldwide, more than 80 million people are affected by stroke, where 70% present with an ischemic nature [2[. Strokes in the posterior region involve 20-25% of people affected by ischemic and medullary infarctions, though rare, it represent a significant clinical subset [3].

The medullary infarctions may affect the cranial nerves IX (Glossopharyngeal nerve), X (Vagus nerve), XI (Spinal accessory nerve), and XII (Hypoglossal nerve), resulting in a lower motor neuron disorder called bulbar palsy. The term “bulb” historically refers to the medulla oblongata [4, 5].

The bulbar palsy is further categorised into lateral, medial and hemibulbar syndrome based on the specific anatomical site affected by infarction and the involvement of particular cranial nerves [5].

This case offers valuable educational insights regarding presentations of brainstem stroke, rare complications, cranial nerves involvement, diagnostic difficulties and approaches of pharmacological management.

1. **CASE PRESENTATION:**

A 45-year-old male patient presented to the emergency department with complaints of sudden mouth deviation to the right side and epigastric pain that radiated to the back, since the previous night (8 hours ago). He also mentioned a history of difficulty in swallowing (dysphagia), pain in the throat, nasal regurgitation of liquids, slurred speech (dysarthria) and hoarseness of voice for the past two weeks.

The patient had a personal history of chronic alcohol consumption (22 years) and long-term smoking (15 years). His reported last intake of alcohol was the previous night before the occurrence of the deviation of the mouth, about seven hours ago.

On the first day of admission, patient was primarily examined. On examination, the patient was conscious, oriented and did not have fever. He experienced discomfort while moving his neck. His blood pressure was 140/90 mmHg, and his pulse rate was 115 beats per minute. Examination of both ears revealed chronic perforation of the tympanic membrane with mucus discharge.

Within three hours of admission, Neurological assessment revealed dysphonia, nasal speech and an intact gag reflex. Even though the gag reflex was intact, occasional nasal regurgitation of feeds was also present. There was tongue deviation to the left side without tongue fasciculation. Cranial nerve testing confirmed involvement of cranial nerves IX, X, XI, and XII. Cranial nerves I, II, III, IV, V, VI, VII and VIII are mentioned as normal. No vertigo or nystagmus was noted. The motor reflex was normal.

Routine laboratory investigations were recommended and the results were obtained on the second day. The routine laboratory findings were within the normal range. There was no evidence of hepatic or renal dysfunction. Electrocardiogram results were normal.

A clinical diagnosis of bulbar palsy was made on the first day itself. The pattern of tongue deviation and dysphagia raised suspicion of hemi-medullary syndrome. After suspecting and ruling out amyotrophic lateral sclerosis, Gullian-Barré syndrome, Kennedy disease, chronic meningitis, Syringobulbia and Poliomyelitis, the quick results of magnetic resonance imaging (MRI) on the day one and the clinical features of the patient provided a clarity. Magnetic resonance imaging (MRI) demonstrated an acute infarct in the medulla oblongata, confirming the diagnosis of medullary ischemic stroke. The patient was also diagnosed with complications like alcoholic gastritis, systemic hypertension and bilateral chronic suppurative otitis media.

The medical team managed the patient from the first day of admission with intravenous fluids, tablet form of Aspirin 150mg in the afternoon, Tab. Atorvastatin 20mg orally at bedtime, Tab. Amlodipine 5mg orally in the morning, Tab. Enalapril 2.5mg orally twice a day. A psychiatrist provided counselling for cessation of alcohol consumption. Intravenous administration of pantoprazole 40mg once a day was given to treat gastritis caused due to alcohol intake. Supportive treatment of vitamin B1 100mg in 100 mL of normal saline was administered as intravenous infusion. Amoxicillin and potassium clavulanate 1.2g were administered intravenously to the patient twice a day from Day 2 to Day 8.

Over the next twenty days, the patient showed gradual improvement in speech clarity, facial palsy and reduced nasal regurgitation. There were no new neurological deficits, and the overall clinical condition of the patient was stable. He was discharged with follow-up rehabilitation counselling sessions and stroke therapy.

The National Institute of Health stroke scale (NIHSS) score was calculated to be three prior to hospital admission with mild facial palsy (mouth and tongue deviation- score 1) and severe dysarthria (score 2). During the discharge the score improved to be one (mild slurred speech – 1)

1. **DISCUSSION:**

Medullary infarcts account for a small proportion of all ischemic strokes but often impose diagnostic and treatment challenges due to their nonspecific symptoms [3]. This case educationally represents the complexities arising during the diagnosis and the confusion arising during the therapy.

This case starts with the patient presenting with evident classical symptoms of bulbar palsy, which could be a presentation for many diseases. Symptoms including dysarthria, dysphagia, hoarseness of voice, nasal speech, and deviation of tongue confirmed the diagnosis of bulbar palsy. The absence of emotional imbalance ruled out pseudo-bulbar palsy [4].

Bulbar palsy could be a common presentation for several diseases like amyotrophic lateral sclerosis, Guillain-Barré syndrome, Kennedy disease, syringobulbia, poliomyelitis, chronic meningitis, neoplasms, aneurysms or congenital abnormalities. No visual presentation or history of congenital abnormalities is present in the patient [4, 6].

**Table 1: Reasons for ruling out the differential diagnosis [6, 7, 8, 9 and 10].**

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| **Differential Diagnosis** | **Reasons for ruling out the possibility** |
| Amyotrophic lateral sclerosis | Symptoms causing death of both upper and lower motor neurons were not observed. The patient’s symptoms are not chronic. |
| Gullian-Barré syndrome | Loss of sensation and muscle weakness are not noted in the patient. |
| Kennedy disease | No chronic progressive symptoms, no limb dysfunction noted. |
| Chronic meningitis | No abnormalities in MRI supporting chronic meningitis. No complaints of fever, focal deficit, headache, nausea and vomiting. |
| Syringobulbia | No fluid fill or syrinx is seen in the medulla on MRI. Diplopia, vertigo, loss of sense of temperature on one side of the face, palatal and vocal cord paralysis, and nystagmus were not seen. |
| Poliomyelitis | No history of polio virus or preceding febrile illness, no asymmetric flaccid limb paralysis or loss of deep tendon reflexes |
| Bilateral medial medullary infarction | MRI results doesn’t show bilateral medial medullary involvement. No motor weakness , sensory disturbance or vertigo is noted |

In this case, the patient presented with systemic hypertension and, history of long-term alcohol and tobacco use. All three of these factors would have contributed to the etiology of Ischemic brainstem stroke, and this was confirmed by the results of MRI, which showed an acute medullary infarct. MRI also ruled out aneurysm and a neoplastic cause of bulbar palsy [11].

Careful neurological examination was carried out to confirm the involvement of the cranial nerves. The cranial nerves, IX (Glossopharyngeal nerve), X (Vagus nerve), XI (Spinal accessory nerve), and XII (Hypoglossal nerve) arise from the medulla oblongata and impairment in all four of these nerves is noted.

The involvement of the glossopharyngeal nerve is observed by the patient’s complaint of difficulty in swallowing and pain in the throat. Dysphonia and dysphagia confirmed the impairment of the vagus nerve. Though weakness in head support is not seen, the patient complains of neck pain and discomfort in twisting the neck, suspecting spinal accessory nerve involvement. Slurred speech, tongue deviation to the left side are due to the impairment of the motor functions of the hypoglossal nerve [5].

Bulbar palsy is further classified into lateral, medial and hemibulbar syndrome [5].

**Table 2: Presence of Characteristic features of lateral and medial bulbar syndrome [5].**

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| **Syndrome** | **Characteristics** | **Status** |
| Lateral bulbar syndrome | Dysphonia  Dysphagia  Dysarthria | Present |
| Medial bulbar syndrome | Tongue deviation | Present |

Though hemiplegia, hemiparesis, nausea and vertigo are absent, the presence of characteristics from both lateral bulbar syndrome and medial bulbar syndrome raises suspicion for partial hemibulbar syndrome. Hemibulbar syndrome is also known as Babinski-Nageotte syndrome [12].

Oral aspirin 150mg in tablet form was prescribed once a day to manage ischemic stroke. [13] Some conditions require dual antiplatelet therapy whereas some cases are managed with single antiplatelet therapy. [3] Tab. Atorvastatin 20mg oral administration during the night is given as a prophylaxis to reduce the risk of stroke by preventing atherosclerotic cardiovascular disease [14].

Hypertension management is recommended if it persists for more than two weeks, whereas in this clinical situation,hypertension was managed by oral administration of the tablet Amlodipine 5mg once a day and tablet form of Enalapril 2.5mg twice a day. Though this was a deviation from guidelines, patient showed significant improvement in real-life practice [13].

Intravenous form of vitamin B1 100mg as a formulation with normal saline 100mL was administered as intravenous infusion to the patient to achieve detoxification. Counselling from a psychiatrist was also given to provide non-pharmacological treatment to the patient. Cessation of alcohol was suggested [13].

Amoxicillin and potassium clavulanate 1.2g were administered intravenously to the patient twice a day for 7 days to manage chronic suppurative otitis media, whereas guidelines suggest oral administration of amoxicillin and clavulanic acid three times a day for 7 days [13].

According to the NIHSS-15 item, the stroke severity of the patient before hospitalization was calculated to be three. Item 4, facial palsy, was given a score of one; the item 10, dysarthria, was given a score of two.

The outcome of the patient after hospitalization was calculated with the same scale and found to be one. The mouth deviation was rectified, and the patient showed significant improvement in speech. Item 10, dysarthria, was scored one due to the mild slurred speech [15].

This case highlights the diagnostic difficulties faced due to the insignificant symptoms of the patients. Though MRI guided the diagnosis of medullary infarct, the specific region was not documented. The involvement of cranial nerves examination helped in the diagnosis of hemibulbar palsy and ruled out differential diagnosis. Treatment dilemma in administering intravenous amoxicillin and potassium clavulanic acid 1.2mg three times a day; treating hypertension added educational value to this case report.

Limitations of the study includes lack of usage of tools to check the severity of the stroke. The damage occurred due to ischemic stroke or the recovery achieved was not quantified. As this case was diagnosed and treated in a rural area, the limitations of advanced equipment, financial restraints and advanced diagnostic procedures are also present. This report also limits the treatment follow-up to primary therapy, long term recovery was not documented. Advanced neuroimaging was not implied, lacking access to anatomical precision.

1. **CONCLUSION:**

This case adds to the limited literature on medullary ischemic stroke and hemibulbar syndrome involving the cranial nerves IX-XII without any specific motor dysfunction. It highlights the need to maintain suspicion for medullary infarct in patients presenting with bulbar symptoms. Early diagnosis, timely imaging and appropriate therapy in this patient helped in achieving therapeutic outcomes.

1. **CONSENT:**

Written informed consent was obtained from the participant for publication of this case and any accompanying clinical information.

1. **ETHICAL APPROVAL:**

Institutional ethical committee approval for anonymized single case report is exempted at our institution.

**DISCLAIMER (ARTIFICIAL INTELLIGENCE)**:

Author(s) hereby declare that generative AI technologies such as Large Language Models, etc. have been used during the writing or editing of manuscripts. This explanation will include the name, version, model, and source of the generative AI technology and as well as all input prompts provided to the generative AI technology

Details of the AI usage are given below:

1. ChatGPT (GPT-4): Assisted with restructuring sentences and formatting references.

2. Grammarly: Checked and corrected grammar, spelling and punctuation.

3. SmallSEOTools: Used to check plagiarism and ensure originality.

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