Case Report

Barber`s neck manipulation causing bilateral diaphragmatic paralysis and type-2 respiratory failure

Ashish Kumar Prakash, Anand Jaiswal, Sandeep Mittal, Poulomi Chatterjee, Sameer Kotalwar, Bornalli Datta
Department of Respiratory and Sleep Medicine, Medanta - The Medicity, Gurgaon, Haryana, India

ABSTRACT

This is a case report of an unusual cause of bilateral diaphragmatic palsy. A 54-year-old gentleman, presented to us with exertional dyspnea and chest heaviness for the past 6 months which had increased in the last 6 days. Dyspnea increased on lying down. He was diagnosed as pneumonia on the basis of X-ray and chest CT scan, received treatment for the same and responded to the therapy. However, breathlessness and hypercapnia persisted. He had unexplained hypercapnia for which extensive investigations were carried out. Neurological and cardiac assessments were essentially normal. On revisit clinical examination, he was found to have paradoxical diaphragmatic movement with respiration. Ultrasound of chest detected no diaphragmatic movement. Detailed history elicited that patient was fond of neck massage and neck cracking wherein his barber would bend his neck with jerk to either side after a haircut. After considering all possible etiologies; we concluded that it was a case of diaphragm palsy induced by barber neck manipulation, leading to Type-2 respiratory failure. The fact that the vital clues to the diagnosis were elicited by detailed history and thorough examination reinforces that history and clinical examination for doctors shall remain a very important tool for clinical diagnosis.

KEY WORDS: Barber, chiropractic neck manipulation, diaphragm, Type-2 respiratory failure

INTRODUCTION

With the advancement of medical science, the practice of investigation dependency has increased. The role of history-taking and clinical examination which was the only diagnostic modality in the early days has reduced in the present times. As stated by Osler “the whole art of medicine is in observation,” this article proves the worth of it.[1]

Among causes of Type-2 respiratory failure, diaphragmatic palsy is rare and bilateral involvement of diaphragm is even rarer. We found a barber’s neck manipulation as an iatrogenic cause of bilateral diaphragm palsy.

CASE REPORT

The patient was a 54-year-old gentleman, nonsmoker and nonalcoholic. He presented to us with gradually progressive, exertional dyspnea and chest heaviness for past 6 months, which had increased in the last 6 days. Dyspnea increased on lying down. The patient had visited a local physician and a neurologist for the same. His chest X-ray showed left-sided lung consolidation [Figure 1]. Blood reports such as total leukocyte count with differentials as well as C-reactive protein (CRP) and procalcitonin were normal. Computed tomography (CT)
chest done was suggestive of bilateral lower lobe pneumonia (left > right). His cardiac evaluation including doppler echocardiography was normal. He was started on treatment with antibiotics, inhaled bronchodilators, and noninvasive positive pressure ventilation (NIPPV). The patient showed clinical and radiological improvement. However, he had unexplained hypercapnia, which led to further evaluation. His serial arterial blood gas initially showed acute on chronic Type-2 respiratory failure which later compensated [Table 1]. On further workup for Type-2 respiratory failure, pulmonary function testing was suggestive of severe restriction with reduced diffusion capacity of lung. Sleep Study done which was normal. Thyroid profile and serum electrolytes were also normal. There was no history of thoracic neck surgery or trauma. Electromyography phrenic nerve could not be done. Nerve conduction velocity (NCV) showed mild involvement of median nerve only. At this point, a more detailed history was taken and clinical examination was carried out. We found the paradoxical diaphragmatic movement with respiration [Video 1]. Neurological examination and investigations ruled out any neuromuscular disorder including myasthenia gravis. An autoimmune profile for collagen vascular disease was negative (including ANA and Ds DNA). An ultrasonography of chest revealed that there was no diaphragmatic movement even on forced inspiration (Sniff test). The patient informed us that he was fond of neck cracking and would go to the barber’s every 2–3 months for the same. The patient was discharged on domiciliary bi-level positive airway pressure therapy and is doing well. He was further advised to avoid swimming breathing in water tub and sleep in propped-up position. He regularly comes to follow-up visit in the outpatient department and is clinically much better and stable now.

**DISCUSSION**

The reported case is very important with two perspectives: (a) clinical evaluation is yet essential for diagnosis and (b) Chiropractic neck manipulation causing diaphragmatic palsy is an important warning- awareness message to public at large [Figure 2].

In this case, the patient was initially treated for pneumonia. Radiological pictures (CT and chest X-ray) showed basal consolidation and atelectasis which responded to the therapy. The important clue which motivated us for further investigations was (a) Type-2 respiratory failure and its discordance with lung involvement, (b) all blood parameters such as total leukocyte count, CRP, and procalcitonin were within normal limit, (c) he received noninvasive ventilation therapy, which might have led to radiological improvement as well. Thorough workup for causes of Type-2 respiratory failure was done, and every possible cause was excluded.[2] Still, clueless-clinical examination was repeated. While in normal respiratory movement, diaphragm contracts leading to expansion of ribcage as well as pushes the abdominal content downward to increase intrathoracic volume. This causes outward movement of both thorax and abdomen during inspiration [Figure 3a]. The paradoxical movement occurs when the paralyzed diaphragm moves upward (cephalad) during inspiration that leads to inward movement of abdomen while inspiration [Figure 3b]. The paradoxical movement of
diaphragm caused by bilateral diaphragmatic palsy causes severe dyspnea and orthopnea. The history revealed that patient was fond of neck manipulation by the barber and would go for the same every 2–3 months. Following a literature review, the diagnosis was made. This case was diagnosed merely on history and clinical examination. As mentioned in the article, “Must doctors still examine patients” without a doubt they must. We publish this case for highlighting the importance of history and physical examination as well as awareness about the neck manipulation by the barber which can lead to such complication.

### CONCLUSION

Neck manipulation can cause phrenic nerve injury leading to diaphragmatic palsy and present as orthopnea and type 2 respiratory failure. Bi-level noninvasive ventilation is the treatment of choice. One should always restrict barber’s hand to head rather lending them necks. History and clinical examination for the doctor have always been a very important tool for diagnosis.

### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

### Financial support and sponsorship

Nil.

### Conflicts of interest

There are no conflicts of interest.

### REFERENCES

1. Phoon CK. Must doctors still examine patients? Perspect Biol Med 2000;43:548-61.
2. Feller-Kopman DJ, Schwartzstein RM. The Evaluation, Diagnosis, and Treatment of the Adult Patient with Acute Hypercapnic Respiratory Failure; Available from: http://www.uptodate.com/contents/the-evaluation-diagnosis-and-treatment-of-the-adult-patient-with-acute-hypercapnic-respiratory-failure?source=search_result&search=type%20+2+respiratory+failure&selectedTitle=1%7E7E150. [Last accessed on 2017 Nov 27].
3. McCool FD, Tzelepis GE. Dysfunction of the diaphragm. N Engl J Med 2012;366:932-42.
4. John S, Tavee J. Bilateral diaphragmatic paralysis due to cervical chiropractic manipulation. Neurologist 2015;19:65-7.
5. Heffner JE. Diaphragmatic paralysis following chiropractic manipulation of the cervical spine. Arch Intern Med 1985;145:562-4.
6. Schram DJ, Vosik W, Cantral D. Diaphragmatic paralysis following cervical chiropractic manipulation: Case report and review. Chest 2001;119:638-40.
7. Olson DP, Roth KE. Diagnostic tools and the hands-on physical examination. Virtual Mentor 2007;9:113-8.
8. Phoon CK. Must doctors still examine patients? Perspect Biol Med 2000;43:548-61.
9. Phoon W. Book review. Int Med J 2005;35:440.
10. Bruhn JG. The doctor’s touch: Tactile communication in the doctor-patient relationship. South Med J 1978;71:1469-73.

### Table 1: Serial arterial blood gases of patient

| ABG | Triage | Before NIV | After NIV | At discharge | OPD follow-up |
|-----|--------|------------|-----------|--------------|---------------|
| pH  | 7.236  | 7.206      | 7.354     | 7.46         | 7.359         |
| PCO₂ | 86    | 96         | 73        | 60           | 53            |
| PO₂  | 102   | 102         | 101       | 61           | 63            |
| HCO₃⁻ | 43.6  | 41         | 39        | 42           | 29            |
| SO₂  | 96    | 99         | 97        | 90           |               |

ABG: Arterial blood gas, NIV: Noninvasive ventilation, OPD: Outpatient department