A Rare Case Report on Plummer-Vinson Syndrome with a Complication of Oral Cancer in a South-Asian Woman

INTRODUCTION

Plummer-Vinson syndrome (PVS) or Paterson-Brown-Kelly syndrome is a rare entity associated with the classical triad of symptoms including microcytic hypochromic anemia, esophageal strictures, and dysphagia [1]. It affects predominantly females, in their 4th to 7th decade of life and is due to deprived nutritional status, multiparity, and menstrual blood loss. Three to fifteen percent of the patients affected by PVS have been reported to develop esophageal or pharyngeal cancer [2,3]. Precise data about incidence and prevalence of the syndrome are not identified, but in the first half of the 20th century it appeared to be common in Caucasians of Northern countries [4]. It is also common in countries with high possibility of iron deficiency; though, with improvement of nutritional status, it is extremely erratic nowadays [5]. It is hardly diagnosed in males and has also been described in children and adolescents [6,7].

The chief clinical features of Paterson-Brown-Kelly syndrome are postcricoid dysphagia [254x201]. The chief clinical features of Paterson-Brown-Kelly syndrome are postcricoid dysphagia [254x201]...
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Phagia, upper esophageal webs, and iron deficiency anemia. The dysphagia is generally painless and intermittent or progressive over years, restricted to solids, and occasionally accompanied with weight loss. Symptoms subsequent to anemia such as weakness, pallor, fatigue, and tachycardia may lead the clinical presentation. Additionally, it is characterized by glossitis, angular cheilitis, and koilonychia (spoon-shaped finger nails). Enlargement of the spleen and thyroid may also be detected [8,9].

The diagnosis of Paterson-Brown-Kelly syndrome relies on detailed clinical history, general clinical examination, hematological investigation, and radiological examination. However, in the evolving countries numerous patients underestimate the importance of medical history about dental health and treatment.

**CASE PRESENTATION**

A 40-year-old female patient was admitted in Mahatma Gandhi Memorial Hospital (MGMH), Warangal, Telangana, India with chief complaints of gradually progressive dysphagia for solids in the past 3 months, hoarseness of voice, pain in both ears, and history of weight loss. On physical examination, the patient was cachectic with conjunctival pallor, pedal edema, cheilosis but without koilonychia. She had no history of smoking cigarettes, chewing tobacco, alcohol use, or drinking hot liquids. There was no family history of esophageal cancer. Table I reports laboratory findings at admission.

In particular, iron deficiency anemia should be noticed.

Diagnosis was made by performing the following tests:

- whole-body positron emission tomography-computed tomography (PET-CT) was done for stage evaluation of postcricoid growth (Figures 1 and 2). It was performed from vertex of skull to mid-thigh after injecting 10.9 mCi of F-18 fludeoxyglucose (FDG) and CT images were acquired after injecting IV contrast medium. In the neck region, an irregular heterogeneously enhancing lesion was detected, involving posterior pharyngeal wall and postcricoid region and measuring 2.7 cm × 1.7 cm. Therefore, the PET-CT scan confirmed hypermetabolic irregular enhancing soft tissue thickening in posterior pharyngeal wall and postcricoid region. The solid mass was neoplastic in nature;
- biopsy revealed well differentiated squamous cell carcinoma with stage T2 N2 M0;
- esophageal endoscopy was also performed and it showed ulcerated lesion in esophagus.

Therefore, this patient was finally diagnosed with Paterson-Brown-Kelly syndrome with a complication of postcricoid carcinoma. She was planned for radiation therapy. As her hemoglobin level was low, blood transfusion of 2 pints of packed red blood cells (PRBCs) was given and iron supplement medications (Inj. Orofer, Tab.

| Parameter                          | Detected level | Normal range |
|-----------------------------------|----------------|--------------|
| Hemoglobin (g%)                   | 6.5            | 12-16        |
| Total RBC count (million/mm³)     | 2.7            | 4.7-6.5      |
| MCV (mm³)                         | 74             | 78-95        |
| MCH (%)                           | 24             | 25-30        |
| PCV (Vol%)                        | 20             | 40-54        |
| Iron (µg/dl)                      | 18             | 60-170       |
| Ferritin (ng/dl)                  | 10             | 12-150       |
| Transferrin (mg/dl)               | 222            | 170-370      |
| Total iron binding capacity (µg/dl)| 270            | 240-450      |

Table 1. Laboratory findings at admission

MCH = mean corpuscular hemoglobin; MCV = mean corpuscular volume; PCV = packed cell volume; RBC = red blood cells

Figure 1. Whole-body Positron Emission Tomography, neck region.
findings at admission

Table I.

| Parameter                        | Detected Level | Normal Range |
|----------------------------------|----------------|--------------|
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| Total RBC count (million/)        | 2.7            | 4.7-6.5      |
| MCH (%)                          |                | 24-30        |
| MCV (mm³)                        | 74             | 78-95        |
| PCV (Vol%)                       | 20             | 40-54        |
| Total iron binding capacity (µg/dl) | 222       | 170-370      |
| Ferritin (ng/dl)                 | 10             | 12-150       |
| Iron (µg/dl)                     | 18             | 60-170       |
| PCV (%)                          |                | 30-45        |

Laboratory tests:
- Hemoglobin: 6.5 g%, PCV: 20%, Hb: 222 µg/dl, Ferritin: 10 ng/dl, Iron: 18 µg/dl, MCV: 74 mm³

The patient was given supplemental medications (Inj. Orofer, Tab. blood cells (PRBCs) was given and iron blood transfusion of 2 pints of packed red blood cells, then oral iron therapy. As her hemoglobin level was low, iron folic acid, Tab. Neurokind) were suggested in the treatment plan.

A slow improvement of dysphagia occurred after 2 weeks of oral iron therapy.

**DISCUSSION**

The pathogenesis of Paterson–Brown–Kelly syndrome is unknown. The most significant etiological factor is iron deficiency. This theory is chiefly based on the conclusion that iron deficiency is a part of the classic triad of Paterson–Brown–Kelly syndrome composed with dysphagia and esophageal webs and that dysphagia can be improved by iron supplementation. Certainly, impaired esophageal motility has been defined in Paterson–Brown–Kelly syndrome [10,11]. Myasthenic changes arise in muscles involved in the swallowing mechanism due to the depletion of iron-dependent oxidative enzymes. The rapid loss of iron-dependent enzymes causes web formation and ultimately lead to cancer development of the upper gastrointestinal tract [12-14].

It has been reported that malignity in the upper digestive system occurs in 3-16% of patients with PVS, and thus it has been suggested that yearly endoscopic controls should be performed for such patients [15,16]. Tissue iron plays a vital role in the propagation of epithelial cells. The physical signs of tissue iron deficiency include smooth tongue, angular cheilitis, and koilonychia, which were also observed in our patient, except koilonychia.

Besides, the epithelial layer of the upper alimentary tract is particularly liable to iron deficiency because of its high cell turnover [17-19]. Atrophy of the esophageal mucosa and formation of webs is seen as mucosal complications. These dysregulations were evident in the present case. Other etiologic factors, including malnutrition, genetic predisposition, or even autoimmune processes, have been proposed. The latter is based on the connotation between Paterson–Brown–Kelly syndrome and certain autoimmune disorders such as celiac disease (which was the most often mentioned associated disease in the case reports published in recent years), thyroid disease, and rheumatoid arthritis [20].

It has been proposed that dysphagia associated with Paterson–Brown–Kelly syn-
drome is improved by iron supplements [21], though in several cases the dysphagia did not respond to iron therapy and eventually required endoscopic dilatation or incision [22,23].

Here, we presented a rare case report on Paterson-Brown-Kelly syndrome in a 40-year-old woman, who developed postcricoid carcinoma. If this patient had presented earlier, when she had intermittent progressive dysphagia, her Paterson-Brown-Kelly syndrome could have been potentially treated and the cancer might have been prevented for further progression.

Early diagnosis is of utmost importance for a better prognosis and can be managed by iron supplementation and mechanical dilation. Likewise, esophageal webs may well relapse if iron deficiency recurs; therefore, careful follow-up is mandatory for these patients. Endoscopic surveillance is also crucial because of the risk of cancer.

**CONCLUSION**

Paterson-Brown-Kelly syndrome is a rare disease generally affecting middle-aged females.

Dysphagia is slowly progressive and patients often present with iron deficiency anemia. An early diagnosis is of the utmost importance, since, if left untreated, patients may develop upper alimentary tract cancer, as in the patient described in this article. She was treated with oral iron therapy, which deliberately improved dysphagia, and was planned for radiation therapy.

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**Key points**

- Paterson-Brown-Kelly syndrome or Plummer-Vinson syndrome (PVS) is a rare entity associated with the classical triad of symptoms, including microcytic hypochromic anemia, esophageal strictures, and dysphagia
- It generally effects middle-aged women
- After the initial diagnosis is confirmed, it can be managed by iron supplementation and mechanical dilation
- Noticeably, in this case report a slow improvement of dysphagia occurred after 2 weeks of oral iron therapy
- Early diagnosis is of extreme importance for better prognosis, since negligence may worsen the patient’s condition, by increasing the risk for upper alimentary tract cancer, as in this patient, who developed postcricoid carcinoma

**Acknowledgments**

We all express our gratitude to the patient, who kindly gave her consent for this case to be presented in this paper.

**Funding**

None received.

**Conflicts of Interests**

The authors declare that they have no competing interests.

**Consent for Publication**

Written informed consent was obtained from the patient for publication of this case report and any accompanying images.
REFERENCES

1. Lanke G, Koduru P, Bhutani MS. Plummer-Vinson syndrome presenting as squamous cell carcinoma of esophagus. *J Dig Endosc* 2016; 7: 71-3; https://doi.org/10.4103/0976-5042.189156
2. Goel A, Lakshmi CP, Bakshi SS, et al. Single-center prospective study of Plummer-Vinson syndrome. *Dis Esophagus* 2016; 29: 837-41; https://doi.org/10.1111/dote.12393
3. Hoffman RM, Jaffe PE. Plummer-Vinson syndrome. A case report and literature review. *Arch Intern Med* 1995; 155: 2008-11; https://doi.org/10.1001/archinte.155.18.2008
4. Novacek G. Plummer-Vinson syndrome. *Orphanet J Rare Dis* 2006; 1: 36; https://doi.org/10.1186/1750-1172-1-36
5. Goel A, Bakshi SS, Soni N, et al. Iron deficiency anemia and Plummer-Vinson syndrome: current insights. *J Blood Med* 2017; 8: 175-84; https://doi.org/10.2147/JBM.S127801
6. Plummer S. Diffuse dilatation of the esophagus without anatomic stenosis (cardiospasm). A report of ninety-one cases. *J Am Med Assoc* 1912; 58: 2013-5; https://doi.org/10.1001/jama.1912.04260060366003
7. Bassene M, Diallo S, Thibou M, et al. Plummer-Vinson Syndrome and Esophageal Cancer in an Endoscopy Center of Dakar. *Open J Gastroenterol* 2017; 7: 217-22; https://doi.org/10.4236/ojgas.2017.78023
8. Gude D, Bansal D, Malu A. Revisiting plummer vinson syndrome. *Ann Med Health Sci Res* 2013; 3: 119-21; https://doi.org/10.4103/2141-9248.109476
9. Yasawy MI. Treatment of Plummer-Vinson syndrome with Savary-Gillard dilatation. *Saudi Med J* 2004; 25: 524-6
10. Diner G, Tander B, Kalayci AG, et al. Plummer-Vinson syndrome in a 15-year-old boy. *Turk J Pediatr* 2009; 51: 384-6
11. Tahara T, Shibata T, Okubo M, et al. A case of Plummer-Vinson syndrome showing rapid improvement of Dysphagia and esophageal web after two weeks of iron therapy. *Case Rep Gastroentrology* 2014; 8: 211-5; https://doi.org/10.1159/000364820
12. Anderson SR, Sinacori JT. Plummer-Vinson syndrome heralded by postcricoid carcinoma. *Am J Otolaryngol* 2007; 28: 22-4; https://doi.org/10.1016/j.amjoto.2006.06.004
13. López Rodríguez MJ, Robledo Andrés P, Amarilla Jiménez A, et al. Sideropenic dysphagia in an adolescent. *J Pediatr Gastroenterol Nutr* 2002; 34: 87-90; https://doi.org/10.1097/00005176-200201000-00021
14. Sugiuara Y, Nakagawa M, Hashizume T, et al. Iron supplementation improved dysphagia related to Plummer-Vinson syndrome. *Keio J Med* 2015; 64: 48-50; https://doi.org/10.2302/kjm.2014-0011-CR
15. Mouna S, Kabbaaj N, Raissouni F, et al. Safety and effectiveness of endoscopic Savary-Gillard Bougies dilation in Moroccan Plummer-Vinson syndrome patients. *ISRN Endosc* 2013; 2013: 137895; https://doi.org/10.5402/2013/137895
16. Sinha V, Prajapati B, George A, et al. A case study of Plummer-Vinson syndrome. *Indian J Otolaryngol Head Neck Surg* 2006; 58: 391-2; https://doi.org/10.1007/BF03049607
17. Kim KH, Kim MC, Jung GJ. Gastric cancer occurring in a patient with Plummer-Vinson syndrome: a case report. *World J Gastroenterol* 2005; 11: 7048-50; https://doi.org/10.3748/wjg.v11.i26.7048
18. Demirci F, Savas MC, Kepkep N, et al. Plummer-Vinson syndrome and dilation therapy: a report of two cases. *Turk J Gastroenterol* 2005; 16: 224-7
19. Yukelen V, Karaoglu AO, Yasa MH. Plummer-Vinson syndrome: a report of three cases. *Int J Clin Pract* 2005; 57: 646-8
20. Sood A, Midha V, Sood N, et al. Paterson Kelly syndrome in celiac disease. *J Assoc Physicians India* 2005; 53: 991-2
21. Medrano M. Dysphagia in a patient with rheumatoid arthritis and iron deficiency anemia. *MedGenMed* 2002; 4: 10
22. Enomoto M, Kohmoto M, Arafu UA, et al. Plummer-Vinson syndrome successfully treated by endoscopic dilatation. *J Gastroenterol Hepatol* 2007; 22: 2348-51; https://doi.org/10.1111/j.1440-1746.2006.03430.x
23. See MH, Chun HJ, Jeen YT, et al. Esophageal web resolved by endoscopic incision in a patient with Plummer-Vinson syndrome. *Gastrointest Endosc* 2011; 74: 1142-3; https://doi.org/10.1016/j.gie.2011.06.037