

## Plummer-Vinson Syndrome Masking a Gastric Tumour: A Report of a Very Rare Association

A. Alaoui<sup>1\*</sup>, Z. Ztati<sup>1</sup>, O. Zarhouni<sup>1</sup>, O. Nacir<sup>1</sup>, F. Lairani<sup>1</sup>, H. Aouroud<sup>1,2</sup>, A. Ait Errami<sup>1</sup>, S. Oubaha<sup>1,2</sup>, Z. Samlani<sup>1</sup>, K. Krati<sup>1</sup>

<sup>1</sup>Department of Gastroenterology, Mohammed VI University Hospital, Marrakesh, Morocco

<sup>2</sup>Physiology Laboratory, Faculty of Medicine and Pharmacy, Marrakech, Morocco

DOI: <https://doi.org/10.36347/sjmcr.2026.v14i06.054> | Received: 05.05.2026 | Accepted: 15.06.2026 | Published: 22.06.2026

\*Corresponding author: A. Alaoui

Department of Gastroenterology, Mohammed VI University Hospital, Marrakesh, Morocco

### Abstract

### Case Report

Plummer-Vinson syndrome (PVS) is a rare disorder characterized by dysphagia, iron-deficiency anemia, and esophageal webs. Although it is classically associated with upper aerodigestive tract malignancies, its coexistence with gastric cancer is exceptionally rare. We report the case of a 66-year-old man with chronic iron-deficiency anemia who presented with progressive dysphagia, severe asthenia, weight loss, and malnutrition. Laboratory investigations revealed profound microcytic hypochromic anemia with markedly reduced ferritin levels. Upper gastrointestinal endoscopy demonstrated an impassable cervical esophageal web, confirming the diagnosis of PVS. Following endoscopic balloon dilation, further evaluation revealed thickened ulcerated gastric folds in the fundus. Histopathological examination of gastric biopsies showed a moderately differentiated gastric adenocarcinoma without evidence of metastatic disease. After nutritional optimization, the patient underwent total gastrectomy and perioperative chemotherapy, with a favorable outcome at three months of follow-up. This case highlights a very rare association between PVS and gastric adenocarcinoma and underscores the importance of comprehensive gastrointestinal evaluation in patients with persistent iron-deficiency anemia and constitutional symptoms. Early recognition may facilitate timely diagnosis and management of underlying malignancies, potentially improving patient outcomes.

**Keywords:** Plummer-Vinson syndrome, iron-deficiency anemia, dysphagia, esophageal web, gastric adenocarcinoma, gastric cancer, gastrointestinal malignancy, endoscopy.

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## INTRODUCTION

Plummer-Vinson syndrome (PVS) is a rare condition characterised by a triad comprising dysphagia, iron-deficiency anaemia and the presence of an oesophageal membrane. Although this condition is classically associated with oesophageal motor disorders and an increased risk of oesophageal and pharyngeal cancers, its association with gastric tumours is less frequently reported.

This article reports a rare case of SPV associated with gastric adenocarcinoma, along with a review of the literature exploring this exceptional association, focusing on the underlying mechanisms, clinical characteristics and current therapeutic management strategies.

## CASE REPORT

This is a 66-year-old male patient with a history of iron-deficiency anaemia under iron therapy, a chronic smoker (20 pack-years) with occasional alcohol consumption. He has no history of caustic ingestion or chronic acid reflux. He has been complaining for one year of intermittent dysphagia, specifically with solids but not with liquids, associated with a poorly tolerated anaemic syndrome characterised by significant asthenia, exertional dyspnoea, brittle nails and hair loss, with no other associated digestive or extra-digestive symptoms, notably no dysphonia or other oropharyngeal or respiratory signs. All of this is occurring against a background of a profound deterioration in his general condition, characterised by severe asthenia, significant weight loss of 18 kg, and loss of appetite.

On physical examination, the patient was conscious, haemodynamically and respiratorily stable,

**Citation:** A. Alaoui, Z. Ztati, O. Zarhouni, O. Nacir, F. Lairani, H. Aouroud, A. Ait Errami, S. Oubaha, Z. Samlani, K. Krati. Plummer-Vinson Syndrome Masking a Gastric Tumour: A Report of a Very Rare Association. Sch J Med Case Rep, 2026 Jun 14(6): 1551-1555.

an WHO score of 2, a body mass index (BMI) of 17 kg/m<sup>2</sup>, generalised pallor of the skin and mucous membranes, signs of malnutrition such as wasting of subcutaneous fat and muscle, and signs of dehydration such as persistent skin turgor and sunken eyes. Abdominal examination revealed a soft abdomen, no tenderness on palpation, no hepatomegaly or splenomegaly, no palpable mass, and no effusion on abdominal percussion. Examination of the oral cavity and lymph node areas revealed no detectable abnormalities.

Laboratory tests revealed severe anaemia at 8 g/dL (hypochromic microcytic), with ferritin levels plummeted to 5 ng/L; platelet and white blood cell counts were normal. The rest of the follow-up investigations revealed functional renal impairment (urea at 0.78 mg/L and normal creatinine at 11 mg/L), hypokalaemia at 2.9 mmol/L, hypoalbuminaemia at 23 g/L, along with vitamin D and calcium deficiency.

An oesophagogastroduodenoscopy (EGD) was initially performed and revealed the presence of a uniform stricture in the form of an impassable barrier at the level of the cervical oesophagus (**Figure 1**), the histopathological results of the biopsies showed an

oesophageal mucosa consisting of acanthotic squamous epithelium with foci of parakeratosis, with no evidence of dysplasia in the samples taken. An oesophagogastroduodenal (OGD) study confirmed the presence of a diaphragm at the level of the cervical oesophagus, consistent with Plummer-Vinson syndrome (PVS). (**Figure 2**)

The patient subsequently underwent an upper endoscopy with hydraulic balloon dilation using progressive diameters up to 12 mm; follow-up revealed laceration of the stenotic area without any immediate complications. Examination of the stomach also revealed thickened and ulcerated gastric folds at the fundus. (**Figure 3**) The biopsies taken showed findings consistent with a moderately differentiated adenocarcinoma.

Staging investigations had ruled out secondary sites. Following adequate nutritional support and discussion at a multidisciplinary team meeting, the patient underwent total gastrectomy with perioperative chemotherapy, with a favourable clinical outcome at the three-month follow-up after his final course of chemotherapy.



**Figure 1: Upper gastrointestinal endoscopy showing a regular stenosis in the form of an impassable diaphragm at the level of the cervical oesophagus**



**Figure 2: TOG showing a diaphragm at the level of the cervical oesophagus, consistent with SPV syndrome**



**Figure 3: Follow-up ERCP after dilation showing the presence of thickened and ulcerated gastric folds at the fundus**

## DISCUSSION

Plummer-Vinson syndrome, also known as 'Paterson-Brown-Kelly syndrome', was first described in the early<sup>20th</sup> century. It manifests as oesophageal membranes that narrow the upper oesophagus, causing dysphagia, often accompanied by severe iron-deficiency anaemia (Sharma *et al.*, 2019). The anaemia is generally linked to iron deficiency, which results either from malabsorption or from chronic occult bleeding. The oesophageal membranes are mainly observed in the

cervical oesophagus, but they can also be found in other oesophageal segments (Chung *et al.*, 2020).

SPV is often observed in women, particularly those of childbearing age, and is traditionally associated with an increased risk of cancers of the oropharyngeal region, particularly of the oesophagus and oral cavity (Kwon *et al.*, 2021). However, the association between PVS and gastric tumours is not commonly reported, although there are studies suggesting a correlation between chronic iron-deficiency anaemia and an increased risk of gastrointestinal cancers.

The association between Plummer-Vinson syndrome and gastric tumours is a relatively unexplored topic. However, several recent studies highlight that chronic iron-deficiency anaemia, which characterises PVS, may increase the risk of developing digestive cancers, including gastric tumours. A study conducted by Giannini *et al.*, (2021) showed that persistent iron-deficiency anaemia may play a role in gastric carcinogenesis, due to metabolic alterations and oxidative stress induced by low iron availability.

Iron deficiency anaemia is also a risk factor for chronic inflammation, which is a precursor to carcinogenesis in various organs, including the stomach. The hypothesis that chronic inflammation may promote the development of gastric tumours in patients with SPV is supported by a study by Liu *et al.*, (2022), which demonstrated that inflammation associated with nutritional deficiencies can cause genetic mutations in gastric cells, thereby facilitating tumour formation.

The link between IFS and gastric tumours may be mediated by several biological mechanisms. Chronic iron-deficiency anaemia leads to a reduction in the availability of iron, a trace element essential for numerous cellular functions. Iron plays a key role in regulating cell growth and the immune response. When iron becomes deficient, it can disrupt these processes and induce changes in DNA repair mechanisms, thereby increasing the likelihood of mutations and tumour formation (Gao *et al.*,2021).

Furthermore, iron deficiency can promote the production of free radicals, unstable molecules that can damage cells in the gastric mucosa and cause chronic inflammation. This oxidative stress is known to be a key factor in gastric carcinogenesis (Zhang *et al.*,2020). Chronic inflammation induced by iron deficiency could therefore be a contributing factor in the development of gastric tumours in some patients with VPS.

A case report by Ahmed *et al.*, (2020) observed that a patient with SPV had developed gastric cancer following several years of dysphagia and untreated iron-deficiency anaemia. This observation, although rare, suggests a possible link between SPV and gastric tumours, although it is difficult to demonstrate a direct causal relationship. However, further, larger epidemiological studies are needed to better understand this association.

The diagnosis of Plummer-Vinson syndrome is based primarily on the classic triad: dysphagia, iron-deficiency anaemia and oesophageal membranes. Confirmation of PVS requires endoscopic examinations to detect membranes in the oesophagus, as well as blood tests to assess iron levels, ferritin and iron-binding capacity (Margaritis *et al.*,2019).

Treatment of Plummer-Vinson syndrome is primarily based on correcting iron deficiency, usually through oral or intravenous iron supplementation. Endoscopic dilation of oesophageal membranes may also be necessary if they are responsible for dysphagia (Sharma *et al.*,2020). In case where a gastric tumour is detected, comprehensive oncological management is required, often comprising surgical resection, followed by chemotherapy or radiotherapy, depending on the type and stage of the tumour (Kim *et al.*,2021).

## CONCLUSION

Although the association between Plummer-Vinson syndrome and gastric tumours is rare, it raises important questions regarding the underlying mechanisms of gastric carcinogenesis in the context of chronic iron-deficiency anaemia. Iron deficiency anaemia associated with PVS may induce oxidative stress and chronic inflammation, creating an environment conducive to the development of gastric tumours.

Further epidemiological studies are needed to better understand this association and assess the specific risks for patients with Plummer-Vinson syndrome. In the meantime, rigorous clinical monitoring is recommended for these patients, with particular attention to the early detection of gastric tumours.

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