Iron Supplementation Improved Dysphagia Related to Plummer–Vinson Syndrome

To the editor;

Plummer–Vinson syndrome (PVS) is characterized by dysphagia with esophageal web, glossitis, angular stomatitis, and iron-deficiency anemia and is associated with increased frequency of cancer of the alimentary tract. Therefore, treatment of the symptoms related to PVS and precise evaluation of the upper gastrointestinal tract are essential in PVS.

A 59-year-old woman was referred to our hospital in September 2012 because of an abnormal shadow on chest X-ray; she complained of dysphagia, from which she had suffered for the previous two decades. Computed tomography revealed a tumor in the right upper lung, and an esophagogram indicated the presence of web in the proximal esophagus (Fig. 1A). The esophageal web, located between the hypo-pharynx and esophagus, precluded the use of endoscopy (Fig. 1B). The results of a complete blood analysis at the first visit indicated a hemoglobin (Hb) level of 8.5 g/dL, a hematocrit of 29.4%, a mean corpuscular volume of 60.4 fl, and a ferritin level of less than 4 ng/mL, which suggested iron-deficiency anemia. The patient also had angular stomatitis and koilonychias. Nothing in the patient’s history suggested a cause for the anemia, e.g., melena and metrorrhagia. The patient had never been a smoker. On the basis of these symptoms, PVS was diagnosed. Because gastrointestinal endoscopy was not possible in this patient, we used positron emission tomography (PET) and an upper gastrointestinal series, including esophagography, to investigate the gastrointestinal tract for the presence of cancer. The results established that there was no additional malignant tumor other than that in the right lung. Preoperatively, we administered a fine granular oral iron supplement to treat the iron-deficiency anemia. In October 2012, video-assisted upper lobectomy of the right lung and lymph node dissection were performed without blood transfusion.

The patient opted for conservative treatment for dysphagia, rather than endoscopic intervention, and iron supplementation was continued for iron-deficiency anemia. Six months later, follow-up examinations found that the patient’s body weight had increased by 5 kg, Hb levels had recovered to 14.7 g/dL, and an esophagogram demonstrated that the esophageal web had improved (Fig. 2). Amelioration of the esophageal web meant that a gastrointestinal endoscope could pass through the web and we could confirm that there was no lesion beyond the esophageal web. The dysphagia caused by PVS has been much improved for the 2 years and 5 months since surgery.

There are two approaches to the treatment of esophageal web: the first is iron supplementation and the second is endoscopic intervention. Endoscopic intervention includes balloon dilation, incision, and bougie dilation and is applied in cases refractory to iron supplementation. Moreover, several reports have indicated that iron deficiency in PVS patients may be caused not only by morphological obstruction such as web, but also by functional disorder of the esophagus. Dantas et al. reported that manometric examination showed low-amplitude contractions and high intrabolus pressure in a PVS patient. After iron supplementation, the amplitude of contraction in their patient increased and the intrabolus pressure decreased. However, it is not known why iron supplementation improves esophageal peristalsis and dysphagia in PVS patients. In the present case, Hb levels increased by 73% after iron supplementation. Because Hb is a scavenger of nitric oxide (NO), and NO plays a key role in lower esophageal sphincter relaxation and esophageal peristalsis, improved homeostasis of NO (one of nonadrenergic noncholinergic neurotransmitter) after iron supplementation may have contributed to the improvement in peristalsis. Some reports have shown that Hb can alter smooth muscle function because of its ability to bind NO. Stamler et al. suggested that physiological oxygen gradient in tissues is accompanied by an allosteric transition in S-nitrosohemoglobin that releases NO. In other words, in hypoxic tissue, NO is released from the thiols in Hb.

We obtained the informed consent from the patient for publication on a medical journal.
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may play a key role in the smooth muscle of the esophagus. In the present case, correction of the Hb level by iron supplementation may have resulted in recovery of esophageal peristalsis and amelioration of dysphagia.

A previous study suggested that cancers of the alimentary tract occur in 3%–16% of patients with esophageal web and iron deficiency anemia. Surveillance of the upper gastrointestinal tract is recommended in PVS patients. However, in the current patient, a gastrointestinal endoscope could not pass through the esophagus because of the web. Therefore, we instead ruled out esophageal and gastric cancer by a combination of upper gastrointestinal series and PET. We could establish that there was no gastrointestinal cause for the advanced anemia, thus, the strategy employed proved to be a suitable option.

We demonstrated the efficacy of treating PVS with iron supplementation and evaluation of the alimentary tract using PET and X-ray imaging. Iron supplementation potentially has a pivotal role in the management of dysphagia caused by PVS. The combination of PET and upper gastrointestinal series can substitute for an upper gastrointestinal endoscopic examination, especially when esophageal web prevents endoscopy from being used.

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The authors declare that no conflicts of interest exist.

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Fig. 2 Esophagogram with barium at follow-up 6 months after commencement of iron supplementation showed amelioration of the esophageal web.