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Evaluation Of Plummer-Vinson Syndrome in Pediatric Patients with Dysphagia

Disfaji Olan Çocuk Hastalarda Plummer-Vinson Sendromunun Değerlendirilmesi

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Abstract

Objective: In our study, after excluding all other causes of dysphagia in the pediatric age, we tried to present the patients who were followed up and treated with the diagnosis of Plummer-Vinson syndrome (PWS) with iron deficiency anemia and dysphagia. Our aim is to emphasize that there may be dysphagia that can only be cured with anemia treatment and that it can be improved with treatment by a pediatrician.

Materials and Methods: Pediatric patients who applied to our hospital with the complaint of dysphagia between May 2019-November 2020 were included in the study. After excluding all other causes of dysphagia, patients diagnosed with PWS were evaluated retrospectively. It was aimed to evaluate the age, gender, type, characteristics and duration of dysphagia of the patients retrospectively and to present them in the light of the literature.

Results: PWS was detected in 24 of 200 pediatric patients who presented with dysphagia. The proportion of male patients was 37.5%, and their mean age was 97 months. The mean duration of dysphagia complaints was 11.2 months. Four patients had difficulty swallowing liquid food only, 12 patients had solid swallowing difficulties, and 8 patients had difficulty swallowing both solid and liquid food. Anemia was diagnosed by performing a complete blood count and having hemoglobin and hematocrit levels below 2 standard deviations appropriate for age; Those with vitamin B12 levels below 200 pg/ml were defined as cobalamin deficiency. Esophageal web was detected in 4 patients who underwent contrast esophagography. In esophagogastroduodensoscopy, stenosis was treated endoscopically in patients with web. In 20 patients, dysphagia did not persist after six months of iron deficiency anemia treatment.

Conclusion: Although the diagnosis of PVS is rare in children, it should be considered and treated in all children with dysphagia associated with iron deficiency anemia. Patients whose complaints continue after treatment at the appropriate dose and duration should be referred for pediatric gastroenterology evaluation.

Keywords: Child; Plummer-Vinson Syndrome; Iron-Deficiency Anemia; Esophageal Web, Dysafgia.

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Öz

Amaç: Disfaji çocukluk çağında sık görülmeye başlanmakta ve birçok nedene bağı olarak gelişmektedir. Çalışmamızda pediatrik çağda disfajinin diğer tüm nedenleri dışlandıktan sonra demir eksikliği anemisi disfaji olan Plummer-Vinson sendromu tanısı ile takip ve tedavi edilen hastalar sunulmaya çalışılmıştır. Amacımız sadece anemi tedavisi ile düzelebilecek disfaji olabileceğini ve çocuk sağlığı ve hastalıkları uzmanı tarafından tedavi ile düzelebileceğini vurgulamaktır.

Gereç ve Yöntemler: Hastanemizde Mayıs 2019 ve Kasım 2020 arasında disfaji şikayeti ile başvuran, disfajinin diğer tüm nedenleri dışlandıktan sonra Plummer-Vinson sendromu tanısı alan hastalar retrospektif olarak değerlendirildi. Hastaların yaş, cinsiyet, disfaji şekli, özelliği ve süresi retrospektif olarak değerlendirilerek literatür eşliğinde sunmak amaçlanmıştır.

Bulgular: Disfaji şikayetiyle başvuran 200 çocuk hastanın 24'ünde PWS saptandı. Hastaların %37,5'u erkek olup, ortalama yaşları 97,5 aydı. Hastaların disfaji şikayet süresi ortalama 11,2 ay olup, 4 hastanın sadece sıvı gıda yutmada zorlanması varken 12 hastada katı, 8 hastada hem katı hem sıvıya karşı yutma güçlüğü mevcuttu. Tam kan sayımı yapılarak ve hemoglobin, hematokrit düzeyleri yaşa uygun 2 standart sapma değerinin altında olanlar anemi; vitamin B12 düzeyi 200 pg/ml değerinin altında olanlar kobalamin eksikliği olarak tanımlandı. Kontraslı özofagografi çekilen 4 hastada özofageal web saptandı. Web saptanan hastaların özofagogastroduodensokopide darlık endoskopik olarak tedavi edildi. Yirmi hastada ise altı aylık demir eksikliği anemi tedavisi sonrası yutma güçlüğünün devam etmediği görüldü.

Sonuç: PVS tanısı çocuklarda nadir görülsede, demir eksikliği anemisi ile ilişkili yutma güçlüğü çeken tüm çocuklarda akla gelmeli ve tedavisi verilmelidir. Uygun dozda ve sürede tedavi sonrası şikayeti devam eden hastalar çocuk gastroenteroloji değerlendirmesi için yönlendirilmelidir.

Anahtar Kelimeler: Çocuk; Disfaji, Plummer-Vinson Sendromu; Özofageal Web; Demir Eksikliği Anemisi.

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Introduction

Swallowing is a complex situation that is possible with the coordinated work of many structures. Difficulty in swallowing is a symptom that occurs as a result of mechanical inhibition of the transfer of food from the mouth to the stomach, decreased strength of the muscles that provide the swallowing movement, or deterioration of coordination. Plummer-Vinson syndrome (PVS) is a tirade characterized by dysphagia, upper esophageal web, and iron deficiency anemia. There is no definitive data on its incidence and prevalence in the literature; only case reports have been published and it is very rare in childhood (1,2). The incidence of PVS has decreased due to the improvement of nutritional status with early detection and treatment of iron deficiency. Dysphagia is usually limited to solids and is intermittent or progressive over years. The esophageal webs are thin and transverse, extending into the esophageal lumen. They can be single or multiple. Esophageal web is not always necessary in patients with iron deficiency in PVS, but dysphagia is always necessary for diagnosis (3).

Materials and Methods

In the study, 200 pediatric patients who applied to the Pediatric Gastroenterology outpatient clinic of Adana City Training and Research Hospital between May 2019 and November 2020 with the complaint of dysphagia were evaluated. The age, gender, type, characteristics and duration of dysphagia of the patients were evaluated. Hemogram, serum iron, iron binding capacity, ferritin were measured for iron deficiency anemia, and vitamin B12 level for concomitant vitamin B12 deficiency. Barium esophagography was performed to detect anatomical abnormalities. Non-web anatomical diseases were excluded from the study. May cause esophageal web; Other causes such as infectious citricides, corrosive burns, and heterotropic gastric mucosa were excluded from the study. To determine the cause of anemia, esophagogastroduodenoscopy was performed and biopsies were taken from the duodenum and stomach. Oral iron supplementation was given for at least 3 months to correct anemia and iron stores. All patients were instructed to follow up regularly after 3 months or if dysphagia recurred. All data were evaluated retrospectively in the light of the available literature. The study was approved by the scientific research ethics committee of our university. (approval date: 17.08.2023, meeting number:133, decision no:2772).

Statistical Analysis

Parametric descriptive statistics of the numerical data in the study group were calculated as mean, standard deviation, and median (min-max) of non-parametric data, and categorical data were given as percent (%). The limit of significance was accepted as $p<0.05$.

Results

PWS was detected in 24 of 200 children who presented with dysphagia, after all other causes were excluded. In our study, the rate of male patients was 37.5% and female patient was 62.5%; their average age is 97 months; The mean duration of dysphagia complaint was 11 months. The shortest complaint period was 1 month and the longest 48 months. According to the dysphagia types, the patients were divided into three different groups including solid and liquid both types. Solid food group consisted of 12 cases, liquid food group consisted of 4 cases, and solid-liquid food group consisted of 8 cases. The characteristics of the patients according to the groups are shown in Table 1.

Complete blood count was performed, and those with hemoglobin and hematocrit levels below 2 standard deviations appropriate for age were accepted as anemia. Those with vitamin B12 levels below 200 pg/ml were defined as cobalamin deficiency. Vitamin B12 deficiency was accompanying in 3.5% of 24 patients with iron deficiency. Contrast esophagography was performed in 79% of 24 cases with PVS, and esophageal web was detected in 4 cases. Esophagogastroduodenoscopy was performed in 14 patients (58.3%) whose dysphagia was accompanied by anemia, for the diagnosis and treatment of webi, to exclude helicobacter pylori gastritis and pernicious anemia that may cause anemia. The web was shown by performing esophagogastroduodenoscopy in 4 patients with web. During the procedure, the stenosis was expanded endoscopically. There was slight bleeding due to the procedure, no other complications developed. Iron deficiency anemia treatment was started in the cases, and vitamin B12 treatment was started in the cases with vitamin B12 deficiency, and they were followed up for 6 months with 3-month intervals. After six months of

iron deficiency anemia treatment, the patients were excluded from follow-up, as it was observed that the dysphagia did not continue. PVS cases with web detected continued to be followed up with pediatric surgery.

Table 1.

Demographic And Clinical Features of Patients by Groups.

	Solid dysphagia	Liquıd dysphagia	Solid and Liquıd dysphagia
Gender	10 F/ 2M	2 F/ 2 M	2 F/ 6 E
Average age	119 month	45.5 month	115 month
Contrast esophagography	9 patient	3 patient	7 patient
Esophagogastroduodenoscopy	9 patient	3 patient	2 patient

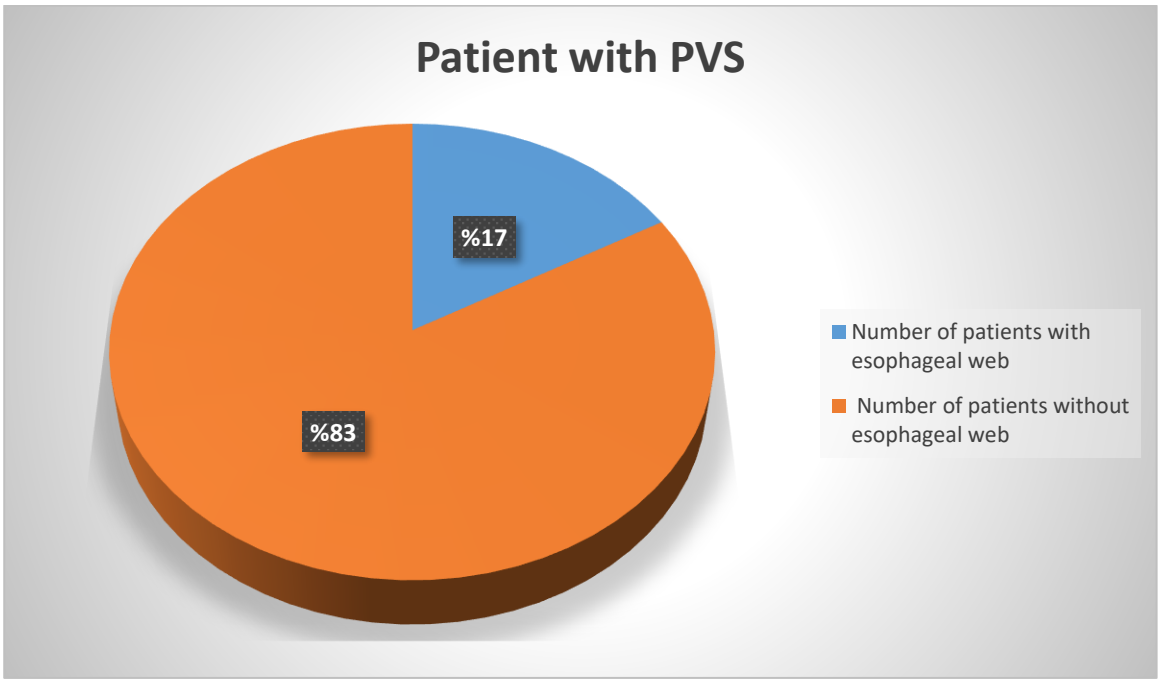

Figure 1. Distribution of pediatric patients with Plummer-Vinson syndrome according to webs.

Discussion

Plummer-Vinson syndrome (PVS) was first described by Henry Stanley Plummer in 1912 as upper esophageal spasms without anatomical stenosis. Surgeon Porter Paisley Vinso defined it in 1919 as dysphagia caused by esophageal stricture that can be treated surgically. In the United Kingdom; After Donal Ross Paterson described the esophageal web and dysphagia, Adam Brown-Kelly defined the classic triad of the syndrome. Therefore, this clinical syndrome is known as Plummer-Vinson syndrome in the USA and Paterson-Brown-Kelly syndrome in the UK (4). Plummer-Vinson syndrome (PVS) is a clinical condition characterized by dysphagia, upper esophageal web and iron deficiency anemia (5, 6). Webs, which are a rare cause of upper cervical dysphagia in children, are seen in 5-15% of patients with dysphagia (7). esophageal web; It is a thin

mucosal membrane localized just below the cricopharyngeal muscle, consisting of mucosa and submucosal tissue in the cervical esophagus, usually asymmetrically adherent to the anterior esophageal wall (8). Although most (89%) patients with inflammatory infiltrating PVS at biopsy were female in the adult literature (9). In our study, unlike the literature, female cases were more common than males (M: 37.5% F: 62.5%). The mean age of the cases was 97.5 months, and the mean duration of dysphagia complaints was 11 months. The shortest duration of the complaint was 1 month. There were also cases whose complaints lasted up to 48 months. Dysphagia in PVS is especially related to solid foods and in most cases it is painless, intermittent or progressive, but in some cases it can be progressive from solid food to liquid food (2, 10). In our study, the cases were divided into three different groups according to the dysphagia types as solid, liquid and both types. Contrast-enhanced radiographs could not be taken in 1 case in the liquid food dysphagia group, in 3 cases in the solid food dysphagia group, and in 1 case in both types of dysphagia group. When the groups were compared according to the results of esophagogastroduodenoscopy, no difference was observed. Esophagogastroduodenoscopy was not performed in 3 cases in the solid food dysphagia group, in 1 case in the liquid food dysphagia group, and 6 cases in the solid-liquid dysphagia group due to family preference. When the mean ages of the groups were compared, no statistically significant difference was found. Because the mean age of the solid and solid-liquid dysphagia groups was approximately the same. However, although the mean age in the liquid food dysphagia group was significantly younger than the other two groups, there was no statistically significant difference due to the small number of patients. Webs may be more than one, if the lumen diameter is narrower than 2 cm, dysphagia is observed, therefore most of them are asymptomatic (11). All the webs we detected in our study were odd in number and narrowed the esophageal lumen by approximately 80%. Accordingly, patients with web had difficulty in swallowing due to both solid and liquid food. In addition to dysphagia, weakness, fatigue, pallor, palpitation, glossitis, scoop nail, dyspepsia, weight loss, hoarseness, atrophic gastritis may accompany anemia. All of the cases in our study had normal body weight and height. However, other physical examination findings of the patients could not be accessed because they were not recorded in the computer system. This was the missing aspect of our study and shed light on future studies. The etiopathogenesis of PVS is unclear; Many genetic, environmental, nutritional, immunological and infectious causes are thought to play a role. The iron deficiency theory is based on the assumption that the decrease in iron-dependent oxidative enzymes gradually leads to atrophy and myopathy of the pharyngeal muscles and mucosa, resulting in the development of webs. Despite the persistence of webs after iron treatment, normalization of esophageal motility and improvement of dysphagia support the theory. However, it cannot explain why webs originating from squamous epithelium secondary to fibrosis due to submucosal inflammation are in the hypopharyngeal proximal esophagus.

Whatever the cause, iron deficiency causes rapid losses of iron-dependent enzymes due to high cell turnover. The reduction of these enzymes can lead to mucosal degenerations, atrophic changes and web formation, and even the development of cancer in the upper gastrointestinal tract (12). Studies have shown that iron deficiency leads to motility disorder by reducing the amplitude of contraction of the esophageal muscle (11, 13). In the study of Miranda and Dantas, the esophageal transit time of patients with iron deficiency anemia was slower in the proximal and middle parts of the esophagus than in normal healthy individuals, while no difference was found in the distal esophagus. This theory may explain why webs form in the proximal esophagus (14). Motility studies, especially manometry studies used to evaluate esophageal motility, are not easy to apply in children. For successful swallowing during monometry, it is necessary to be in harmony with the commands of the practitioner and a very good cooperation. It is very difficult to achieve this in childhood, especially in children younger than 7 years old. On the other hand, the number of experienced centers that can perform pediatric motility studies is insufficient. In our study, the rate of patients older than 7 years was 41.6% and motility studies were not performed in our center. Our study is important in terms of showing that there is a need for larger multicenter studies with a larger number of cases, including motility studies, with this missing aspect. Another proposed theory is that there is an immunological process that triggers the formation of autoantibodies against the esophagus (11). PVS; Some autoimmune disorders such as rheumatoid arthritis, systemic lupus erythematosus, Sjögren's syndrome, pernicious anemia, thyroiditis or celiac disease should be investigated (15, 16, 17). It is unclear whether these autoimmune disorders cause PVS through autoantibody production or due to the inflammatory process and iron chelation (18). In our study, tauride tests and celiac antibodies, which were used to evaluate other diseases that may cause dysphagia, were found to be normal. Gastric biopsy samples taken during esophagogastroduodenoscopy were not compatible with pernicious

anemia. However, it was not evaluated because other specific findings of autoimmune diseases such as rheumatoid arthritis, systemic lupus erythematosus, and Sjögren's syndrome did not accompany the cases. The diagnosis is clinically made with dysphagia associated with chronic iron deficiency anemia, and esophageal webs are observed only in 10% of patients radiologically and endoscopically. Esophageal web is not always necessary in patients with iron deficiency in PVS, but dysphagia is always necessary for diagnosis (3).

Contrast-enhanced radiographs are important in the diagnosis of PWS, especially in showing webs on lateral images (19, 20). In severe cases, a ring-shaped stenosis may occur even if barium esophagography is normal. In 1975 Nosher JL. et al. In his study, when the proximal esophagus was evaluated in 1000 radiographs, 1 or more webs were found in 5.5% of the esophagus (21). In the 1974 study of Chisholm M. et al. only 10% of patients with iron deficiency anemia reported esophageal mesh. In our study, web was detected in 17% of 24 PVS cases, which is similar to the literature. However, web was detected in only 2% of 200 children who presented with dysphagia. Barium radiographs, especially upper esophageal anomalies, are difficult to evaluate. Because studies on swallowing in childhood are difficult due to coordination problems. However, the number of experienced teams to evaluate barium radiographs during serial shooting is insufficient. We think that the rate of web detection will increase when appropriate conditions are met.

Webs can also be detected by upper endoscopy. Upper esophageal webs can be easily overlooked in endoscopic examination, and there is a risk of perforation. Iron deficiency anemia was found in 38.5% of 135 patients with web detected by esophagogastroduodenoscopy, and low serum ferritin levels were found in 0.7% without anemia (22). Our study was similar to that of Godino et al. In our study, esophagogastroduodenoscopy was performed in 58.3% of the cases. In 4 of 14 patients who underwent esophagogastroduodenoscopy, the web, which was also detected in contrast-enhanced radiography, was shown and treated. Treatment options include iron supplementation, esophageal dilation, or both. Iron therapy should be continued until hematocrit and ferritin levels return to normal. This treatment provides significant improvement in dysphagia in patients who are not completely obstructive. Clinical studies have shown that iron intake also improves esophageal motility in these patients. However, patients with severe and prolonged dysphagia do not respond to iron support and generally require mechanical dilation of the stenosis, and surgical treatment is very rarely required (23, 24, 25). In pediatric patients, 93% of PVS patients require an upper endoscopy and 64% require endoscopic expansion. It shows that the response to iron treatment is lower than adults. In many cases, unlike adults, a single dilatation procedure is sufficient (26). In a three-year study of 37 patients with PVS, 94% of symptomatic patients showed resolution of dysphagia after 1 endoscopic dilatation. 10% recurrence was observed in the ten-month follow-up (27). In another study, 1 session of Savary-Gilliard bougie dilatation was performed in 153 patients, 132 of whom had PVS, and it was observed that dysphagia did not continue in 90.7% of the patients (28). In our study, 3% iron deficiency anemia, 6.5% vitamin B12 deficiency, 6% iron deficiency and vitamin B12 deficiency were found in 200 pediatric patients with dysphagia. A single session of endoscopic dilatation was performed together with iron treatment in 4 patients in whom we detected web, and only slight bleeding was observed. Other PVS cases without web did not complain of dysphagia after 3-6 months of iron deficiency treatment.

In conclusion; Dysphagia started to be seen frequently in childhood and develops due to many reasons. The diagnosis of PVS is rare in children, but it should be considered in all children with dysphagia associated with iron deficiency anemia. Patients with dysphagia, whose complaints persist despite 6 months of treatment, should be referred to pediatric gastroenterology.

Ethics Committee Approval: The study was approved by the Adana City Training And Research Hospital Clinical Research Ethics Committee (date: 17.08.2023 and approval number: 133/2772).

Informed Consent: Written consent was obtained from the participants.

Conflict of Interest: Authors declared no conflict of interest.

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