Case Report

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Incidentally Diagnosed Duodenal Web in Infancy

영아기에 우연히 진단된 십이지장 격막

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A duodenal web is an incomplete diaphragm of the duodenal lumen that causes a partial or (intermittent) complete obstruction. The size of a duodenal web's aperture determines the degree of obstruction, age at presentation, and radiologic findings. We report a case of duodenal web incidentally diagnosed in a 14-month-old boy who presented to the hospital after ingesting a foreign body. We provide a comprehensive report of multiple studies through abdominal radiograph, upper gastrointestinal study, endoscopy, and surgical findings. We emphasize that the duodenum should be considered as the location of the obstruction when infants exhibit delayed discharge or dynamic positioning of a foreign body in a radiologic examination.

Index terms Duodenum; Upper Gastrointestinal Tract; Foreign Bodies

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INTRODUCTION

A duodenal web is an incomplete diaphragm of the duodenal lumen and can cause partial or (intermittent) complete obstruction. It is usually diagnosed in the neonatal period. However, the degree of obstruction, age of presentation, and image findings depend on the size of the aperture of the web (1). We report a case of duodenal web incidentally diagnosed in a 14-month-old boy who presented to the hospital after ingesting a foreign body. We tried to determine the exact location of the ingested foreign body, and in the process, duodenal web was incidentally confirmed.

CASE REPORT

A 14-month-old boy was referred to our institution after he had ingested a foreign body. The patient was born by normal spontaneous vaginal delivery at 39 weeks gestation. The patient had three episodes of vomiting that lasted several days after transitioning to solid feeding. There were no additional symptoms except for a nonspecific

habit of ingesting random objects. On this occasion, he visited a local clinic after vomiting a balloon, and there was a suspicion that he had ingested other objects. An abdominal radiograph revealed a 15 mm-metallic bolt in right upper quadrant (RUQ) of his abdomen. After 5 days, he was transferred to our facility for removal of the bolt. The patient's abdomen was soft and non-tender without signs of peritonitis when he was admitted. We presumed that the bolt had passed the pyloric canal due to probable ingestion time and its location in the RUQ. However, the supine abdominal radiograph taken on the day of admission indicated that the bolt had moved to the left upper quadrant (LUQ) of the abdomen (Fig. 1A). Both cross-table lateral and left lateral decubitus views were also obtained, and the bolt's position changed widely, from the anterior to the posterior abdomen (Fig. 1B, C). On the second day of admission, the bolt had moved to the RUQ of the abdomen again (Fig. 1D). We presumed that the foreign body was still located in the stomach; therefore, endoscopy was performed to remove the bolt on the third day of admission. Endoscopy (GIF-Q260; Olympus Corporation, Tokyo, Japan) revealed a markedly dilated duodenum containing a large variety and amount of ingested food. Some of the ingested food, along with a small circular plastic sticker and a piece of thin vinyl plastic, were removed. When the endoscope was advanced distally, a blind pouch made up of normal mucosa was located at the most distal portion of the dilated duodenum. The pouch had a small opening in its central portion (Fig. 1E). The opening was too small for an endoscope to pass. The bolt was initially detected in the distended duodenum but disappeared from view and could not be traced. An abdominal radiograph taken after the endoscope showed the bolt at the previously identified location. And then on the same day, an upper gastrointestinal (UGI) study was performed to localize the bolt and evaluate the distal bowel loops. The UGI study demonstrated incomplete duodenal obstruction with markedly distended first and second portions of the duodenum. A curvilinear radiolucent rim demonstrated a windsock appearance at the distal portion of the distended duodenum (Fig. 1F). This was compatible with a duodenal web. The duodenojejunal junction was normally positioned at the LUQ of the abdomen, and passage of the contrast medium into the distal duodenum and jejunum was noted. The patient was then transferred to another hospital for open duodenoplasty. An incomplete duodenal web was found in the second portion 2 cm above the ampulla of Vater. After the removal of multiple foreign bodies (a bolt and toys) and food residue, web excision and duodenoplasty were performed.

The submission of this report for publication was approved by the Institutional Review Board of our institution, and the requirement for informed consent was waived (IRB No. 2020-07-027).

DISCUSSION

Duodenal atresia is a rare anomaly with an incidence of one in 5000–10000 live births (2). The duodenum is temporarily obliterated in the fifth to twelfth weeks of gestation due to epithelial cell proliferation. When the epithelial cells degenerate, vacuolation occurs and the duodenum is recanalized. If the vacuolation process were to be defective, congenital atresia of the duodenal lumen would occur.

Periampullary web is an important variant of the duodenal atresia spectrum, which proj-

Fig. 1. A 14 months old boy with duodenal web.
A. On the day of admission, the location of the metallic bolt has changed to the left upper quadrant on supine abdominal radiograph.
B. On the day of admission, the location of the metallic bolt is in the midline of the abdomen in the left lateral decubitus view.
C. On the day of admission, the metallic bolt is located in the posterior abdomen in the left cross-table lateral view (left) and in the anterior abdomen in the left cross-table lateral view.

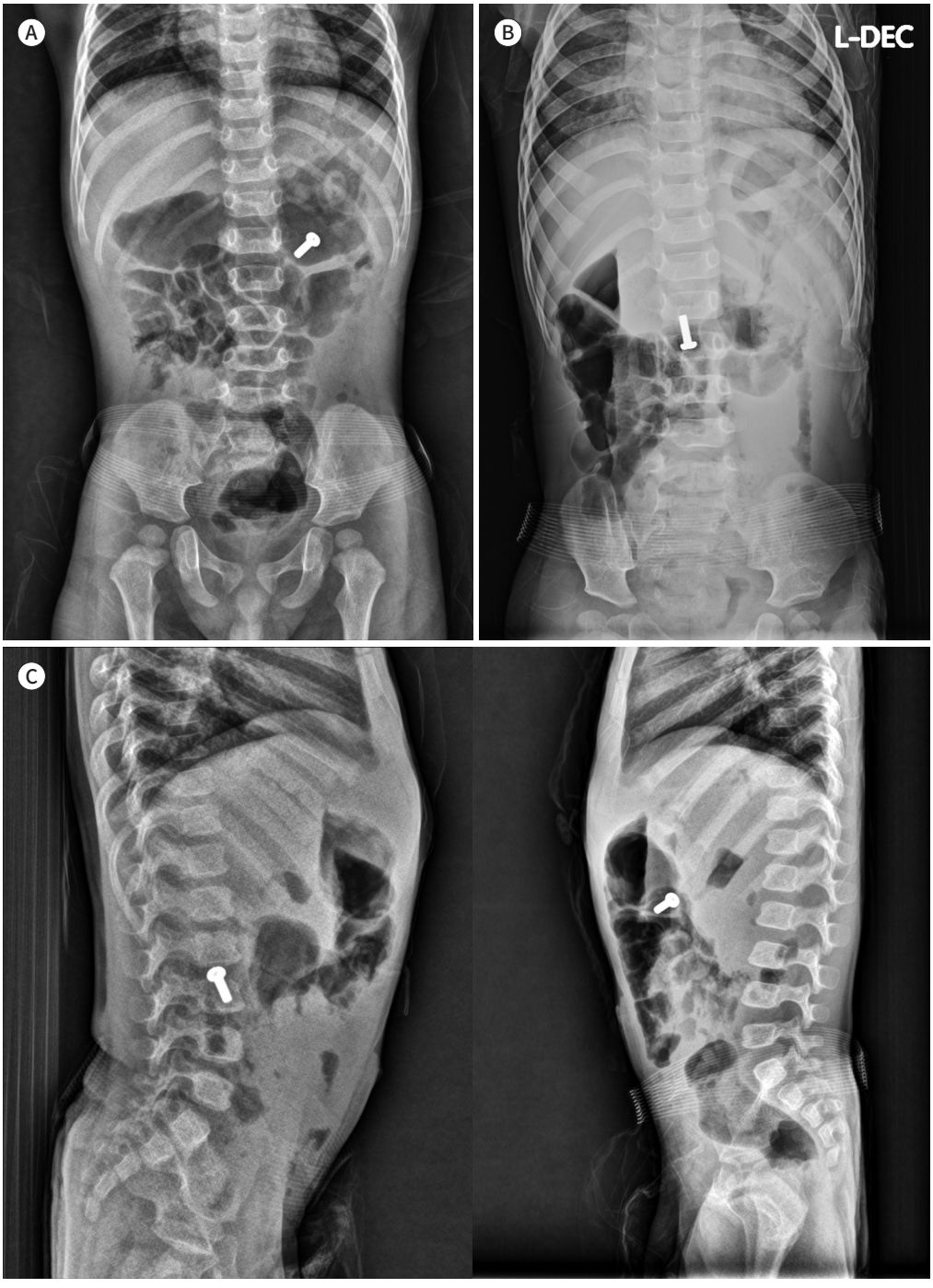
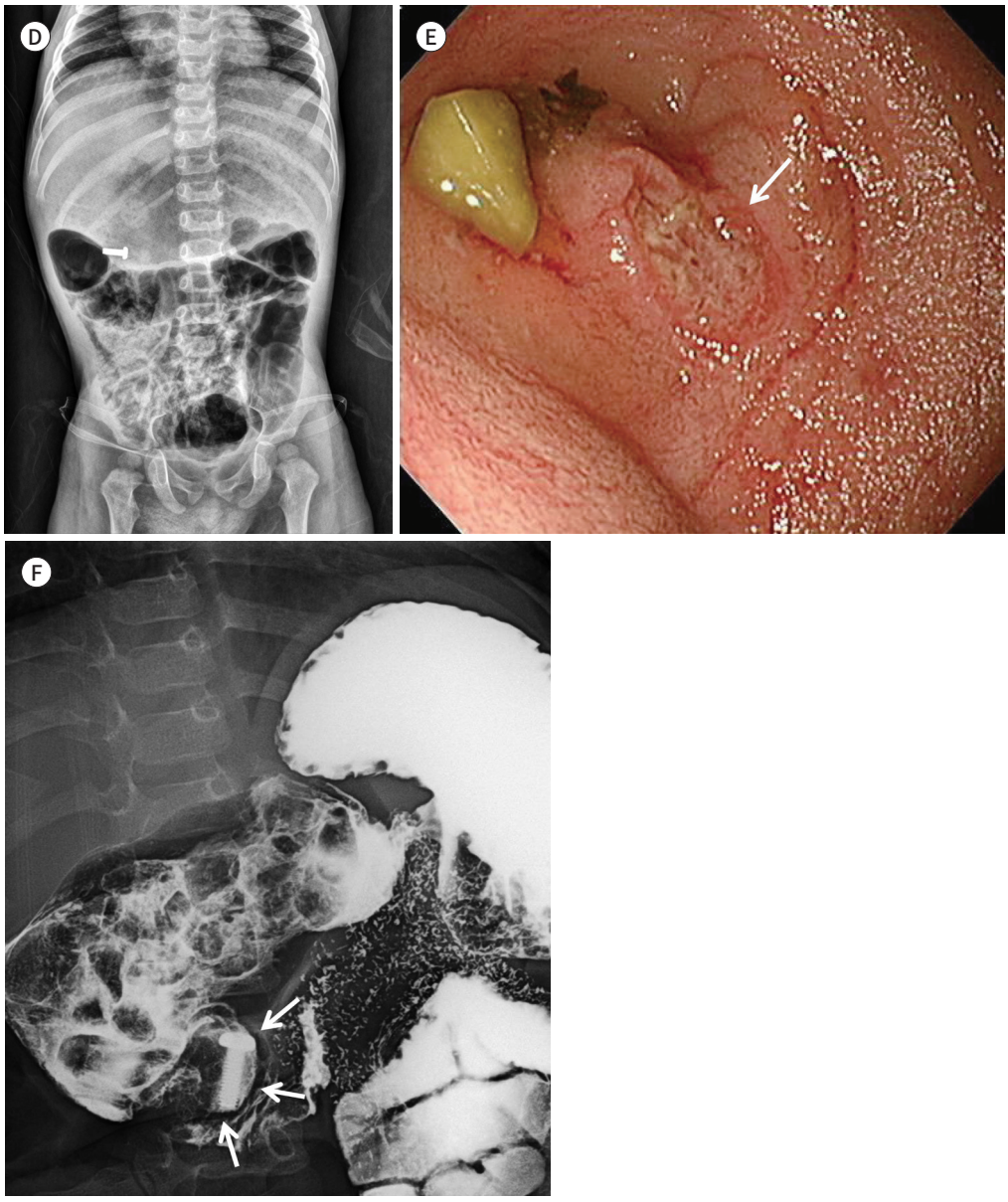


Fig. 1. A 14 months old boy with duodenal web.
D. On the second day of admission, the location of the metallic bolt has changed to the right upper quadrant on supine abdominal radiograph.
E. Endoscopy on the third day of admission shows a blind pouch with erosive mucosa and a small opening (arrow) in the duodenum.
F. The upper gastrointestinal study on the third day of admission shows incomplete duodenal obstruction with a markedly dilated proximal duodenum that contains the bolt. A radiolucent rim is seen distal to the dilated duodenum (arrows), which is characteristic of a duodenal web.



ects distally into the duodenal or jejunal lumen, forming a "windsock" deformity (3). It is common for a periampullary web to be undetected during early infant stage because the fenestrated web allows distal passage of the duodenal contents and may not produce symptoms. The size of a duodenal web's aperture determines the degree of obstruction, age of presentation, and image findings. Early symptoms include feeding intolerance and emesis.

Nausea, abdominal pain, progressive emesis, and acute pancreatitis are typical symptoms reported in a post-childhood clinical presentation (1, 4).

A duodenal web with complete duodenal obstruction yields the typical "double-bubble sign" on an abdominal radiograph. Unlike a complete duodenal obstruction, an incomplete obstruction is evidenced by distal gas in the small or large intestine on abdominal radiograph.

A UGI study is useful for evaluating the location and type of duodenal web. The typical UGI findings of a duodenal web are a short transverse segment filling defect in the descending duodenum associated with proximal dilatation–the "windsock" sign (5, 6). US shows a fluid-filled, dilated proximal duodenum with an echogenic curvilinear band. Endoscopy shows a distended duodenum with membranous stenosis at, or just distal to the ampulla. The differential diagnosis for infants with suspected incomplete obstruction at the duodenal level includes a fenestrated web, volvulus secondary to malrotation, preduodenal portal vein, and annular pancreas.

Yeom et al. (7), in 2005, reported an incomplete duodenal web in a 13-month-old girl who presented with hematemesis. They tried to find the bleeding focus, and the child underwent abdominal radiographs as the first-line investigation for bleeding, and there was a round foreign body located in the RUQ. A UGI endoscopy was performed to remove the foreign body, and a blind pouch was incidentally found at the post-bulbar portion of duodenum.

Recognition of the exact location of the ingested foreign body is important for determining the management plan. In our case, the location of the foreign body was misjudged to be a distended stomach because of the wide range of movement of the foreign body. A retrospective approach revealed that the retroperitoneal location of the duodenum effected various positions of the foreign body. The first portion of duodenum runs posterosuperiorly on the transpyloric plane and has large space when it becomes fully distended. If the bolt was in the stomach, it would have been seen in the left abdomen rather than in the midline on the left lateral decubitus view (Fig. 1B). Additionally, an air-fluid level on the right side of the stomach was caused by the distended duodenum. We did not suspect duodenal obstruction because of the absence of the classic "double-bubble" sign and the presence of air density in the distal bowel on the abdominal radiographs. Duodenal webs allow for the passage of air distal to the obstruction and a less dramatic "double-bubble" sign. The retention of ingested foreign body within the duodenum is suggestive of partial obstruction, frequently of congenital origin (8).

The endoscope did not precisely localize the foreign body because it was placed in the dependent portion of the enlarged duodenum, which was a blind spot of the endoscopic view. Thus, the clinician thought that the foreign body was located between the duodenal web and a stenotic segment in the proximal jejunum. However, the UGI study revealed the duodenal web with a windsock appearance with a markedly distended proximal duodenum containing the bolt. The treatment of choice for duodenal web is surgical or endoscopic repair. The duodenal web is excised through a longitudinal duodenotomy. The ampulla of Vater must be identified before duodenal web excision to avoid injury. Closure of the longitudinal duodenotomy is performed transversely to avoid narrowing of the duodenum (3). For our patient, open duodenotomy, web excision, and duodenoplasty were performed.

In our patient, the location of the obstruction was misjudged to be the stomach, hence the diagnosis of duodenal web was delayed. Therefore, the duodenal webs should be taken into consideration when a foreign body does not pass through the gastrointestinal tract and its position varies widely.

Author Contributions

Investigation, all authors; supervision, H.B.H., P.K.Y.; visualization, K.S.Y., H.B.H., W.D.H.; writing—original draft, K.S.Y., H.B.H.; and writing—review & editing, all authors.

Conflicts of Interest

The authors have no potential conflicts of interest to disclose.

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영아기에 우연히 진단된 십이지장 격막

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십이지장 격막은 십이지장 관강 내의 불완전한 막으로 부분폐쇄 또는 간헐적인 완전 폐쇄를 일으킨다. 격막의 개구부 크기에 따라 폐쇄의 정도, 증상이 나타나는 시기, 영상의학적 소견이 다르다. 저자들은 이물질 섭취를 주소로 내원한 14개월 남아에서 우연히 진단된 십이지장 격막 증례를 보고하고자 한다. 복부 방사선 촬영, 상부 위장관조영술, 내시경, 수술 소견들을 종합하여 기술하였다. 저자들은 영아기에 섭취한 이물질의 배출이 지연되고 영상의학적 검사에서 이물질의 위치가 다양하게 변화할 경우, 폐쇄 위치로 십이지장을 고려해야 한다는 사실을 강조한다.

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