International Journal of Medical and Pharmaceutical Research

Online ISSN-2958-3683 | Print ISSN-2958-3675
Frequency: Bi-Monthly
Available online on: https://ijmpr.in/

Case Presentation

Phrygian Cap as an Anatomical Variant Identified During Laparoscopic Cholecystectomy: A case report

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OPEN ACCESS

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Received: 22-06-2026
Accepted: 01-07-2026
Available online: 20-07-2026

ABSTRACT

A Phrygian cap is the most common congenital anomaly of the gallbladder, resulting from folding of the fundus during embryological development. Although usually asymptomatic and clinically insignificant, it may occasionally mimic hepatobiliary pathology on imaging, leading to diagnostic uncertainty. We report the case of a 37-year-old female who presented with recurrent upper abdominal pain associated with nausea and vomiting. Ultrasonography revealed multiple gallstones, and the patient was planned for laparoscopic cholecystectomy. During surgery, an incidental Phrygian cap deformity of the gallbladder was identified. The procedure was completed successfully, and the postoperative course was uneventful. Awareness of this anatomical variant is important for surgeons and radiologists to prevent misdiagnosis, avoid unnecessary interventions, and ensure appropriate operative management when encountered incidentally.

Keywords*: Phrygian Cap, Congenital anomalies, gallbladder, Anatomical Variant.*

INTRODUCTION

Congenital anomalies of the gallbladder are frequently encountered during imaging studies and hepatobiliary surgical procedures[2,3]. Among these, the Phrygian cap is considered the most common congenital anatomical variation of the gallbladder[1]. The term “Phrygian cap” originates from its resemblance to the soft, conical cap worn by the ancient inhabitants of Phrygia, a region in present-day Anatolia. Although generally benign and asymptomatic, this anomaly is clinically important because it may mimic gallbladder pathology or hepatic masses on imaging, potentially leading to diagnostic confusion and unnecessary interventions[4,5]. With the increasing use of imaging modalities such as ultrasonography, computed tomography (CT), and magnetic resonance cholangiopancreatography (MRCP), incidental identification of such anatomical variations has become more frequent[5,8].

Embryologically, the gallbladder develops during the fourth week of gestation from the hepatic diverticulum arising from the distal foregut. The cranial portion develops into the liver, while the caudal bud gives rise to the gallbladder and cystic duct. Variations in gallbladder morphology may occur due to abnormal growth or differential folding during embryonic development[2,6]. A Phrygian cap deformity results from folding of the gallbladder fundus over its body without true septation or duplication.

In a normal gallbladder, the fundus projects beyond the inferior border of the liver. In the Phrygian cap deformity, the fundus folds either anteriorly or posteriorly over the body of the gallbladder, producing a characteristic cap-like appearance[4,5]. The deformity may be partial, characterized by an incomplete indentation, or complete, where marked folding creates an apparent false separation within the gallbladder. Despite these anatomical variations, bile drainage is usually unaffected[5]. Reported in approximately 2%–6% of the population, the Phrygian cap represents the most common congenital anomaly of the gallbladder and may occur across all age groups without a strong sex predilection[2,6].

Case Presentation

A 37-year-old female with no significant comorbidities presented with recurrent abdominal pain, predominantly involving the epigastric and right hypochondrial regions, for approximately one year. The pain was associated with episodes of nausea and vomiting. There was no history of fever, jaundice, previous abdominal surgery, or other significant medical illness.

On clinical examination, mild tenderness was noted in the epigastric and right hypochondrial regions. Murphy's sign was negative, and no icterus or palpable abdominal mass was observed. Ultrasonography of the abdomen revealed multiple gallstones, with the largest measuring approximately 15 mm in diameter. Based on the clinical and radiological findings, a diagnosis of symptomatic cholelithiasis was made, and the patient was planned for elective laparoscopic cholecystectomy following routine preoperative evaluation and anesthetic clearance.

During laparoscopic cholecystectomy, an incidental Phrygian cap deformity of the gallbladder was identified intraoperatively. The procedure was completed successfully without any intraoperative complications, and the gallbladder specimen was sent for histopathological examination. The postoperative period was uneventful, and the patient was discharged on the second postoperative day in stable condition.

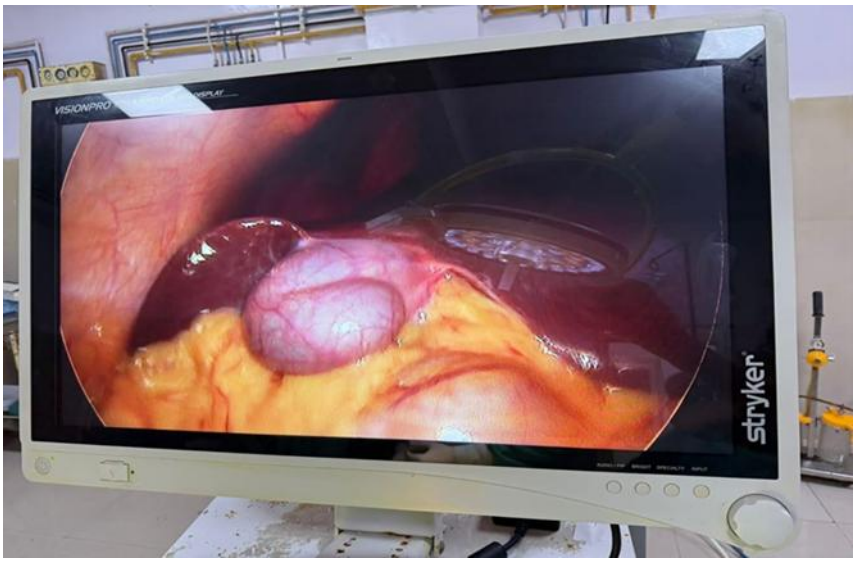

Figure 1: Intraoperative image demonstrating a Phrygian cap deformity of the gallbladder identified during laparoscopic cholecystectomy.

DISCUSSION

The Phrygian cap is recognized as the most common congenital anomaly of the gallbladder and is characterized by folding of the fundus over the body of the gallbladder[1]. The term derives from its resemblance to the ancient conical cap worn by the inhabitants of Phrygia, a region located in present-day Turkey. Although generally considered a benign anatomical variant, its clinical relevance lies in its potential to mimic pathological conditions involving the gallbladder or liver, thereby posing diagnostic challenges[4].

Most individuals with a Phrygian cap remain asymptomatic, and the anomaly is frequently identified incidentally during imaging studies, surgical procedures, or autopsy[4,5]. In rare instances, patients may present with right upper abdominal pain, although a direct causal relationship between the deformity and symptoms remains uncertain[4]. In the present case, the patient presented with symptomatic cholelithiasis, and the Phrygian cap deformity was discovered incidentally during laparoscopic cholecystectomy.

Radiological identification of a Phrygian cap is clinically important because it may resemble gallbladder duplication, a folded gallbladder, or hepatic masses on imaging, potentially resulting in diagnostic confusion[4,5]. Various imaging modalities, including ultrasonography, computed tomography (CT), and magnetic resonance imaging (MRI), may aid in diagnosis. However, ultrasonography and CT findings may occasionally be inconclusive, particularly when differentiation from pathological lesions is difficult[4,5]. In such circumstances, MRI and magnetic resonance cholangiopancreatography (MRCP) provide superior anatomical delineation and may help avoid unnecessary invasive interventions[5,8].

From a surgical perspective, awareness of this anatomical variation is essential to avoid misinterpretation during hepatobiliary procedures and to ensure safe operative management. Although a Phrygian cap itself does not usually

require treatment, cholecystectomy may be indicated in patients with associated gallbladder pathology, such as symptomatic cholelithiasis, as observed in the present case[7].

Figure 2: Classical representation of a Phrygian cap, a soft conical cap with a forward-folded apex worn by the ancient inhabitants of Phrygia, after which the gallbladder deformity derives its name.

CONCLUSION

A Phrygian cap is a relatively common congenital anatomical variant of the gallbladder that is typically asymptomatic and of limited clinical significance. However, due to its potential to mimic hepatobiliary pathology on imaging, recognition of this anomaly is important to avoid diagnostic uncertainty and unnecessary interventions [4,5]. Awareness of this anatomical variation among surgeons and radiologists is essential for accurate diagnosis and appropriate surgical planning. In the present case, a Phrygian cap deformity was identified incidentally during laparoscopic cholecystectomy performed for symptomatic cholelithiasis, emphasizing the importance of recognizing such variants during operative procedures [7].

Patient Consent

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

Ethical approval

The Hospital Research Ethics Committee obtained ethical approval to report this case.

Funding

Regarding the intent of conducting research, writing, and/or publishing this paper, the writers did not receive any funding and grants.

Conflicts of Interest

The authors report no declarations of interest.

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