

# BIFURCATION OF THE CYSTIC DUCT – A RARE REVERSE “Y” ANOMALY ENCOUNTERED DURING LAPAROSCOPIC CHOLECYSTECTOMY

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**ABSTRACT** Cystic duct anatomy has been quite variable in its presentation, but duplication and bifurcation of the cystic duct draining a single gall bladder is an extremely rare scenario. We present a case of reverse “Y” anomaly of the cystic duct in a 47-year-old male who underwent laparoscopic cholecystectomy (LC). Only a single case of a reverse “Y” cystic duct anomaly was reported in the English literature, which was an incidental finding intra-operatively. (1) rare anatomical variations are often missed during pre-operative imaging. Careful dissection while delineating the anatomy and carefully proceeding during every laparoscopic cholecystectomy is ideal to avoid ductal injury.

**KEYWORDS** Cystic duct anomaly, bifurcation of cystic duct, congenital cystic duct anomalies, Reverse Y anomaly of the cystic duct

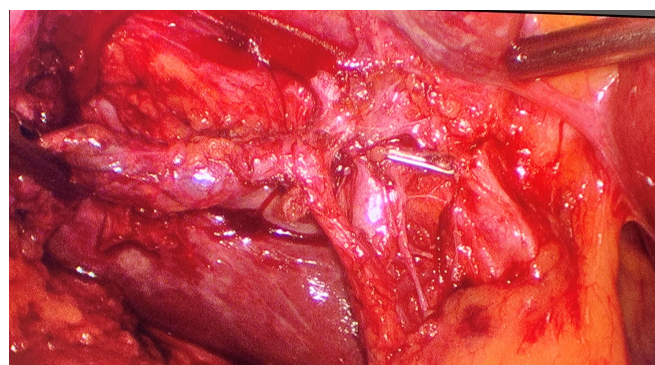
## Introduction

Double cystic duct anatomy arising from two separate gall bladder or cavities is quite common. Still, bifurcation of the cystic duct arising from a single gall bladder has only been described once in English literature. (1) One limb of the cystic duct drains into the common hepatic duct, and the other limb drains into the common bile duct. Most of these anatomical anomalies are visualized intraoperatively. Still, identification and prior knowledge about these variations during LC are crucial to avoid inadvertent ductal injury. Such injury leads to persistent biliary leakage post-operatively.

## Case Report

We report a case of a 47-year-old male who presented with 7 days history of pain abdomen associated with nausea and poor appetite. History of similar episodes over the past 2 years. On physical examination, right upper quadrant tenderness was

noted, but Murphy’s sign could not be elucidated. Blood investigations were within normal limits, and ultrasound imaging reported cholelithiasis. Hence patient was planned for laparoscopic cholecystectomy.



**Image 1**

Surgery was commenced using 4 ports, and dense omental adhesion was noted between the gall bladder and the liver. Dissection began by incising the peritoneum along the edge of the gallbladder on both sides to open the hepatocystic triangle. A combination of blunt dissection and judicious cautery usage revealed a triangular fatty layer. The establishment of a critical

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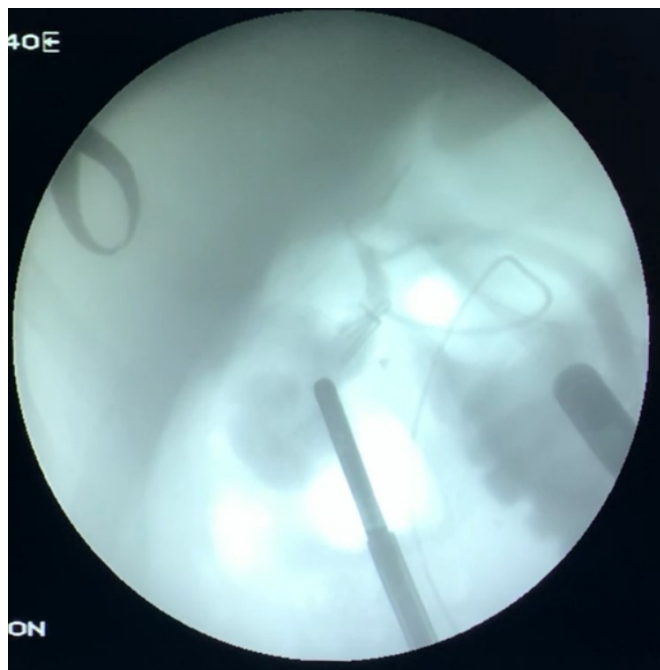
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view of safety was difficult. A singular cystic duct arising from the gall bladder was found to be diverging to form two cystic ducts. Further dissection revealed a branch of the cystic duct entering the common hepatic duct (CHD) and the other branch into the Common bile duct (CBD), resulting in a reverse “Y” pattern (**Image No.1**). Intra-operative cholangiogram revealed a single cystic duct arising from the gall bladder branching into 2 limbs (**Image No.2**). Cystic artery was first clipped and divided and later the cystic duct was ligated at the base of reverse “Y” limb and the gall bladder was removed. Postoperatively patient’s liver function test was within normal limits and was discharge on day 3 of admission. The patient was reviewed after one week of surgery and was doing well. Histopathology showed chronic cholecystitis with cholelithiasis.



**Image 2**

## Discussion

Cystic duct duplication has been a point of interest. It was categorized and described by Caster and Flannery 30 years ago. It played a significant role in understanding the variability of present-day surgeons. (1) “Y” type (noted in 30% of the cases), wherein 2 cystic ducts join to form a single cystic duct that then enters the CBD, (2) “H” type (predominant in 50% of the cases) in which each cystic duct independently joins the bile duct system at the CBD, right hepatic duct, left hepatic duct or common hepatic duct, and (3) trabecular type (noted ) in which one cystic duct enters the CBD while the other directly enters the liver parenchyma. (2) Since then, many case reports have described the anatomical variations noted in patients undergoing LC. (3,4) In this paper, we report a novel case of the cystic duct’s reverse “Y” pattern, wherein one cystic duct draining the gall bladder bifurcates into two limbs. As a result, one limb enters the CHD, and the other enters the CBD. Such a similar case has been documented only once by Suhyun Lim et al., where one limb of the cystic duct was clipped without being aware of the anatomic anomaly resulting in postoperative biliary spillage. (1)

Hence the patient had to be reoperated, and the second branch of the cystic duct was identified and clipped. In both cases, pre-operative imaging could not identify the anatomical anomaly and was an incidental finding.

## Conclusion

Pre-operative imaging has most often failed to identify biliary tract anomalies. It signifies the importance of maintaining constant vigilance during surgery for even a minor change in the architecture and abnormality. Careful dissection and patience during the operative period are key to preventing ductal injury and postoperative complications.

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## Conflict of interest

There are no conflicts of interest to declare by any of the authors of this study.

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