

## Hepatic Artery Aneurysm Masquerading as Abdominal Pain in a Child: A Rare Case Report

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### 1. Abstract

**1.1. Background:** Hepatic artery aneurysm is a rare clinical entity amongst children accounting for 20 % of all the splanchnic artery aneurysms, and if neglected could lead to catastrophic events.

**1.2. Case Presentation:** A 6-year-old child presented with recurrent episodes of upper abdominal pain, which was managed conservatively for 6 months. On diagnostic imaging i.e., ultrasonography, doppler sonography and computed tomographic angiogram a hepatic artery aneurysm was confirmed (i.e., hepatic artery proper). We managed the child by resection of the aneurysmal segment with an end-to-end anastomosis of the hepatic artery proper to the common hepatic artery. There were no peri operative complications, and at follow up the child has grown well with no episodes of recurrence.

**1.3. Conclusion:** Hepatic artery aneurysms are rare amongst children; and should be considered as one of the differential diagnoses in recurrent episodes of undiagnosed upper abdominal pain. Imaging modalities such as ultrasonography, Doppler sonography and computed tomographic angiograms should be performed for the accurate diagnosis of these lesions. Once diagnosed, immediate surgical interventions should be considered, thereby preventing morbidity and mortality.

### 2. Introduction

Hepatic artery aneurysm is a rare clinical and pathological entity accounting for 20 % of all the splanchnic artery aneurysm [1, 2]. Three quarters of the children with hepatic artery aneurysm are asymptomatic and only 15% of them present with rupture in the peritoneal cavity [3, 4]. The classical triad of abdominal pain, hemobilia and jaundice are rarely seen especially in children. The management of these aneurysms when detected, remains to be a area of concern amongst many surgeons, although various modalities of management have been published in literature [5].

We detail the presentation and management of a six-year-old boy who was diagnosed with a hepatic artery aneurysm which was masqueraded by recurrent episodes of abdominal pain, thereby preventing future morbidity and mortality.

### 3. Case Presentation

A 6-year-old boy presented to the emergency with complaints of severe upper abdominal pain and dehydration for 24 hours. Child was resuscitated in the emergency with intravenous fluids and analgesics. The family reported that the child complained of recurrent abdominal pain on, and off which was managed conservatively for 6 months. The family did not report any previous history of trauma, jaundice, vomiting or gastrointestinal bleeding. On clinical

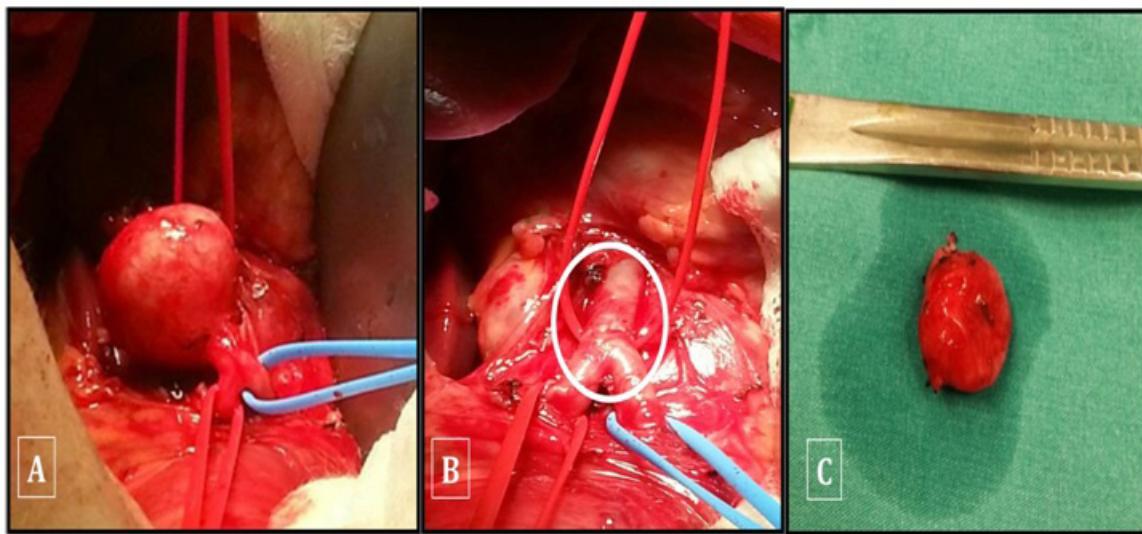
examination the child looked sick, moderately dehydrated, with tenderness in the epigastric and right hypochondriac regions; with normal bowel sounds and no presence of organomegaly. Rest of the systemic examination and vitals were unremarkable. Based on the history, signs, and symptoms a differential diagnosis of common conditions such as acute pancreatitis, acute gastritis, volvulus of the bowel, right pyelonephritis and nonspecific pain abdomen were considered.

The laboratory investigations i.e., complete blood counts, liver function tests, renal parameters, serum amylase, serum lipase and coagulation profile where all within normal limits. The urine and blood culture reports were normal. No free air was detected on the abdominal Xray. An abdominal ultrasound which was performed, depicted a cystic mass of 15 x 20 mm at the portal hiatus with normal liver parenchyma and no evidence of ascites. A doppler ultrasonography performed, revealed vascularity and blood flow within the cystic lesion. A computed tomographic angiogram performed confirmed a 15 x 20 mm aneurysmal dilatation of the hepatic artery i.e., originating from the hepatic artery proper as depicted in (Figure 1).

The parents of the child were counselled and consented regarding the child's condition and the line of management. As a low perioperative cardiac morbidity and low-risk vascular surgery, the child was taken up for an elective laparotomy. A midline incision was made, the aneurysmal segment at the hepatic artery proper just proximal to the bifurcation of left and right hepatic artery was identified as depicted in (Figure 2A). The aneurysmal segment was resected, following which the proximal and distal parts of the artery were anastomosed using 6.0 prolene sutures in an end-to-end fashion with no real need of a vascular graft as depicted in (Figure 2B). The operative time for the resection and completion of anastomosis was 15 minutes (cross clamping time) thereby not causing any ischemic damage to the liver. There were no perioperative complications, and the aneurysmal segment was resected completely as depicted in Figure 2C. The post-operative recovery was uneventful, and the child was discharged after 3 days of the surgery. At follow up, the child has had no recurrence of symptoms, has grown well and the screening imaging did not reveal the presence of any aneurysms.



**Figure 1:** A Computed tomography angiogram depicting a hepatic artery aneurysm (15 x 20 mm) arising from the hepatic artery proper (encircled in red) just distal to the bifurcation at the portal hilus.



**Figure 2:** Intra operative images of the Hepatic aneurysm

**A:** Hepatic aneurysm arising from the hepatic artery proper (15 x 20 mm), the red vascular loop depicting the confluence of the gastro duodenal artery with the common hepatic artery which is depicted by the blue vascular loop.

**B:** End to end anastomosis (area encircled) performed between the hepatic artery proper and the confluence of the common hepatic artery and gastroduodenal artery after complete resection of the aneurysmal segment.

**C:** Resected segment of the hepatic artery aneurysm.

#### 4. Discussion

Splanchnic artery aneurysms are uncommon among children constituting to 1/5th of all visceral artery aneurysms and their rate is increasing due to advancing imaging modalities, increased awareness and possible shift in etiologies. When they occur, they are either congenital, infectious, inflammatory, or traumatic [6]. Splenic artery aneurysms, regardless of the causes, are the most common form of splanchnic artery aneurysms than hepatic artery aneurysms. However, hepatic artery aneurysms have a rupture rate of as high as 44% and a mortality rate of as high as 82% thereby warranting a more aggressive management [7]. Hepatic artery aneurysms were first described in children, in 1959 by Jewett, since then other reports have described in children with hepatic artery aneurysms of various etiologies [8, 9]. One third of patients present with Quincke's triad of jaundice, abdominal pain and haemobilia however, in our case the child presented only with recurrent episode of upper abdominal pain, which could be misleading for clinicians [5].

The preoperative diagnosis of hepatic artery aneurysms is often difficult, since most patients experience no symptoms until the aneurysm ruptures. A differential diagnosis of choledochal cyst, neuroblastoma, Wilms tumor, lymphosarcoma and other primary tumors of the liver could also present with abdominal pain, jaundice, and a mass. These aneurysms could lead to disastrous results if unwittingly biopsied or mobilized, hence it is important to establish an accurate diagnosis to prevent morbidity [9]. A rim of calcification in right upper quadrant on a simple plain abdom-

inal X-ray may suggest the presence of an aneurysm. An ultrasound, contrast enhanced Computed Tomogram and Magnetic Resonance Imaging are the possible choices for diagnosis. Doppler ultrasonography is useful in visualization of blood flow in association with aneurysm. However, a computed tomographic angiography and magnetic resonance angiography are the imaging modalities providing a definitive diagnosis [5, 8]. Similarly in our child we pre operatively could identify the presence and the exact location of the aneurysm using these mentioned modalities following which, we could plan our management precisely, thereby preventing its rupture. Eighty percent of hepatic artery aneurysms are situated in the extrahepatic arteries, of which 75% are in the main hepatic arterial trunk, as also seen in our child [6].

Treatment options include transcatheter embolization, surgery (resection with anastomosis), vessel ligation and revascularization [5]. Our patient underwent a laparotomy, aneurysm was resected, and hepatic artery was end-to-end anastomosed. Aneurysms of the hepatic artery proper, namely the section of hepatic artery distal to the junction of the gastroduodenal and right gastric arteries to the common hepatic artery, invariably require vascular reconstruction if ischemic liver injury is to be avoided. Excision or obliteration of the hepatic artery aneurysm has been the treatment of choice, which was adopted by us in our management of the child [6]. Although endovascular techniques are highly effective, surgery is still the best approach for hepatic aneurysms especially the ones that are located at the portal hilus [10]. We recommend, to consider immediate management of these aneurysms once pre operatively

diagnosed, to prevent catastrophic events such as a rupture, especially in children thereby preventing mortality amongst them.

### **5. Conclusion**

Hepatic artery aneurysms although rare in children, it could cause catastrophic events if overlooked due to asymptomatic or non-specific symptoms such as abdominal pain. Therefore, it is important to perform accurate imaging modalities and to interpret them correctly to arrive at a diagnosis of the aneurysm before a rupture can occur. We recommend to immediately consider management of these aneurysms once pre operatively diagnosed especially in children thereby preventing increased rates of mortality. Surgical resection is still the best approach for hepatic aneurysms in children, especially in the ones located at the portal hilus.

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