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CASE REPORT

Giant Hepatic Adenoma in a 12-Year-Old Girl

Hemant Kumar Singh[1] · **Shraddha Patkar**[1] · **A. M. Polnaya**[2] · **Mukta Ramadwar**[3] · **Mahesh Goel**[1]

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Background

Hepatic adenomas (HA) are benign tumours and constitute 2% of all the liver tumours with an annual incidence of 3–4 per million in Europe and North America [1]. There has been an increase in incidence owing to increase in the use of oestrogen-based contraceptive medication and increased detection due to widespread use of imaging modalities. The common predisposing factor for hepatic adenoma is the use of oestrogen-based oral contraceptive pills. Here, we present a case of giant hepatic adenoma in a young girl in whom no predisposing factors could be identified.

Case Report

A 12-year-old girl presented with an acute onset of abdominal pain and vomiting for 2 days. She was evaluated elsewhere and was diagnosed to have acute pancreatitis due to elevated amylase (248 U/L, 22–80 U/L) and lipase (1680 U/L, 13–60 U/L) levels. The patient did not have any history of previous hospital admissions or significant medical history. There was no relevant family history of liver disease/malignancy. The patient was referred for further evaluation to our institute.

✉ Mahesh Goel
drmaheshgoel@gmail.com

[1] Department of Gastroenterology and Hepatobiliary Surgical Oncology, Tata Memorial Hospital, Dr. E. Borges Road, Parel, Mumbai, Maharashtra 400012, India

[2] Department of Intervention Radiology, Tata Memorial Hospital, Mumbai 400012, India

[3] Department of Pathology, Tata Memorial Hospital, Mumbai 400012, India

Clinical examination revealed the absence of icterus and a firm enlarged right lobe of the liver, 6 cm below the costal margin. Serum liver enzymes AST, ALT and alkaline phosphatase were 39 U/L (< 35 U/L), 18 U/L (< 35 U/L) and 137 U/L (51–332 U/L), respectively. Total bilirubin was 0.56 mg/dL (0.3–1.2 mg/dL). Serum protein, albumin and globulin were 8.0 g/dL (5.7–8.0 g/dL), 4.6 g/dL (3.5–5.2 g/dL) and 3.4 g/dL (1.7–3.5 g/dL), respectively.

She was also evaluated for cause of acute pancreatitis with magnetic resonance cholangiopancreatography (MRCP) and serum parathormone levels. MRCP did not show any evidence of pancreas divisum, and serum PTH and triglyceride levels were normal.

Contrast-enhanced computed tomography (CECT) of the abdomen showed a 16 × 14 × 12-cm well-defined encapsulated mass arising from the right lobe with central necrosis and specks of calcification with late arterial/portal phase hyperattenuation suggestive of hepatic adenoma (Fig. 1a). The right hepatic vein and middle hepatic vein were involved by the tumour. Due to the large size of the tumour and splaying of portal structures, delineation of biliary anatomy was difficult. Resection at this stage would have entailed extended right hepatectomy which was deemed difficult and risky as both the left portal vein and left hepatic vein were forming the margin of the tumour. Hence, it was decided in a multidisciplinary joint clinic to attempt downsizing of the tumour with bland trans-arterial embolisation (TAE).

Alpha-fetoprotein was 1.24 ng/mL (0–9 ng/mL). In view of age and imaging being not definitive, biopsy was performed to rule out hepatoblastoma or an atypical tumour. Ultrasound-guided biopsy was performed which showed benign hepatocytes with no mitotic activity and absence of portal tract and bile duct suggestive of hepatic adenoma.

Superselective catheterisation of arterial feeders was done using a Progreat microcatheter (2.9F), and embolisation was

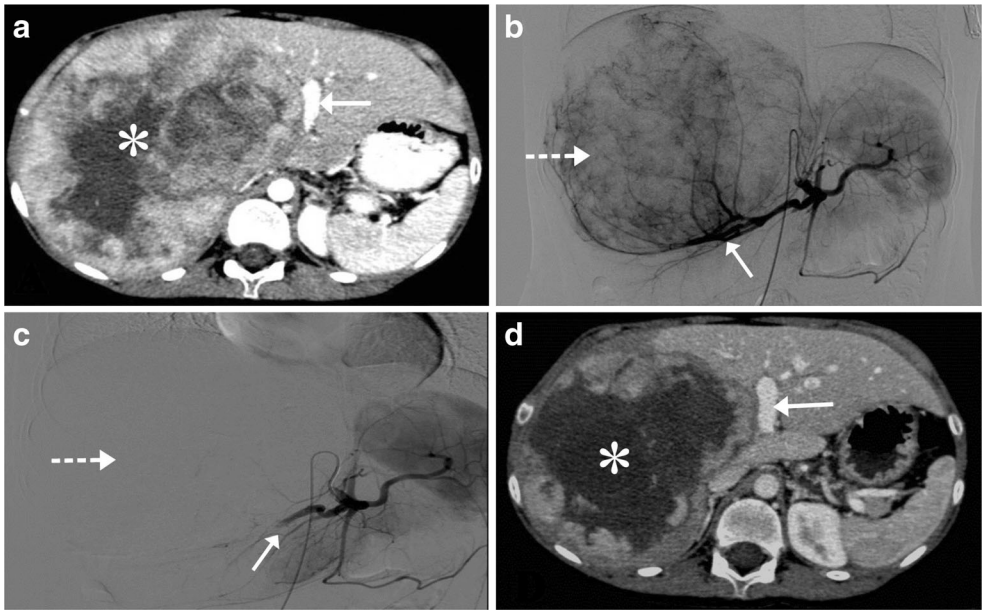

Fig. 1 **a** Work-up CECT (contrast-enhanced computed tomography) shows a large heterogeneous mass lesion in the right lobe of the liver with a central non-enhancing area of necrosis (asterisks) abutting with mass effect on the left portal vein (white arrow). **b** Pre-embolisation DSA (digital subtraction angiography) image shows a large enhancing mass lesion with arterial feeders from the right and middle hepatic arteries (white arrow) which were embolised endovascularly using PVA (polyvinyl alcohol) particles. **c** Post-embolisation check angiogram revealed cessation of tumour blush (dotted arrow) with stasis in the tumour feeders (white arrow). **d** Six-week post-embolisation follow-up contrast CT revealed significant necrosis within the right lobe lesion (asterisks) with regression in size and mass effect on the left portal vein

done using 200-μm polyvinyl alcohol particles. Post-procedure angiogram shows significant reduction in the tumour vascularity (Fig. 1c). Magnetic resonance imaging (MRI) post-TAE showed a 14.5 × 13.2-cm large well-defined heterogeneous soft tissue mass iso-hypointense on T1W and hyperintense on T2W with patches of diffusion restriction within the entire right lobe (segments V, VII and VIII). On post-contrast dynamic sequences, there was inhomogeneous enhancement in the peripheral solid areas with a central non-enhancing area owing to necrosis.

In view of excellent response in terms of reduction in size and better delineation of left-sided vascular anatomy, she was planned for surgery (Fig. 1d). The future liver remnant for extended right hepatectomy increased from 41 to 61.27% calculated by Myrian protocol software (Fig. 2a, b).

The patient underwent extended right hepatectomy by an anterior approach. Intraoperatively, a large tumour was encountered involving segments IV, V, VI, VII and VIII with multiple venous channels on the surface. Intraoperative cholangiogram after resection showed intact segment II and III biliary radicals and no evidence of bile leak. Intraoperative blood loss was 1.5 L and none were replaced. The patient tolerated the surgery well. She had an uneventful recovery and was discharged on post-operative day 5.

On gross examination, the right hepatic lobe specimen measured 18 × 15 × 14 cm. The tumour was greenish

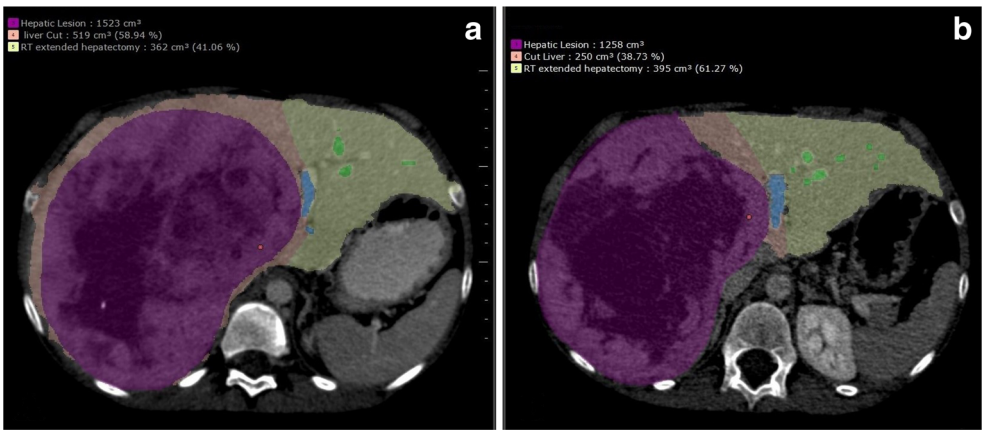

Fig. 2 Myrian images comparing the future liver remnant and resection lines. **a** Pre-embolisation image. **b** Post-embolisation image shows better delineation of the portal structures and increased FLR (future liver remnant)

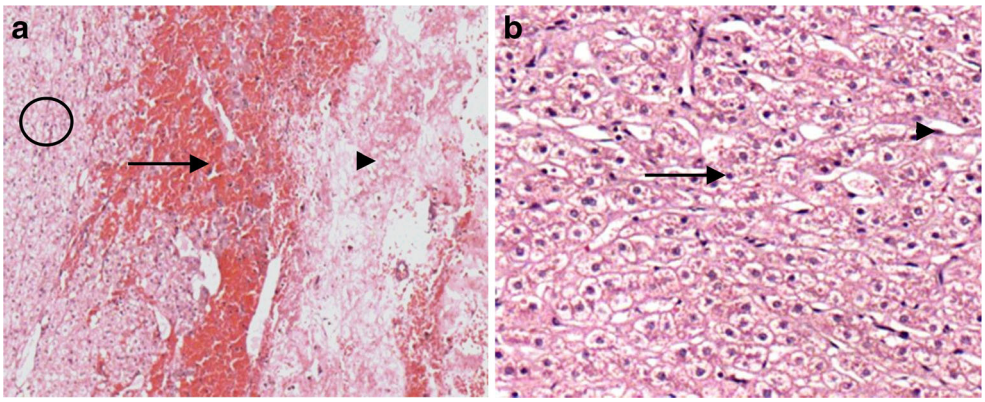

Fig. 3 Histopathology microscopy images. **a** Haematoxylin and eosin staining, ×10 magnification, of the tumour with benign-looking hepatocytes (circle), haemorrhage (black arrow) and necrosis (black arrow head). **b** Magnified image of benign-looking hepatocytes (black arrow) with vascular proliferation (arrow head) shown in **a**

yellow in colour, measured 15 × 15 × 13 cm and weighed 1500 g.

Microscopic examination was remarkable for large areas of infarctoid necrosis (Fig. 3a). Hepatocytes were two to three cells thick with interspersed dilated thin-walled vessels. No portal tract or bile duct structures were identified. There was no cellular atypia or mitotic activity. Reticulin stain showed a maintained reticulin pattern. CD34 highlighted non-triadal vessels. Nuclear β-catenin positivity was not seen. Hepatocytes were highlighted by Hepar-1 suggestive of hepatic adenoma (Fig. 3b).

Review of Literature and Discussion

Liver cell adenoma was first described by Edmondson in 1958 as an encapsulated tumour without bile ducts in two autopsies [2]. Later, Braum associated adenomas with oestrogen exposure in 1978 [3].

These tumours are being increasingly diagnosed due to the use of oestrogen-based contraception and widespread cross-sectional imaging being performed for unrelated reasons in the general population [4].

Similar to oestrogen, anabolic steroids can predispose to the development of the adenomas that regress with hormonal withdrawal. Other hormonal aetiologies are clomiphene citrate [5], methyl testosterone [6], danazol [7] and Klinefelter's syndrome [8]. Glycogen storage type I, III and IV disorders [9] also predispose to the development of HA; however, the mechanism is still unknown.

Adenoma in a young girl without any predisposing factors is extremely rare.

Lack EE [10] et al. have reported HA in a newborn male and a 2-year-old girl, both of which were symptomatic due to the large size of the mass. There was no maternal history of exposure to exogenous steroids during pregnancy.

Our patient has one of the largest HA that have been reported. Rosencrantz RA et al. reported an HA of 16 × 12 × 16 cmin a 13-year-old obese boy [11].

Bleeding is the most common complication in liver adenomas. Adenomas typically consist of dilated sinusoids or thin-walled blood vessels with minimal connective tissue support and hence are prone to bleeding. Flowers BF et al. have identified tumours > 3.5 cm, left lobe, exophytic tumours and pregnancy as risk factors for bleeding [12].

Surgical resection is recommended for adenomas that are large, symptomatic or associated with beta-catenin positivity [13]. Zucman Rossi et al. [14] and Biaulac-Sage et al. [15] emphasised β-catenin-activating mutations in CTNNB1 are associated with an increased risk of malignant transformation. β-Catenin staining in our patients was negative; however, due to the large size, there was an increased risk of bleeding.

Interventional techniques such as embolisation may be used in the management of large tumours that are initially unresectable, in hepatic adenomatosis or medically unfit candidates. They are also particularly helpful in bleeding adenomas, allowing them to be treated electively as shown by Erdogan [16].

Ami et al. have shown adenoma to regress after embolisation with an approximately 81% decrease in size [17]. The decrease is durable and is well demonstrated in small-sized adenomas [17, 18]. Resection can be used as salvage for those adenomas that increase in size or recur post-embolisation especially in those with hepatic adenomatosis. However, large adenomas need resection.

Our patient underwent the same surgery that was planned on pre-TAE scan. However, post-TAE, the anatomical delineation of the portal structures was easy and a safe surgery could be performed.

Conclusion

Multimodality treatment may be used in giant HA for downsizing the tumour as it decreases the blood loss and increases the future liver remnant and surgical safety by identifying and preserving the vital anatomical structures.

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Conflict of Interest The authors declare that they have no conflict of interest.

Research Involving Human Participants and/or Animals None.

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