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Combining on-table embolization with immediate resection to safely excise giant hepatic hemangiomas

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Background

The management of symptomatic giant hepatic hemangiomas (>10cm) varies in the literature. Multiple interventional approaches have been described including surveillance, embolization, enucleation, and resection based on tumor size, location, relationship to vascular and biliary structures, and the quality and quantity of the functional liver remnant. Resection is often performed as a last resort due to the risk of major hemorrhage.

Embolization alone is rarely successful in halting tumor growth and long-term studies have revealed that the majority of these treated tumors will ultimately require surgical resection.¹ One of the major difficulties in surgically approaching massive hemangiomas is safe control of the substantial arterial inflow since the porta, feeding vessels, and outflow may be inaccessible due to tumor size and immobility. Preoperative arterial embolization is an option, however, many patients will experience severe pain, fever, transaminitis, acidosis, recanalization, and collateral inflow that limit its utility.² Furthermore, due to the post-embolization syndrome, patients require post-procedure inpatient observation that extends hospital costs and length of stay. Moreover, there is no consensus on the appropriate time interval between procedures. We endeavored to approach this clinical situation with on-table angiogram and embolization followed by immediate resection in a hybrid operating room.

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Methods

Under general anesthesia in a hybrid operating room with on-table angiogram capabilities, the patient underwent a celiac and SMA angiogram followed by hemangioma inflow embolization and immediate hepatic resection under the same anesthesia in a single procedure.

Results

In this example, it is demonstrated that two large branches of the left hepatic artery were feeding a >20cm hemangioma. The mass replaced the left hepatic lobe and displaced the middle hepatic vein (figure). The main left hepatic artery bifurcated into two prominent branches with the giant hemangioma fed predominantly by the more medial branch. A microcatheter was selectively placed into this prominent branch and 500–700 um sterile beads were deployed, followed by embolization with 6 mm 0.018” coils. With decreased but persistent inflow to the tumor, the lateral branch from the main left hepatic artery was then selectively accessed with deployment of 500–700um beads followed by 4mm coil embolization. A postembolization hepatic angiogram was performed revealing complete stasis of the left hepatic artery inflow with near complete resolution of flow to the large hemangioma (figure). Common hepatic artery angiogram confirmed that the right hepatic artery and gastroduodenal artery remained widely patent.

After coil embolization of the arterial inflow to the tumor, the femoral sheath was removed and the patient was immediately prepped and draped for hepatic resection on the same table (figure). Pre-embolization, the tumor extended to a level 4cm below the gallbladder in the coronal plane (figure), and 3cm below the umbilicus. The inflow appeared inaccessible due to the size of the mass overlying the porta hepatis (video). Post-embolization, the tumor was at the level of the gallbladder fundus and well above the umbilicus. Furthermore, as is demonstrated in the video, the hemangioma became compressible, allowing mobilization of the tumor and access to the porta hepatis. It should be noted that some of these hemangiomas may be amenable to intraoperative ligation of arterial inflow without the additional resources of embolization, however, in these giant tumors that overlie the porta, mobility of the liver and the safety of dissection may be enhanced. Left hepatic arterial and portal inflow were ligated, outflow was controlled, and the parenchyma was divided combining formal anatomic resection planes with enucleation of the tumor off the middle hepatic vein at its origin (video). Blood loss was less than 150mL and the patient was discharged home on no pain medicine and free of the substantial preoperative symptoms on post-operative day 4.

Conclusion

Combining on-table embolization with immediate resection avoids post-procedure pain and many of the pitfalls of preoperative embolization.³ It is an efficient use of hospital resources and eliminates an intervening hospital admission. We have found it to be a preferred approach to enhance the safety and feasibility of resection for massive hepatic hemangiomas with minimal intraoperative blood loss and reduced risk.

Supplementary Material

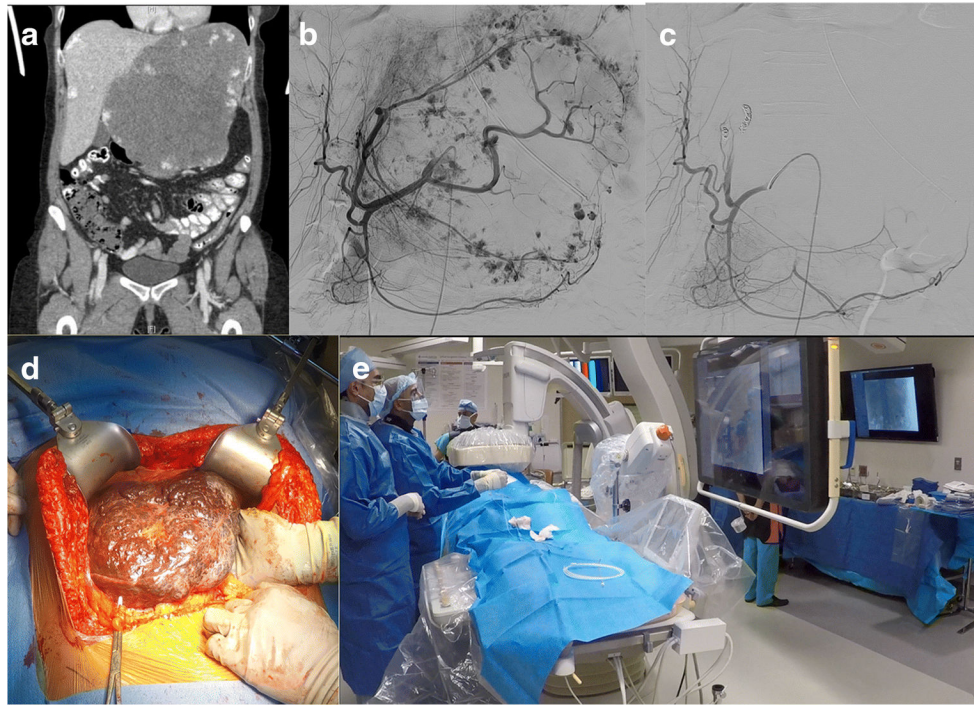
Refer to Web version on PubMed Central for supplementary material.

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**Figure.**

(A) This giant hepatic hemangioma obscured safe access to the porta hepatis, replaced the left hepatic lobe, and displaced the middle hepatic vein. (B) On-table angiogram was performed in a hybrid operating room suite revealing substantial arterial inflow to the tumor from branches of the left hepatic artery. (C) Post-embolization angiogram confirmed near complete control of arterial inflow. (D,E) As a result, at exploration the tumor was compressible and the liver able to be mobilized, enabling immediate resection under the same anesthesia without moving the patient.