A Case of High Output Heart Failure in a Patient with HHT Successfully Treated with Bevacizumab

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Background

Hereditary Hemorrhagic telangiectasia (HHT) is defined by recurrent epistaxis, cutaneous telangiectasia, and arteriovenous malformations. Liver involvement is found in up to 74% of patients [1], with a small percentage of these patients becoming symptomatic with intrahepatic shunts which can lead to high output cardiac failure [2]. High output heart failure is thought to develop from increased cardiac preload and decreased peripheral vascular resistance leading to a high output state.

In this case we discuss a patient with severe tricuspid regurgitation, atrial fibrillation, and HHT complicated by GI and liver AVMs, who presented with high output heart failure and was subsequently started on bevacizumab with significant improvement in her symptoms.

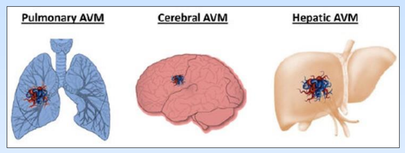

Figure 1. Primary manifestations of AVMs in HHT [3]

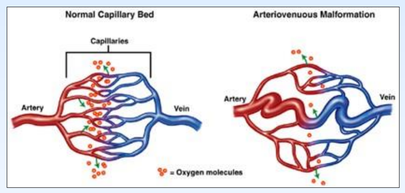

Figure 2: Arteriovenous malformations characteristic of HHT (CureHHT.oth)

Case Description

- 74 year old female with HHT who presented with worsening dyspnea in the setting of acute anemia.
- Strong family history of HHT, but only with h/o hamartoma resection from her liver and frequent epistaxis as a child
- Presented to outside hospital with hypoxemic respiratory distress requiring BIPAP. (thought to be due to anemia/fluid overload)

Investigative Studies

- CTA demonstrated enlarged heart
- Echocardiogram with severely increased RV cavity size, RVSP 88, severe bi-atrial enlargement and severe tricuspid regurgitation.
- Concern for pulmonary AVMs, but bubble study performed during TTE was negative
- CT and RUQ US revealed AV shunting with liver AVMs.
- Right heart catheterization was significant for elevated filling pressures and very high cardiac output

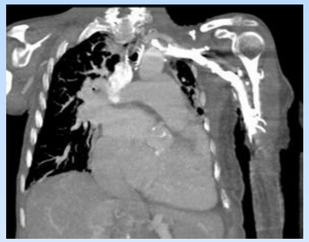

Figure 3: CTA demonstrating enlarged heart

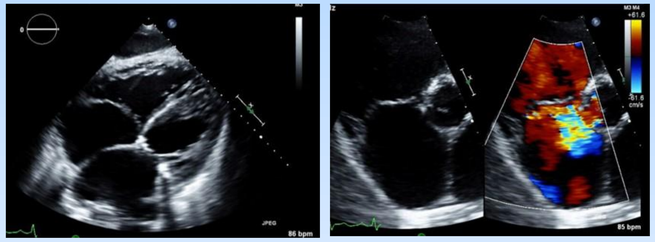

Figure 4: Echocardiogram with increased RV size and biatrial enlargement (left), and severe TR (right)

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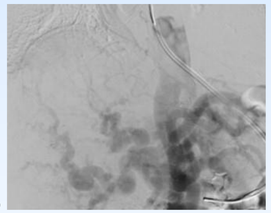

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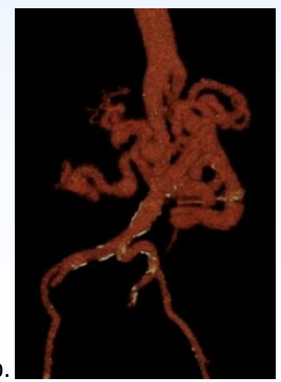

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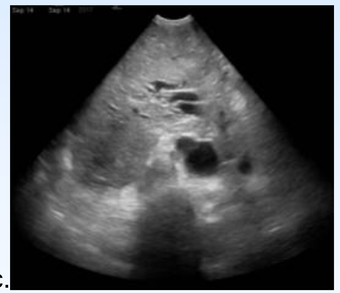

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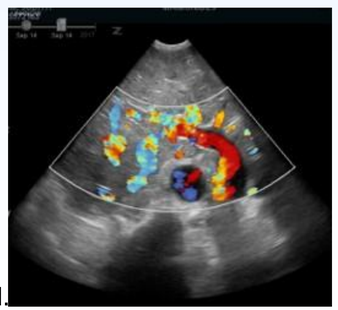

Figure 5: 5a. Vessel reconstruction from CTA Abdomen revealing tortuous liver AVMs. 5b. Visualization of liver AVMs on angiography. 5c-d. Right upper quadrant ultrasound with prominent blood flow through the liver.

Right Heart Cath Results	
PCW	19 mmHg
RA	20 mmHg
WHVP	21 mmHg
HVPG	2 mmHg
Transpulmonary Gradient	15 mmHg
CO	13 L//min
SVR	302 Dynes-sec-cm^5
PVR	92Dynes-sec-cm^5

Clinical Decision Making

- The current treatment for severe hepatic involvement is an orthotopic liver transplant
- The VEGF inhibitor, bevacizumab has been proposed as a possible treatment for HHT [4]
- Bevacizumab was initially tested for recurrent epistaxis, has now been broadened for additional complications of HHT
- Our patient was started on bevacizumab and had significant improvement in her oxygenation (transitioned to nasal cannula) within three days of starting therapy

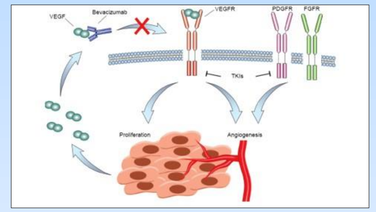

Figure 6. Inhibition of VEGF signaling by Bevacizumab. Abbreviations: FGFR: fibrocyte growth factor receptor, PDGFR: platelet-derived growth factor receptor, TKI: tyrosine kinase inhibitors, VEGF: vascular endothelial growth factor. Image from Levin et al 2017.

Conclusions

This case represents a multidisciplinary approach to treatment of a patient with HHT who presented with acute hypoxemic respiratory failure from high output heart failure who was treated with bevacizumab with improvement in her symptoms. The mechanism of HHT is hypothesized to arise from imbalances between pro and antiangiogenic factors, and therefore Bevacizumab has recently been trialed as treatment, and showed efficacy in this case report

Sources

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The authors have no financial disclosures