The Thrill is Gone: An Interesting Cause of Congestive Heart Failure

American Heart Association Council on Clinical Cardiology
Laennec Young Clinician Award Finalist Presentation
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85F with atrial fibrillation, recent onset congestive heart failure presents with dyspnea

- Sleeping more upright, could only walk room to room, and had a nonproductive cough

She is admitted for congestive heart failure exacerbation

Recent history notable for:

- Progressive fatigue and dyspnea for past year
  - Treated with diuretic therapy for presumed congestive heart failure by outpatient cardiologist for past 3 months

- Five hospitalizations for hematochezia over previous 6 months
  - Extensive workup (3 colonoscopies, 1 upper endoscopy, 1 capsule study) notable only for severe diverticulosis
  - Warfarin discontinued after hospitalization #3, aspirin discontinued after hospitalization #4

Cause of hematochezia and worsening exertional dyspnea not established
Past Medical History: HTN, glaucoma, OA

Allergies: none

Medications: Bumetanide 1mg daily, metoprolol succinate 50mg daily, omeprazole 40mg daily, Fe supplements

Social History: Widowed, lives in apartment attached to her daughter’s home; never smoker, rare EtOH, no illicits

Family History: Colon Ca in mother, no CAD, no SCD
Physical Examination

- **VS:** T 98.7°F HR 74bpm **irregular**, BP 110/56mmHg, RR 16/min, O2 saturation 85% on RA (96% on 3L)
- **General:** Elderly, Caucasian woman. **Cachectic**, no acute distress.
- **HEENT:** PERRL, EOMI, (-) scleral icterus, OP clear
- **Neck:** JVP 18 cm H2O with prominent v waves, 2+ carotid upstrokes, (-) bruits
- **Pulm:** Bibasilar rales, otherwise clear to auscultation, (-) wheezes, rhonchi
Physical Examination

- **CV:** Irregularly irregular rhythm, PMI diffuse and laterally displaced, normal S1 & S2, III/VI HSM at LLSB, murmur increased with inspiration, murmur decreased with expiration and Valsalva, (+) RV heave

- **Abd:** soft, nontender, (+) fluid shift, area of 2cm x 2cm bruit in R flank area w/ thrill, bruit continuous throughout cardiac cycle

- **Extr:** Cool below knees, (-) edema, 2+ brachial, radial, DP/PT pulses

- **Neuro:** CN II-XII intact, 5/5 strength upper and lower extremities

- **Skin:** (-) rashes, lesions, nevi, telangiectasias, hemangiomas
Laboratory Studies

- Troponin T 0.02 ng/mL
- CK 92 ng/mL
- CK-MB 4.5 ng/mL
- NT-proBNP 4497 pg/mL
Chest X Ray
Electrocardiogram
Transthoracic Echocardiogram

Parasternal short axis view

Apical 4 chamber view
Transthoracic Echocardiogram

IVC inflow
Case Synthesis

- Findings of biventricular failure on examination, predominant RV dysfunction, biatrial enlargement and pulmonary hypertension on echocardiogram, atrial fibrillation
  - Valvular heart disease (the newly recognized murmur)
  - Primary pulmonary HTN
  - Restrictive cardiomyopathy
  - **High output cardiac failure** given abdominal bruit and thrill

- Abdominal CTA scan ordered to define the vascular abnormality
Abdominal CT Scan
Abdominal CT Scan
Abdominal CT Scan
Both AF and CHF likely caused by chronic high output state

Hematochezia likely due to chronically elevated visceral venous pressure

Recommended right heart catheterization for hemodynamic assessment and fistula characterization
Cardiac Catheterization and Arteriography

- RA 23, RV 61/27, PA 58/26, PCWP 23
- CO output 8.54L/min (Fick estimate)
- Arteriography: single R renal artery supplying **4.5cm aneurysm** that drained into R renal vein
- With temporary fistula occlusion:
  - CO decreased to 4.66L/min
  - Fixed pulmonary HTN
- Fistula amenable to percutaneous closure
Treatment Options

1. Surgical repair
2. Endovascular repair
3. Medical management

- **Benefits** – potential improvement of CHF, GIB, abrogate risk of rupture
- **Risks** – age and frailty at presentation, risk inherent to procedure, unclear reversibility given calcification and chronicity

Given caliber of fistula and hemodynamic consequences, endovascular repair recommended to patient
Case Management

- Patient and daughter elected to proceed with percutaneous closure
- Procedure performed 6 weeks after discharge
- 22 coils, 2 vascular plugs
Outpatient Follow Up

- Patient has been seen for three outpatient visits since fistula closure
- Patient feels she has gained a ‘new life’
- Improved energy, appetite, dyspnea has nearly resolved
- 3 months post procedure: off diuretics
- 6 months post procedure: anticoagulants started, no recurrent bleeding x 2 months
Summary

- 85F with atrial fibrillation, congestive heart failure, recurrent hematochezia, and worsening dyspnea

- **Physical exam was key to diagnosis**

- **Chronic arteriovenous fistula causing high output state** → root cause of AF, CHF, GI bleeding

- Percutaneous closure of fistula resulted in marked improvement in patient’s course
442 consecutive patients admitted from the emergency department to an academic medicine department

Primary outcome: main diagnosis compared with final diagnosis

<table>
<thead>
<tr>
<th>Modality</th>
<th>Correct Senior Resident</th>
<th>Diagnoses (%) Hospitalist</th>
</tr>
</thead>
<tbody>
<tr>
<td>History alone</td>
<td>19.8</td>
<td>19.3</td>
</tr>
<tr>
<td>Physical exam alone</td>
<td>0.8</td>
<td>0.5</td>
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<tr>
<td>Basic tests alone</td>
<td>1.1</td>
<td>1.3</td>
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<tr>
<td>History and Exam</td>
<td>39.5</td>
<td>38.6</td>
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<tr>
<td>History, Exam, and basic tests</td>
<td>16.9</td>
<td>18.5</td>
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<tr>
<td>Role of imaging on admission</td>
<td>6.5</td>
<td>6.1</td>
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Arch Intern Med. 2011;171(15):1393-1400
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References

- J. Porter et al., A Case of Femoral Arteriovenous Fistula Causing High-Output Cardiac Failure. Case Rep Vasc Med; 2014;510429.
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