Late Cardiac Effects of Chest Radiation

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History

• 57 yr old female
• Diagnosed with Hodgkin disease at age 15
• Treated with mantle radiation (dose unknown)
• Late effects of radiation:
  – Breast cancer – treated with bilat masectomy and tamoxifen
  – 2nd degree heart block – treated with pacemaker
  – Aortic stenosis
  – Non-obstructive CAD
History

- She complains of a decline in exercise tolerance
- She notes fatigue after walking 2-3 blocks at a slow pace
- She notes new exertional chest tightness

Physical Exam

- Gen: No acute distress
- Vitals: BP=140/70, HR=90
- Neck: Nml JVP, Carotid upstrokes
- Lungs: Clear
- Cor: Nonpalpable apical impulse, RRR, 3/6 late peaking systolic murmur at the LUSB with radiation to the carotids
Echocardiogram

LVEF = 50%
GLS = -9.5%
Peak vel=3.5 m/sec
Peak grad=48 mmHg
Mean grad=25 mmHg
AVA=0.9 cm² (0.5 cm²/m²)
DI=0.28
SVI=39 ml/m²
20 mcg/kg/min Dobutamine

- Peak vel=4.4 m/sec
- Peak grad=78 mmHg
- Mean grad=43 mmHg
- AVA=0.9
- DI=0.28
- SVI=43 ml/m²

Cardiac Cath
IVUS of the left main

• Prox LM: 2.7x3.5 (7.4 mm²)
• Distal LM: 1.8x2.5 (3.4 mm²)*
• Prox LAD: 3.2 x 3.25 (8.6 mm²)
• Distal LM showed Fibrocalcific plaque

*significant lesion: MLA < 4.5 mm

How would you manage this patient?

A. Medical therapy
B. Cardiac surgery for AVR + CABG
C. TAVR + PCI LM
D. TAVR alone
E. PCI alone
Chest Radiation

• Radiation is an effective treatment for a variety of cancers
  – High dose thorax radiation used mainly in:
    Adjuvant Tx for breast cancer
    Primary treatment of lung, esophageal cancer
    Complement to systemic treatment in lymphoma.
• Radiation to the chest can lead to late effects on the heart
• Cardiac damage from radiation has been seen most often in patients treated for Hodgkin’s disease

Mechanisms of Radiation Induced Cardiac Injury

• Damage is due to inflammation and scarring of coronary arteries, valves, pericardium, conduction system and myocardium.
• Underlying pathophysiological mechanisms may be related to micro- and macrovascular damage
**Manifestations of Radiation-Induced Cardiac Injury**

**Risk Factors for Radiation-Induced Cardiac Injury**

- Young age at time of treatment
- High cumulative radiation dose (>30 Gy)
- High dose of radiation fractions (>2 Gy/day)
- Anteriorly weighted radiation fields
- Lack of subcarinal shielding
- Concomitant anthracyclines
- Cardiovascular risk factors/prior cardiac disease
- Long follow-up
Late CV Disease in Hodgkin’s Pts Treated with XRT

- 415 pts treated from 1962-1998 retrospectively reviewed. Median follow-up: 11.2 yrs
- 10.4% developed CAD a median of 9 years after treatment
- 7.4% developed carotid and/or subclavian artery disease a median of 17 years after treatment
- 6.2% developed clinically significant valvular dysfunction a median of 22 years after treatment
- Freedom from any cardiovascular morbidity:
  - 88% at 15 years
  - 84% at 20 years.

Hull MC et al. JAMA 2001;290(21):2831-2837

Thank You