His Bundle Pacing in Bundle Branch Block

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Biventricular Pacing (BiV)

- **Rationale**
  - Clearly BiV pacing is superior to RV pacing in HF patients with EF <35% and wide QRS (LBBB > 150 ms)
  - It has to be better in patients with reduced EF (as well as normal EF) and requiring ventricular pacing (pacing induced BBB)

- **Two large trials**
  - BLOCK-HF & BIOPACE
BLOCK-HF (primary endpoint driven by LVSVI change)

BLOCK-HF (HF urgent visit)
Indications for V pacing, any EF (PR >220 ms)
• 27 pts. with LBBB (24 pts. with prolonged HV conduction)

• 25 pts. with proximal HB stimulation: identical QRS complexes as baseline QRS (stimulus to QRS onset equal to HV interval)

• Pacing slightly distal: narrowing of QRS (stimulus to QRS onset < HV interval)
DL Lustgarten et al., Heart Rhythm July 2015
Permanent His Bundle Pacing for Cardiac Resynchronization Therapy
Ajijola et al., Heart Rhythm April 2017

• HBP successful in 16/21 pts with BBB who qualified for CRT
Cases

- Case 1: Failed LV lead at implant
- Case 2: Prior failed LV lead in a patient with congenital heart disease and pacer dependent
- Case 3: Pacing induced LBBB in a congenital heart block patient
Case # 1

- 75 year old female with complete infra-nodal heart block, underwent implantation of dual chamber pacemaker 15 years ago
- Presented with SCA attributed to LQTS (?); underwent upgrade to a dual chamber ICD 3 years later
- Present in 2015 with RV lead fracture (resulting in noise and pacemaker inhibition) and a wide complex ventricular escape rhythm
- EF had been steadily declining over the past 3 years (from 54% to 25%) with NYHA class II HF symptoms
- Consented to CRT-D upgrade with RV lead revision
Case #1

RV pacing

Escape Rhythm for 48 hrs.
Case # 1

- RV coil found to be in the middle cardiac vein
- Only suitable anatomy was the anterior interventricular vein
- Attempted but phrenic nerve capture and high thresholds
- Attempted His bundle pacing
EGMs via Pace-Sense Analyzer

His

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Follow-up: Echo at 2 months- EF 50%, NYHA Class I symptoms
His pacing threshold 0.25V @ 1ms

His Lead
Case # 2

• 52 year old female with Tetralogy of Fallot repair at age 2
• Developed several atrial arrhythmias over the years and underwent multiple ablations
• Underwent AVJ ablation and placement of a biventricular pacemaker 6 years ago
• 2 years later, LV lead turned off due to very high pacing thresholds and diaphragmatic stimulation
Case # 2

- 6 months later, she started to develop progressive shortness of breath and exertional fatigue
- EF declined to 35%; Epicardial lead placement was offered
- She sought a second opinion at our congenital heart clinic
- She was referred for consideration for HBP
- Challenges: surgical repair and AVJ ablation- unsure if I would be successful; plan for LV lead revision
Paced Rhythm
HBP-1.5V @ 1 ms, EF 54% at 2 months

- Used a dual chamber PPM
- Programmed DVIR mode with His lead in atrial port
- Only pacing output is from the His lead
- After 3 months, programmed at 2.5V @ 1ms
Case # 3

• 19 year old with hx of congenital CHB dx at age 6
• In 2015 (at age 17), he underwent Boston Scientific DDD-PPM
• Presented in October 2016 with severe HF, shock liver, multisystem organ failure & evaluation for LVAD & transplant
• ECHO:
  – EF 14%, biventricular failure, severe dilatation of both RV and LV
Case # 3

• HF team suspected possible pacing induced cardiomyopathy (PIC)

• EP consulted for HBP

• Pt treated with milrinone and dobutamine for 1 week along with aggressive diuresis prior to undergoing his procedure
RV paced ECG (QRS 200 ms)
HBP (QRS 128 ms)
(total procedure time 30 minutes; used same device)
HBP (4 days later); electrical remodeling (QRS 108 ms)
Metabolic Profile (red indices- day after HBP initiated)
Routine outpatient check (6 months later)
Conclusions

• Permanent His bundle pacing can be done safely, effectively, and with a possibility for excellent clinical outcomes in patients with heart block and bundle branch blocks

• With increasing interest from the EP community, it is likely to gain more traction in the coming years

• Investment into technology (sheaths, lead designs, programming parameters, etc.) are needed to advance the field

#dontdisthehis