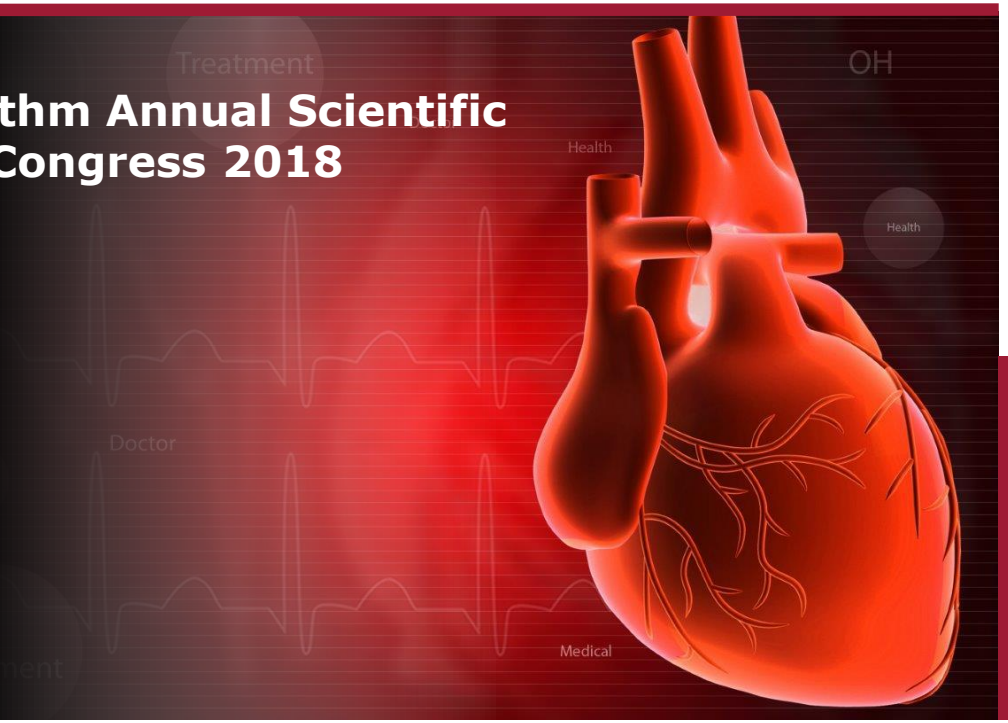
CardioLights
International Conferences Review

Highlights from the Heart Rhythm Annual Scientific Sessions and EHRA Europace Congress 2018



Dra. Érika Olivier Vilela Bragança

Hospital viValle (Rede D'Or)

Hospital Regional

Hospital Santos Dumont

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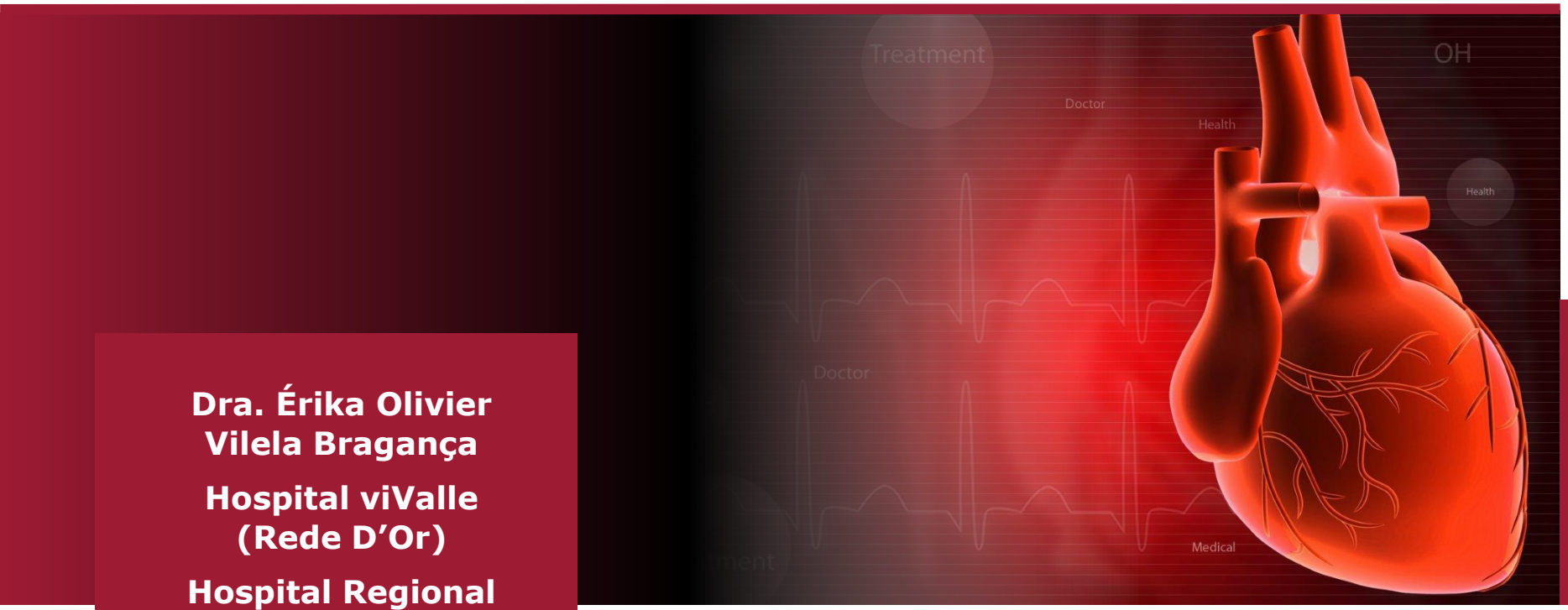
Disclaimer

- Não há conflito de interesse nessa apresentação

Novas Fronteiras na Estimulação Cardíaca



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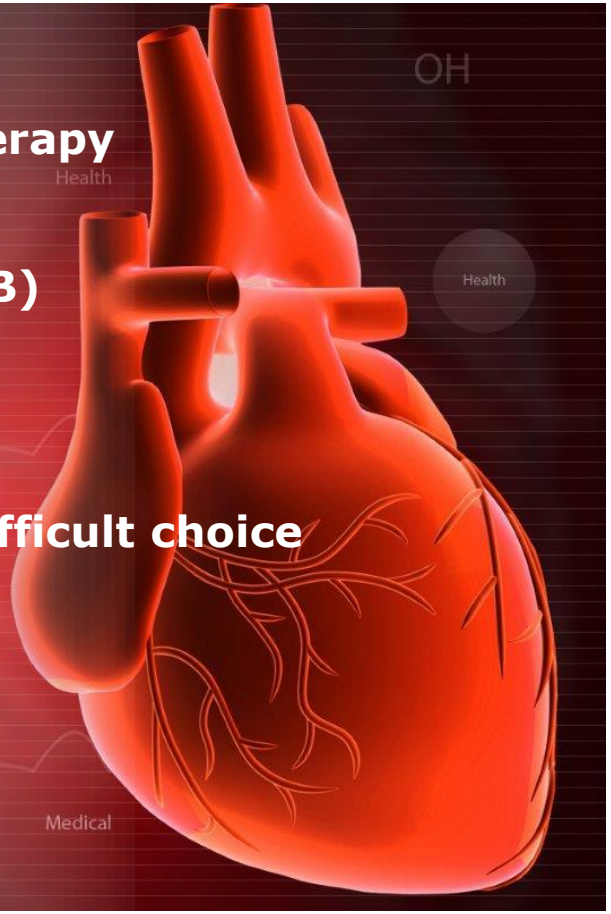
Estimulação Hissiana - A Verdadeira Estimulação Fisiológica

EHRA 2018

Sessão:	**Latest advances in pacing therapy**
Título:	**His bundle pacing**
Palestrante:	**Zachary Whinnett (London,GB)**
Data:	**18/03/2018**
Hora:	**14:00h**
Sessão:	**CRT pacing modalities: the difficult choice**
Título:	**His bundle pacing**
Palestrante:	**Jagmeet Singh (Boston, US)**
Data:	**19/03/2018**
Hora:	**08:30h**



CardioLights International Conferences Review

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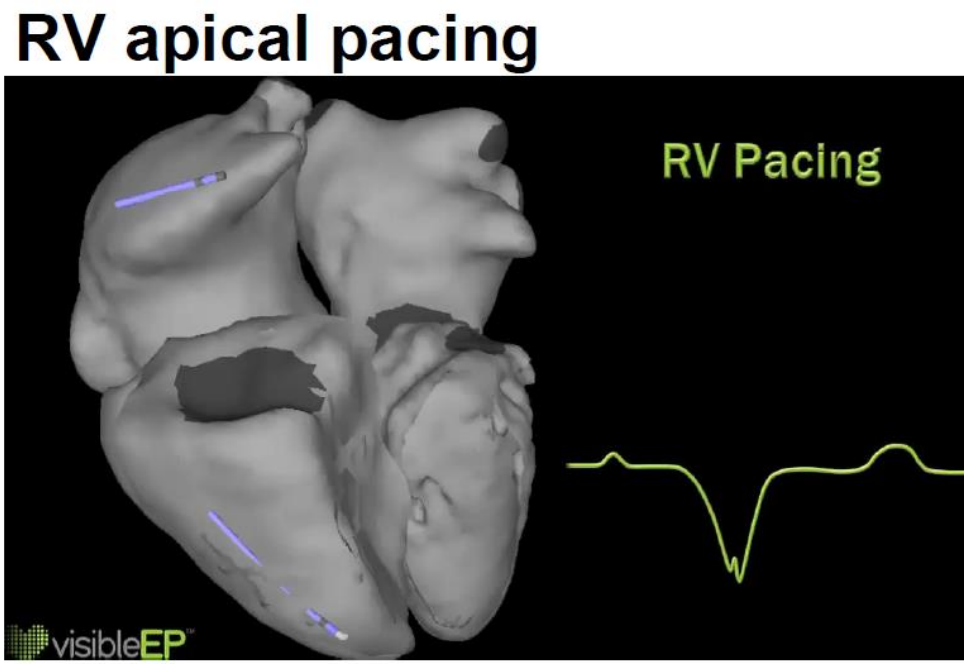
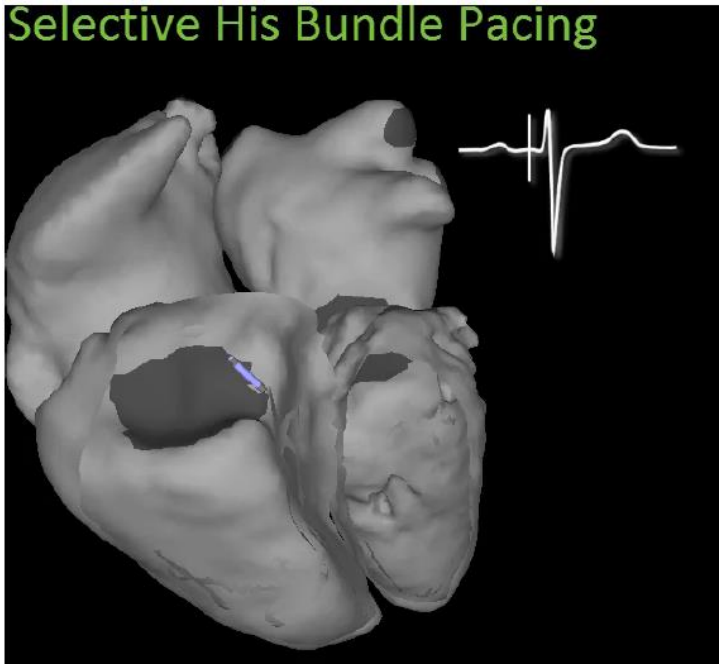
His Bundle Pacing





Peter Spector University of Vermont

His Bundle Pacing

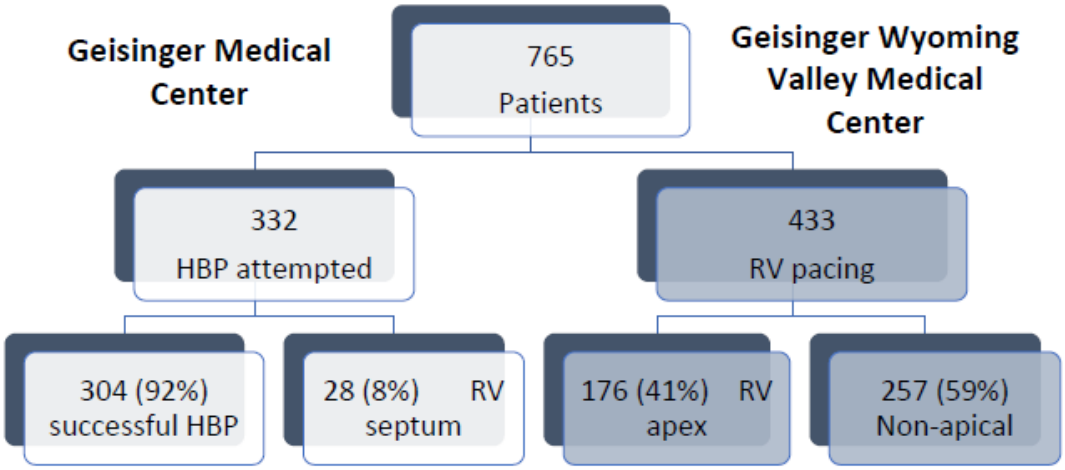
Permanent His Bundle Pacing Is Associated with Reduction in Morbidity and Mortality Compared to Right Ventricular Pacing: Results From Geisinger His Bundle Pacing Registry.

Abdelrahman M / Vijayaraman, P et al, JACC 2018 (Late Breaker ACC March 2018

His Bundle Pacing

Non-randomized, observational cohort study

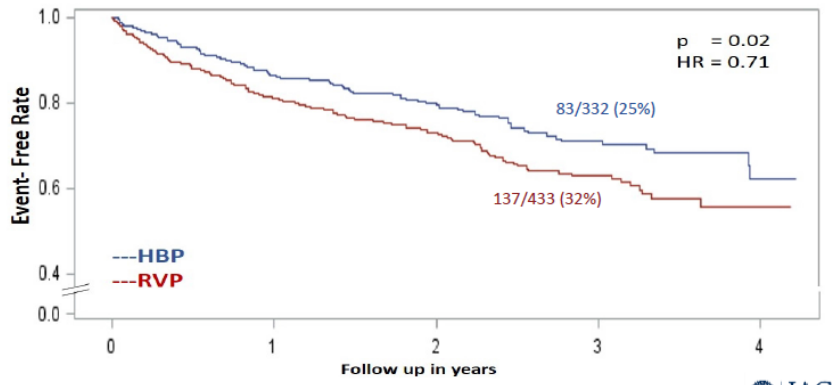
All patients undergoing new permanent pacemaker implantation for bradycardia indications



- Mean Follow-up duration 725 ±423 days
- 220 reached the primary endpoint

His Bundle Pacing

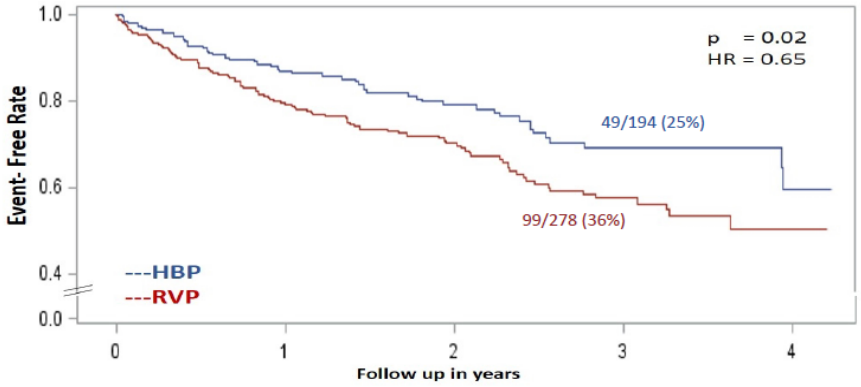
Primary Outcome (Death, HFH or upgrade to biventricular pacing) - *All patients-*



Abdelrahman M, Subzposh FA, Beer D, Durr B, Naperkowski A, Sun H, Oren JW, Dandamudi G, Vijayaraman P, Clinical Outcomes of His Bundle Pacing Compared to Right Ventricular Pacing, Journal of the American College of Cardiology (2018), doi: 10.1016/ j.jacc.2018.02.048.

JACC

Primary Outcome (Death, HFH or upgrade to biventricular pacing) - *Patients with VP >20%-*

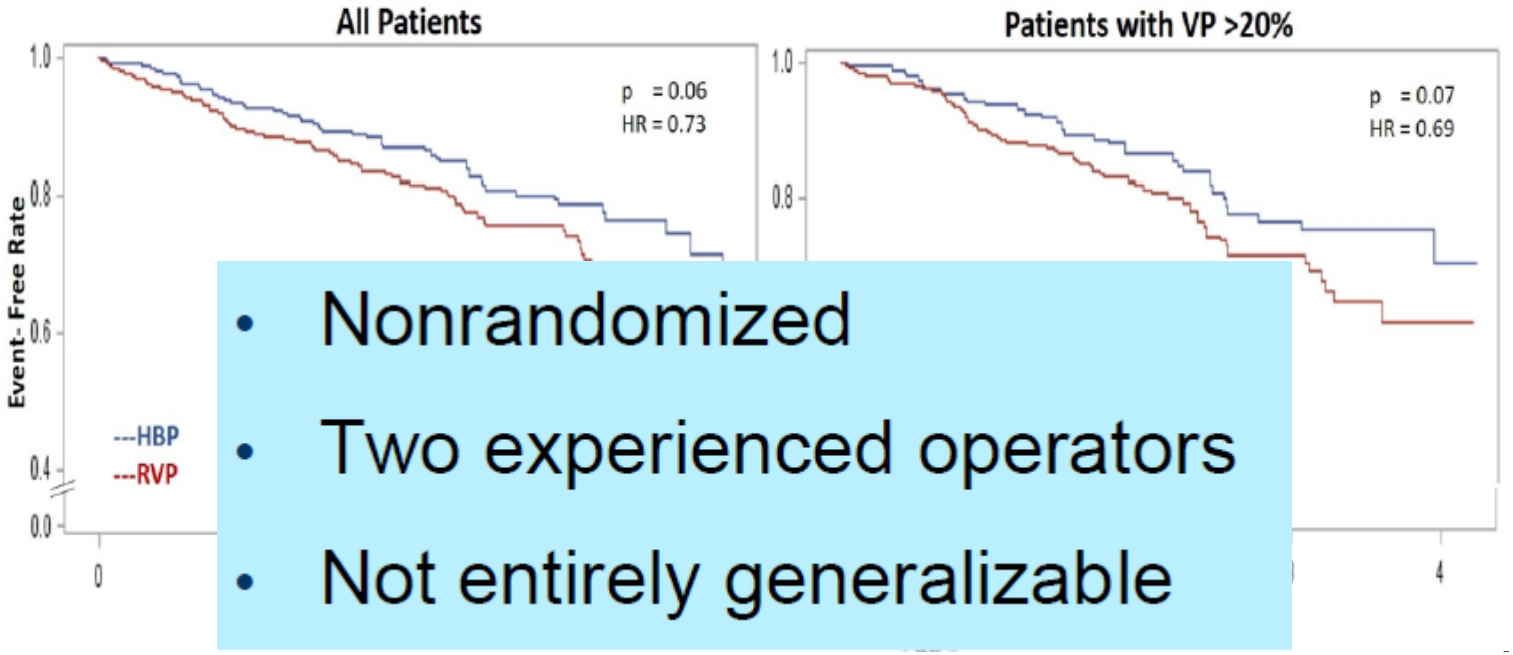


Abdelrahman M, Subzposh FA, Beer D, Durr B, Naperkowski A, Sun H, Oren JW, Dandamudi G, Vijayaraman P, Clinical Outcomes of His Bundle Pacing Compared to Right Ventricular Pacing, Journal of the American College of Cardiology (2018), doi: 10.1016/ j.jacc.2018.02.048.

JACC

His Bundle Pacing

All- Cause Mortality



- Nonrandomized
- Two experienced operators
- Not entirely generalizable

Abdelrahman M / Vijayaraman, P et al, JACC 2018 (Late Breaker ACC March 2018

His Bundle Pacing

AV optimisation delivered with direct His bundle pacing, in patients with heart failure, long PR without left bundle branch block: randomised multi-centre clinical outcome study.
The His Optimised Pacing Evaluated for Heart Failure Trial

HOPE HF

AV delay optimisation delivered with His bundle pacing

↓

Long PR interval, narrow QRS/RBBB and LV impairment

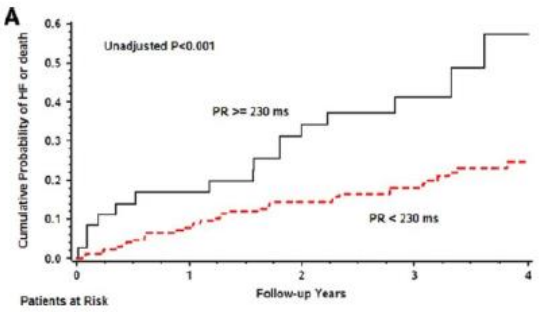
↓

Improve objective exercise capacity?

Imperial College London

British Heart Foundation

MADIT study
ICD arm non LBBB pts



Valentina Kutyifa et al. Circ Arrhythm Electrophysiol. 2014;7:645-651

Study Design

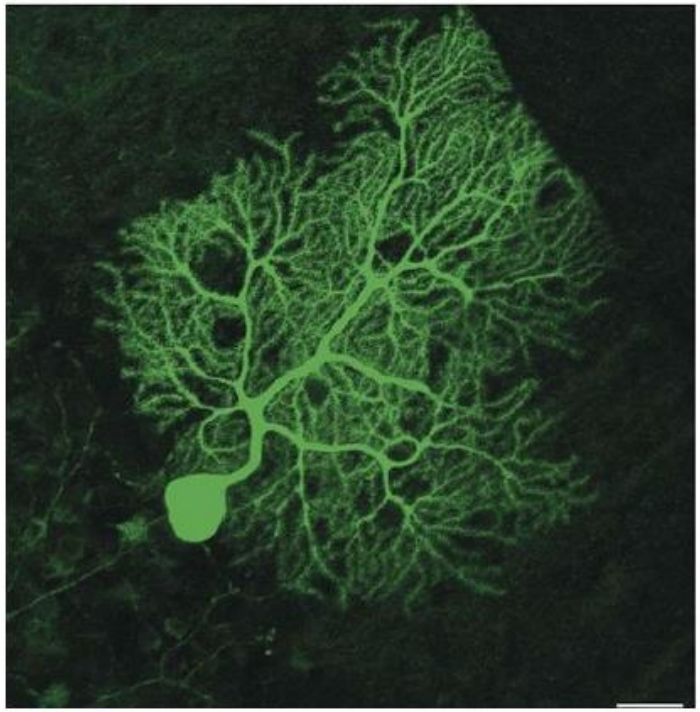
Study Type:	Interventional (Clinical Trial)
Estimated Enrollment:	160 participants
Allocation:	Randomized
Intervention Model:	Crossover Assignment
Masking:	Double (Participant, Outcomes Assessor)
Primary Purpose:	Treatment
Official Title:	AV Optimisation Delivered With Direct His Bundle Pacing, in Patients With Heart Failure, Long PR Without Left Bundle Branch Block: Randomised Multi-centre Clinical Outcome Study.
Study Start Date:	January 2016
Estimated Primary Completion Date:	October 2019
Estimated Study Completion Date:	October 2019

His Bundle Pacing

Concerns

Conduction Tissue Disease- Complex, Patchy & ? Progressive

- His Purkinje Disease
  - Complex & undefined
  - Not all BBB's are the same
  - Not Discrete
  - Often progressive and patchy
- Progressive myopathies, are often times more than just electrical
  - Electro-mechanical uncoupling



His Bundle Pacing

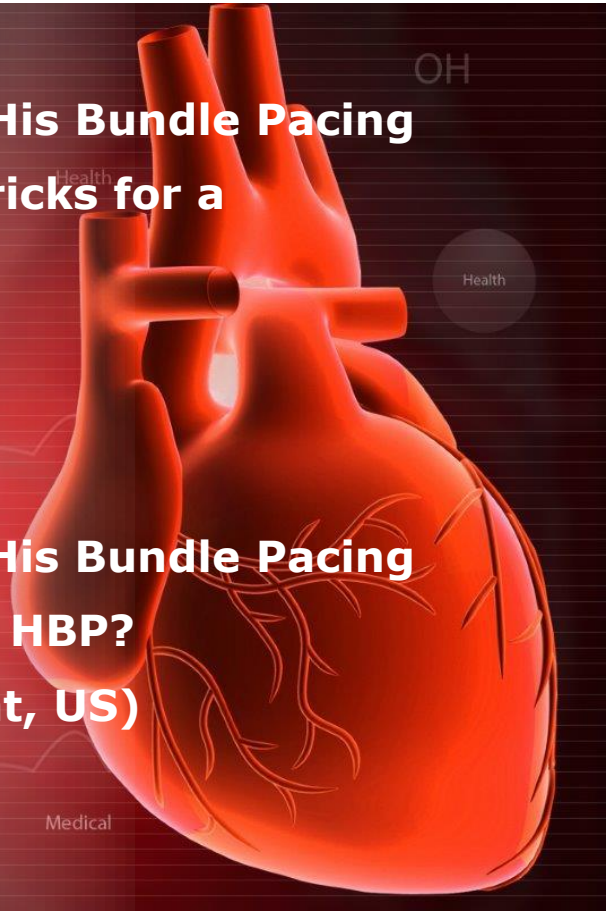
Contemporary Technical Challenges
with His Bundle Pacing

- Experience counts
- Anatomic variation & its challenges:
  - Inability to record His (8-10%)
  - Inability to correct conduction disturbance with HBP (8%)
  - HBP rejected due to high threshold (up to 10-30%)
  - HBP rejected due to inability to fixate (up to 10-24%)
  - Rising thresholds a problem often seen
- Notably, there were similar & more challenges with CRT during early years

Estimulação Hissiana - A Verdadeira Estimulação Fisiológica

HRS 2018

Sessão:	**All You Need to Know About His Bundle Pacing**
Título:	**How to implant a HB lead – tricks for a successful implant**
Palestrante:	**Susan S.Kim (Chicago, US)**
Data:	**10/05/2018**
Hora:	**10:45h**
Sessão:	**All You Need to Know About His Bundle Pacing**
Título:	**Who is an ideal candidate for HBP?**
Palestrante:	**Daniel L. Lustgarten (Vermont, US)**
Data:	**10/05/2018**
Hora:	**11:00h**



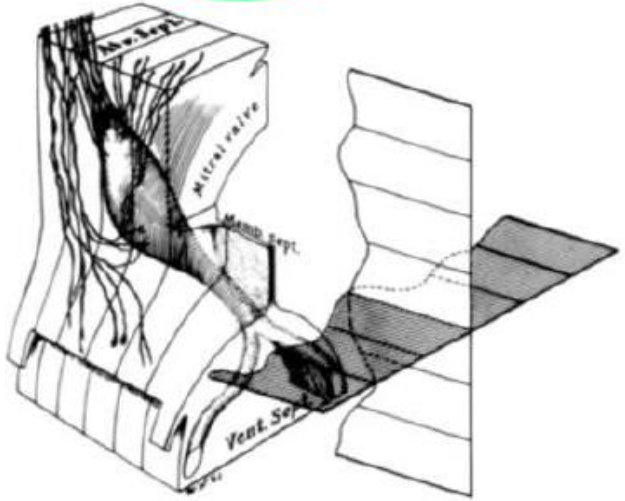
How to implant a HB lead and Who is an ideal candidate for HBP?

His Bundle Anatomy

Anatomical Configuration of the His Bundle and Bundle Branches in the Human Heart

GEORGE K. MASSING, M.D., AND THOMAS N. JAMES, M.D.

SUMMARY The relationships among the His bundle, the origin of both bundle branches, and the interventricular (IV) septum were examined histologically in 32 human hearts, and the entire bundle demonstrating multiple fiber groups which fanned out over the entire left septal surface. The LBB did not divide into two discrete divisions without multiple interconnections. The RBB formed an



Circulation 1976

# Pts	Membranous Septum	Interventricular Septum
20	Partially within Inferior Aspect	Left crest of IVS
5	---	Coursed to the right of the IVS
3	Totally within Inferior Aspect	---
4	*Below*	*Coursed entirely to the left of the IVS*

How to implant a HB lead and Who is an ideal candidate for HBP?

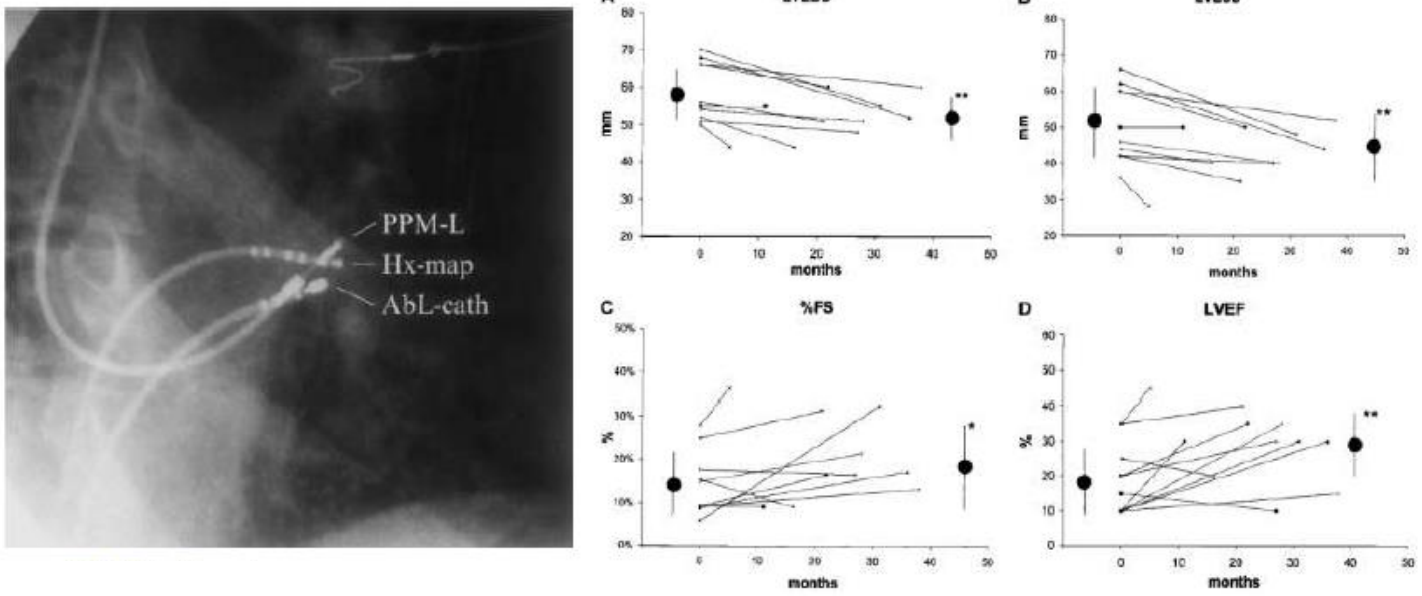
Permanent His-Bundle Pacing

First Clinical Description

Permanent, Direct His-Bundle Pacing

A Novel Approach to Cardiac Pacing in Patients With Normal His-Purkinje Activation

Pramod Deshmukh, MD; David A. Casavant, MS; Mary Romanyshyn, CRNP; Kathleen Anderson, BSN



Deshmukh et al. Circulation. 2000

How to implant a HB lead and Who is an ideal candidate for HBP?

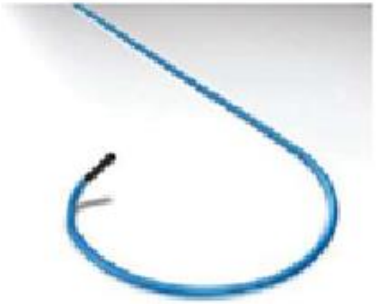
Implant Technique

Delivery System

Select Secure 3830 Lead

4 French Exposed Helix

Lumenless



- *Non-deflectable*
- *Secondary curve toward septum*

C315 His Sheath

7F Short Sheath

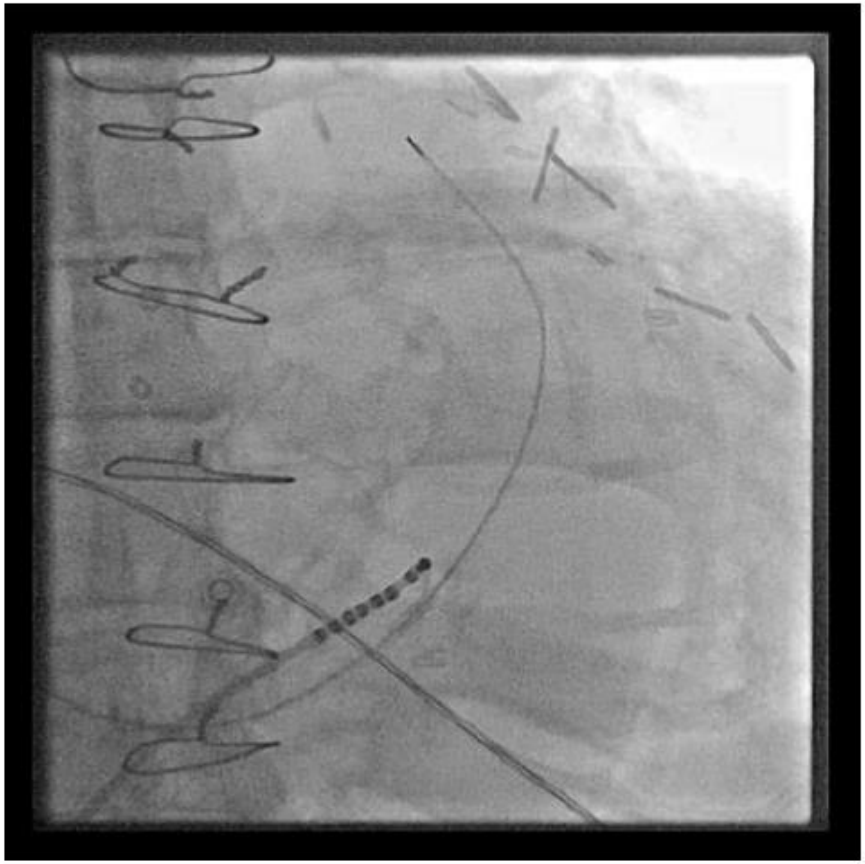
C304 Deflectable Sheath

9F Short Sheath

How to implant a HB lead and Who is an ideal candidate for HBP?

Sheath and Lead Positioning

- Advance long wire to RVOT
- Advance fixed sheath over wire without dilator
- Advance sheath past the valve up to RVOT



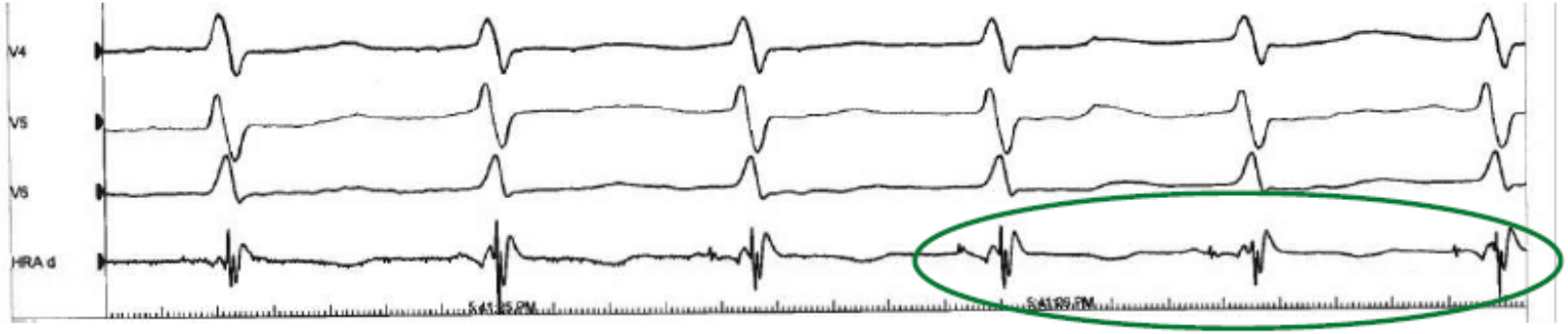
How to implant a HB lead and Who is an ideal candidate for HBP?

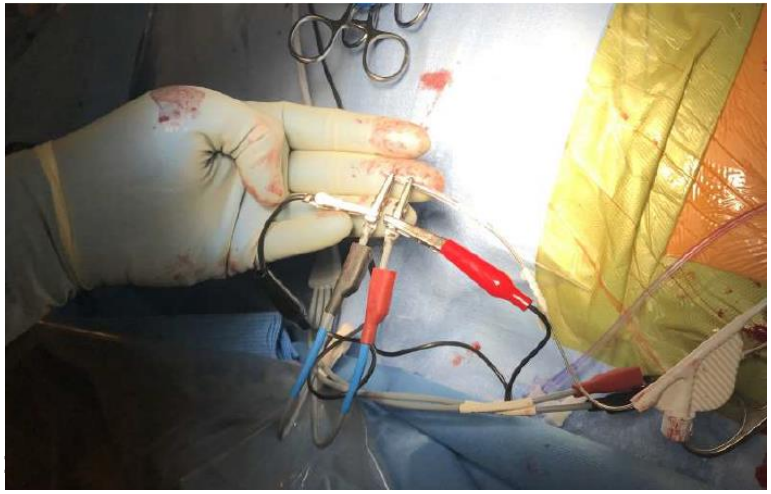
Sheath and Lead Positioning

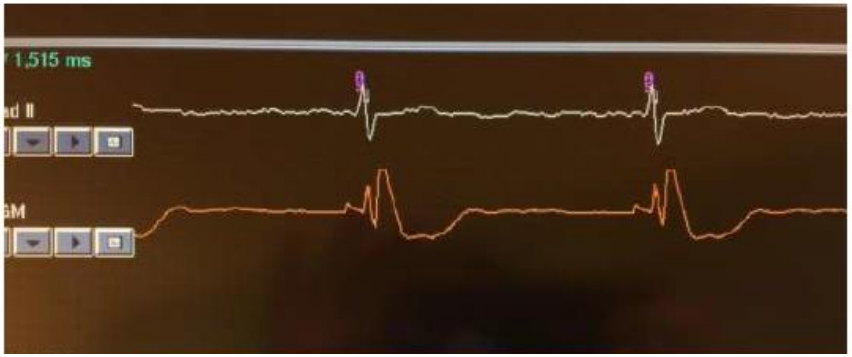
- Advance lead to distal end of sheath, just inside
  - Connect Unipolar
- Counterclock sheath (toward septum) and slowly retract
- Follow EGM

How to implant a HB lead and Who is an ideal candidate for HBP?

Follow EGM: On Recording System & On PSA







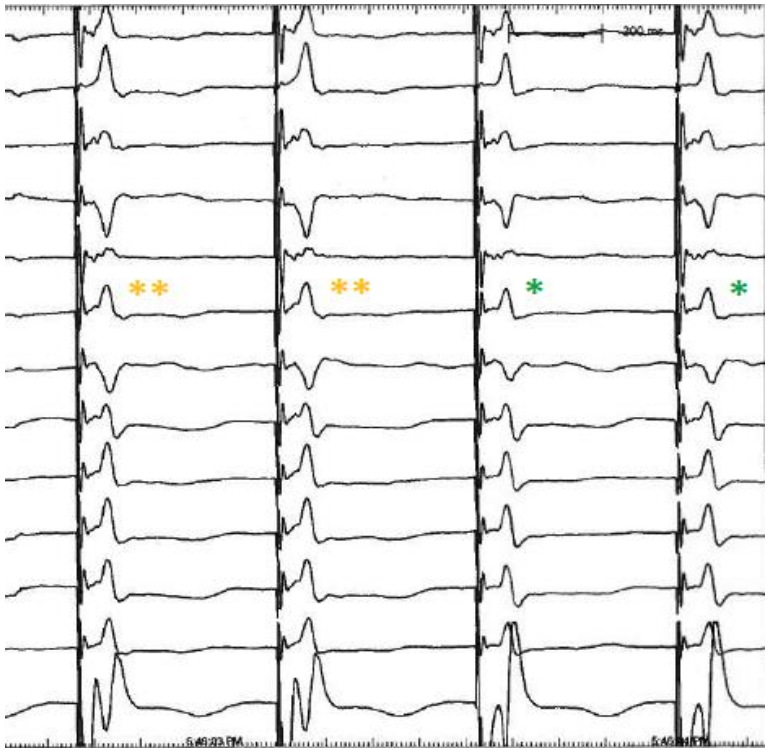
Recording His Lead EGM on Recording System

How to implant a HB lead and Who is an ideal candidate for HBP?

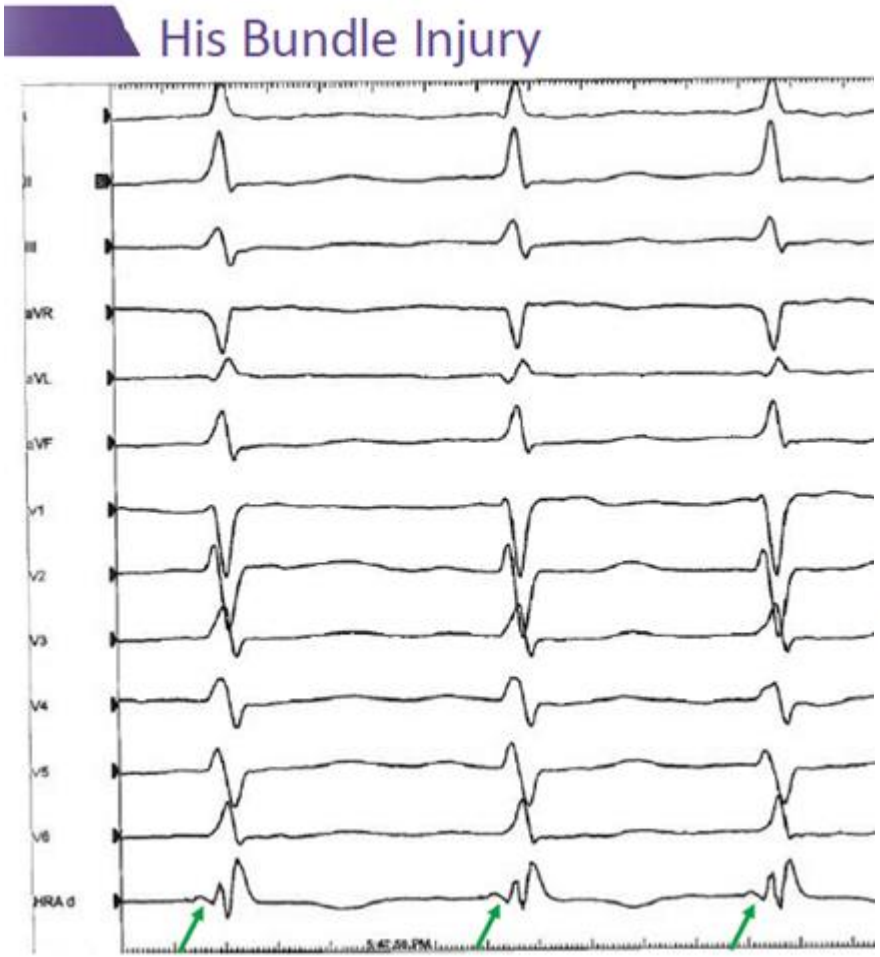
Pace to Assess Quality of Capture

- **Non-Selective Capture**
  - Parahisian capture (His +RV)
  - Presence of a pseudo-delta wave following pacing artifact on surface QRS
- **Selective His-Bundle Capture**
  - Pure His-Bundle capture
  - Isoelectric period following pacing artifact on surface QRS

Non-Selective (His + RV**)→ Selective (His, only*)

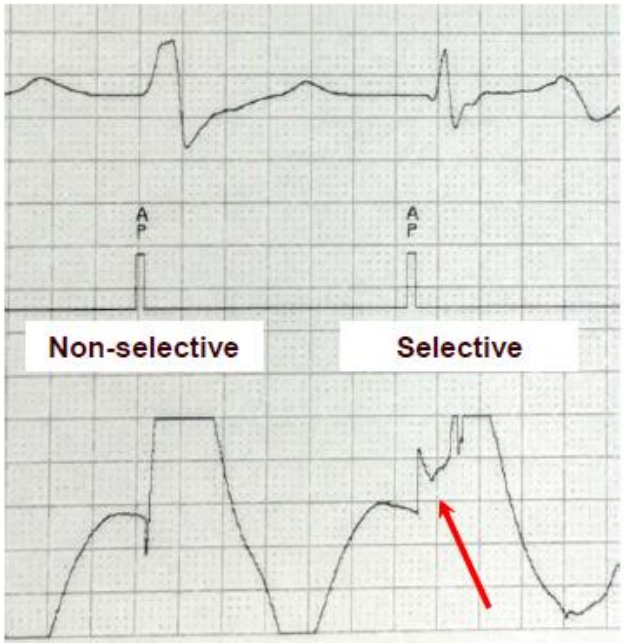


How to implant a HB lead and Who is an ideal candidate for HBP?



Lead II

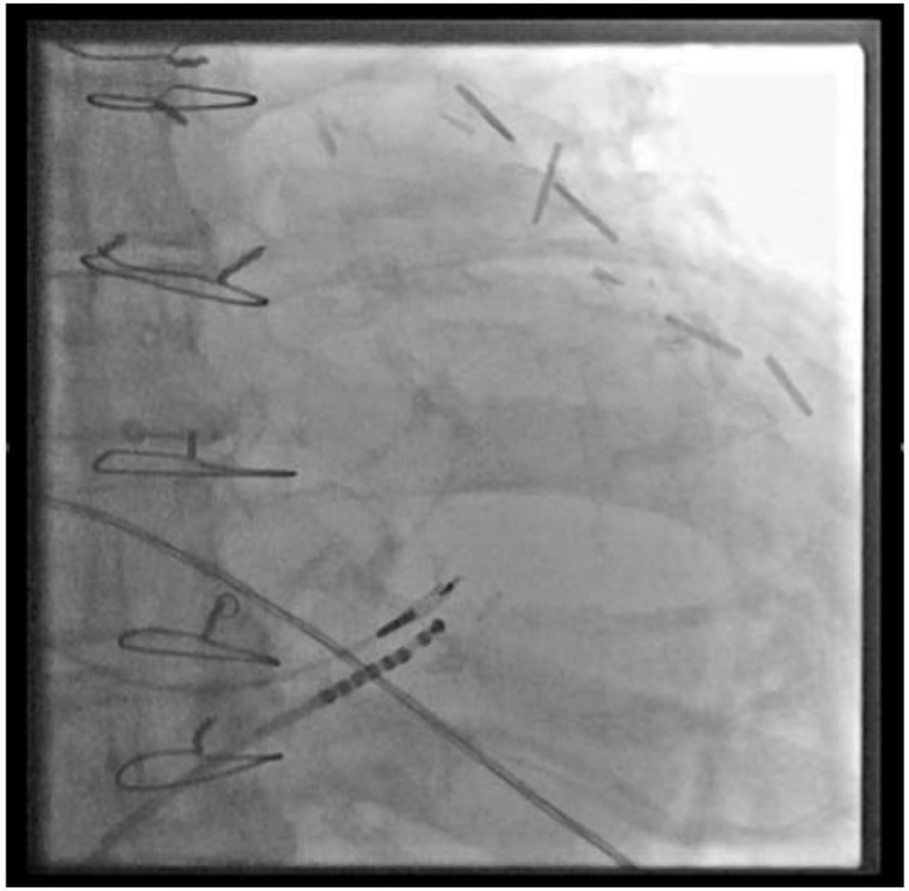
Unipolar Recording



How to implant a HB lead and Who is an ideal candidate for HBP?

Lead Fixation

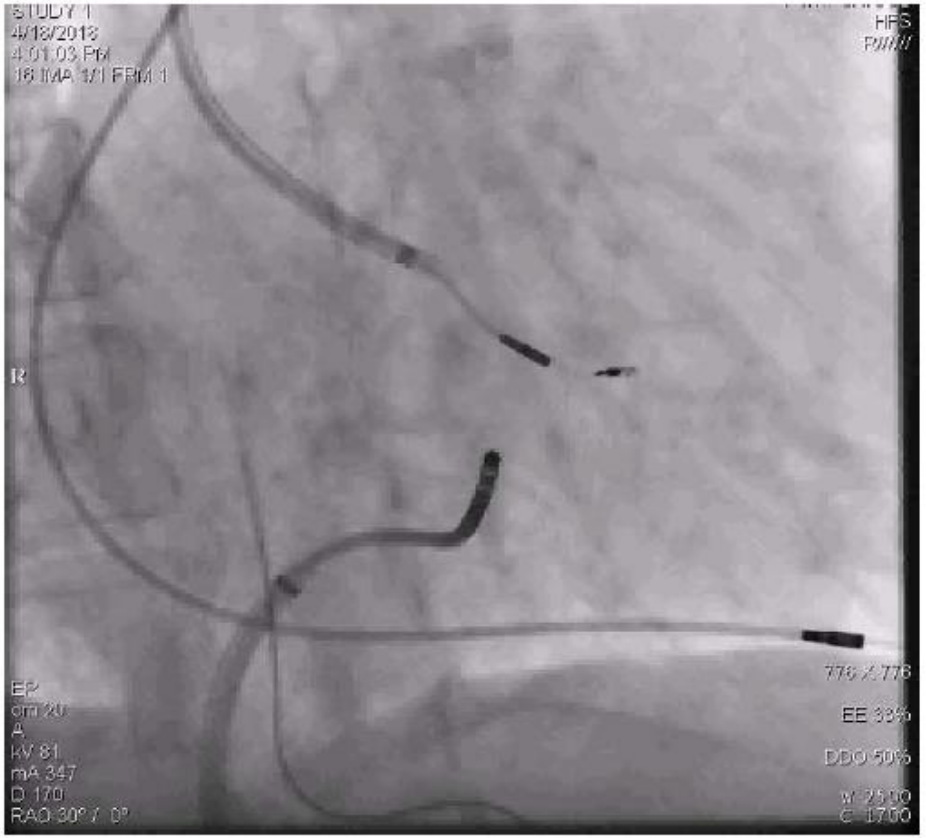
- Disconnect lead from alligator clips and turn clockwise to drive fixed screw tip into tissue



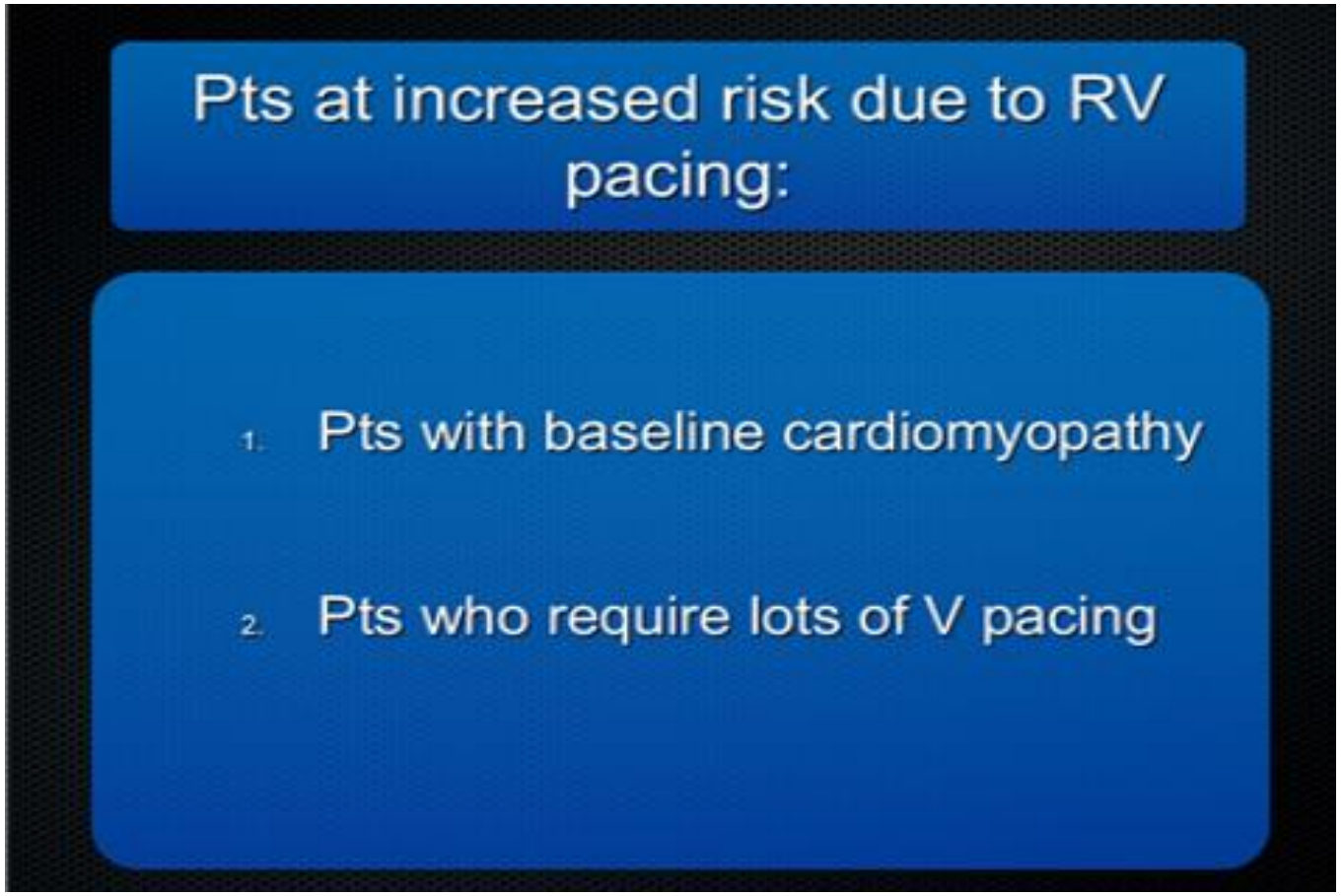
How to implant a HB lead and Who is an ideal candidate for HBP?

After Assessing Response to Pacing

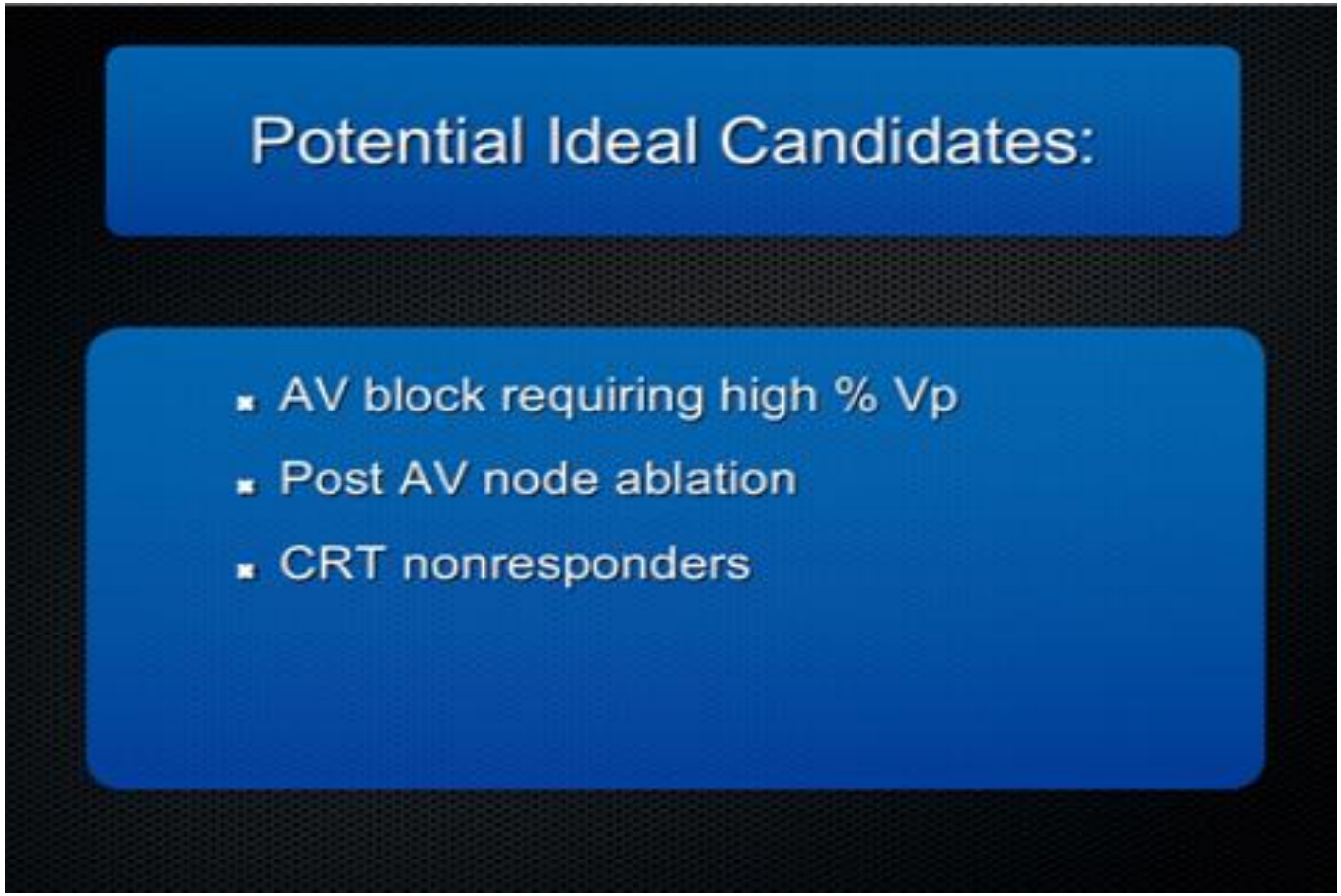
- Recheck local signal and response to pacing
- Withdraw sheath allowing adequate slack; slit sheath



How to implant a HB lead and Who is an ideal candidate for HBP?



How to implant a HB lead and Who is an ideal candidate for HBP?



Estimulação Hissiana - A Verdadeira Estimulação Fisiológica

HRS 2018

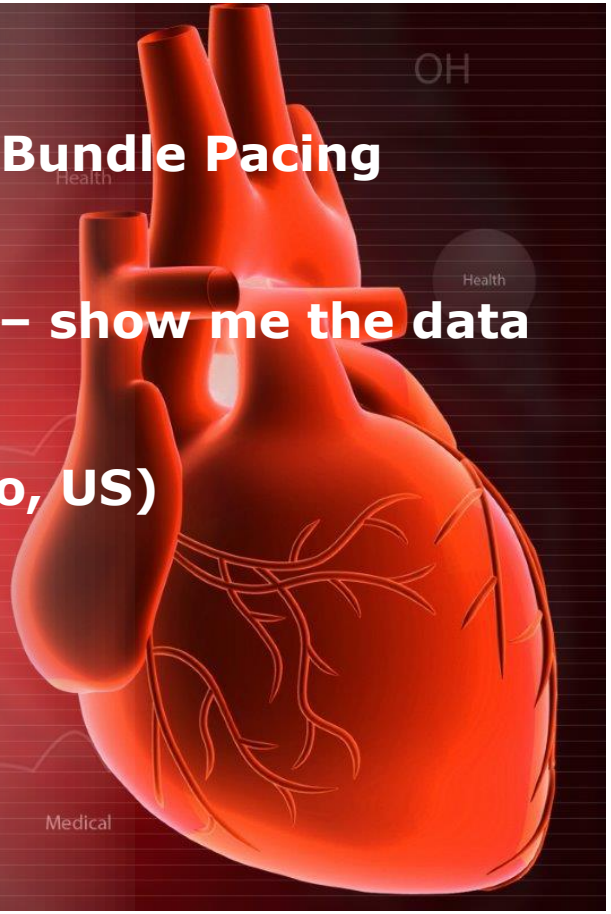
Sessão: **All You Need to Know About His Bundle Pacing**

Título: **His Bundle Pacing in lieu of CRT – show me the data**

Palestrante: **Gaurav A. Upadhyay (Chicago, US)**

Data: **10/05/2018**

Hora: **11:15h**



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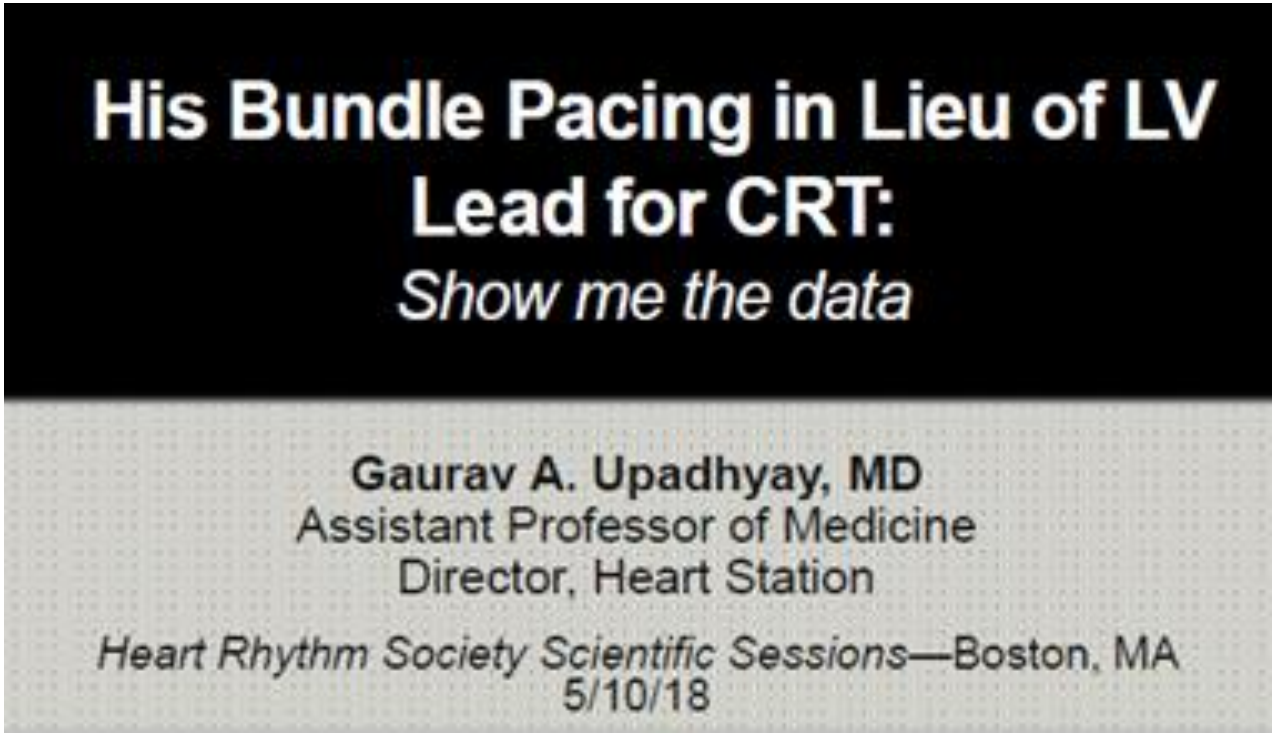
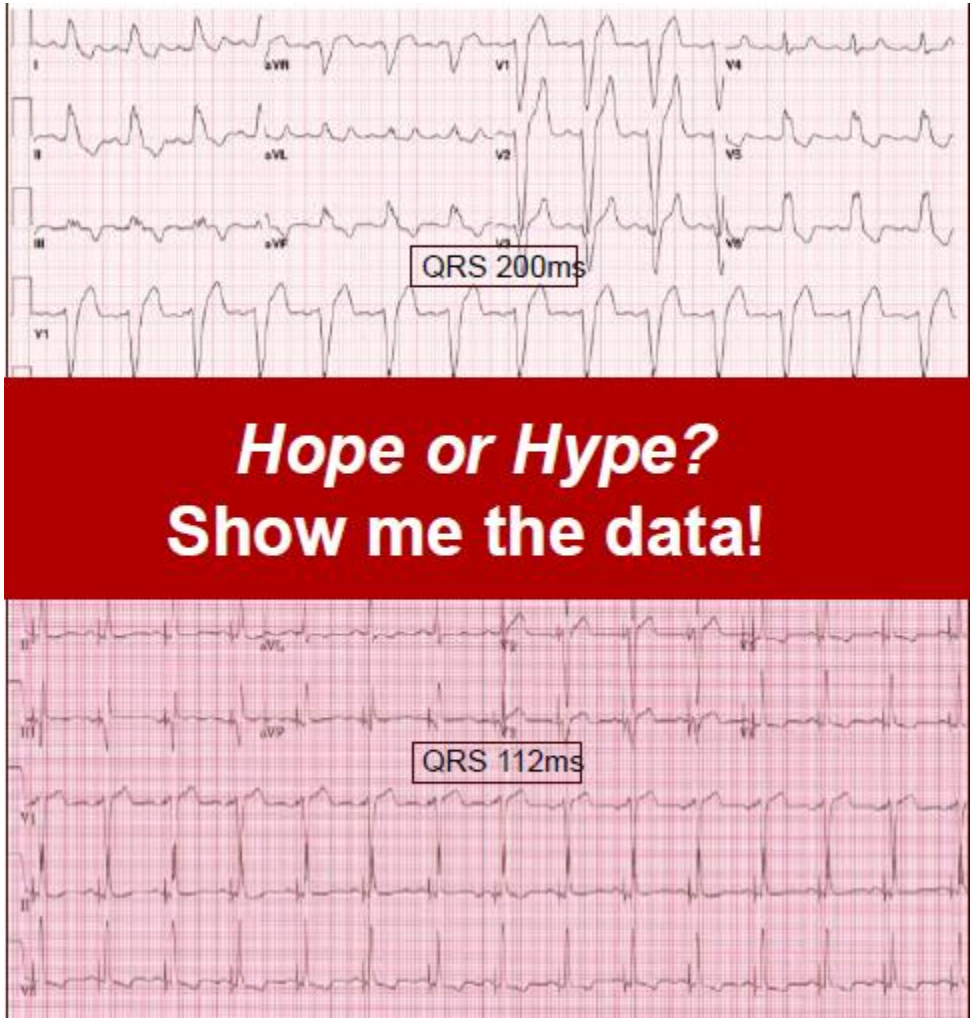
His Bundle Pacing in lieu for CRT



His Bundle Pacing in lieu for CRT



His Bundle Pacing in lieu for CRT

Case Series of Permanent HBP in CRT Eligible Patients With Prior Bundle Branch Block

Author	Year	*n* Total / *n* Implanted with BBB	Indication	His bundle lead	Implant success (%)	Primary Outcome
Barba-Pichardo et al.	2013	16 / 9	CRT implant failure	Tendril 1488T 1788TC 1888TC	56	During mean follow-up of 31.3 ± 21.5 months, NYHA Class improved III→II and LVEF improved from 29→36% (<0.05)
Lustgarten et al.	2015	29 / 17	Cross-over study of HBP and CS lead	Select-Secure 3830	59	Patients demonstrated similar NYHA Class reduction (2.0→1.9, p<0.001) and LVEF improvement from 26→32% (p=0.043)
Su et al.	2015	25 /16	CRT implant failure	Select-Secure 3830	100	Clinical outcomes not reported. HB tip-RV coil configuration demonstrated better capture thresholds and R-wave sensing than dedicated bipolar or unipolar
Ajijola et al.	2017	21 / 16	Primary HBP	Select-Secure 3830	76	NYHA Class III→II (*p*<0.001) and LVEF improved from 27±10% to 41±13% (*p*<0.001)
Sharma et al.	2017	106 / 48	CRT implant failure and Primary HBP	Select-Secure 3830	90	Among all patients NYHA Class 2.8±0.5→1.8±0.6 (*p*=0.0001) and LVEF improved from 30±10% to 43±13% (*p*=0.0001).

= 106

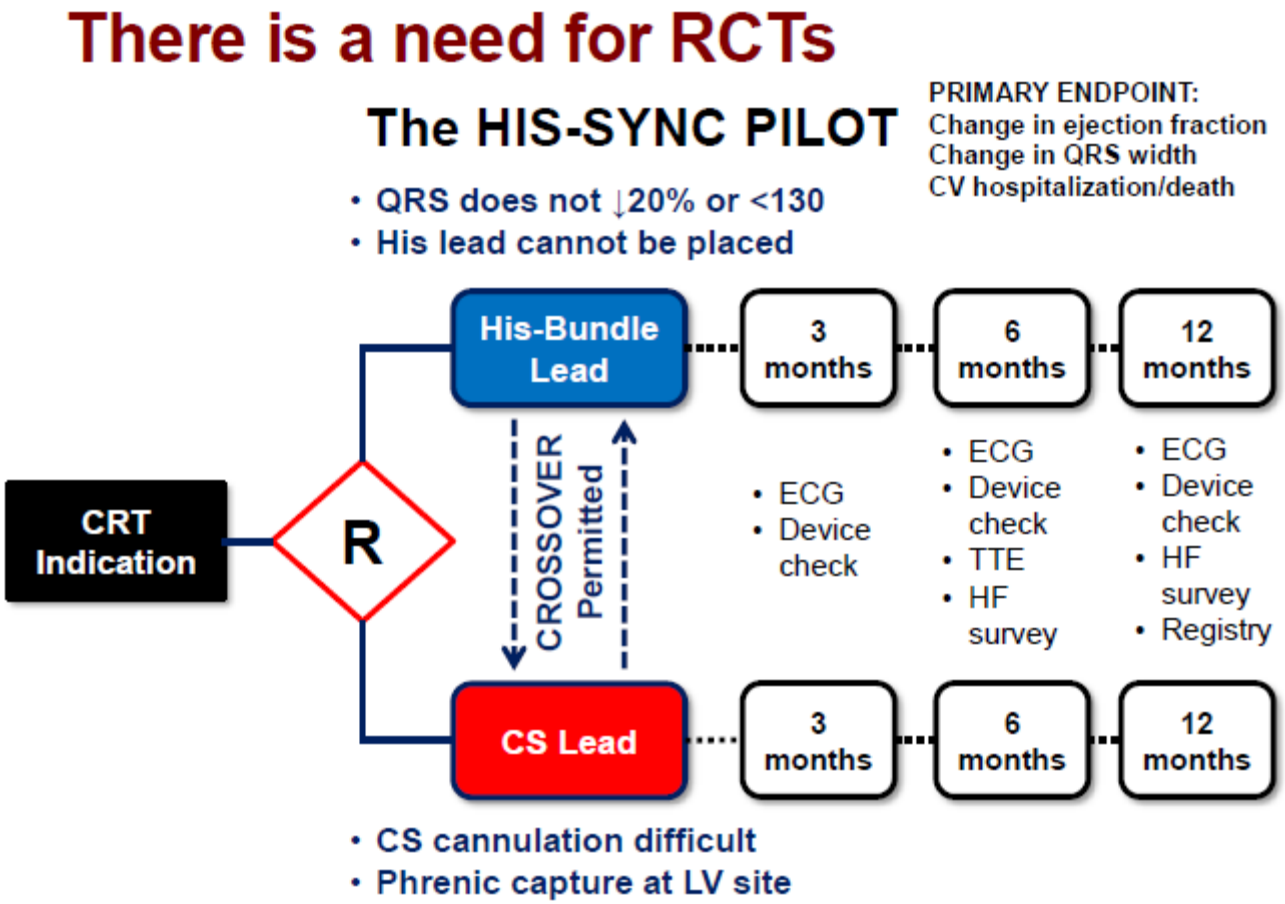
Vijayaraman…Upadhyay et al. *JACC 2018 In Press.*

His Bundle Pacing in lieu for CRT

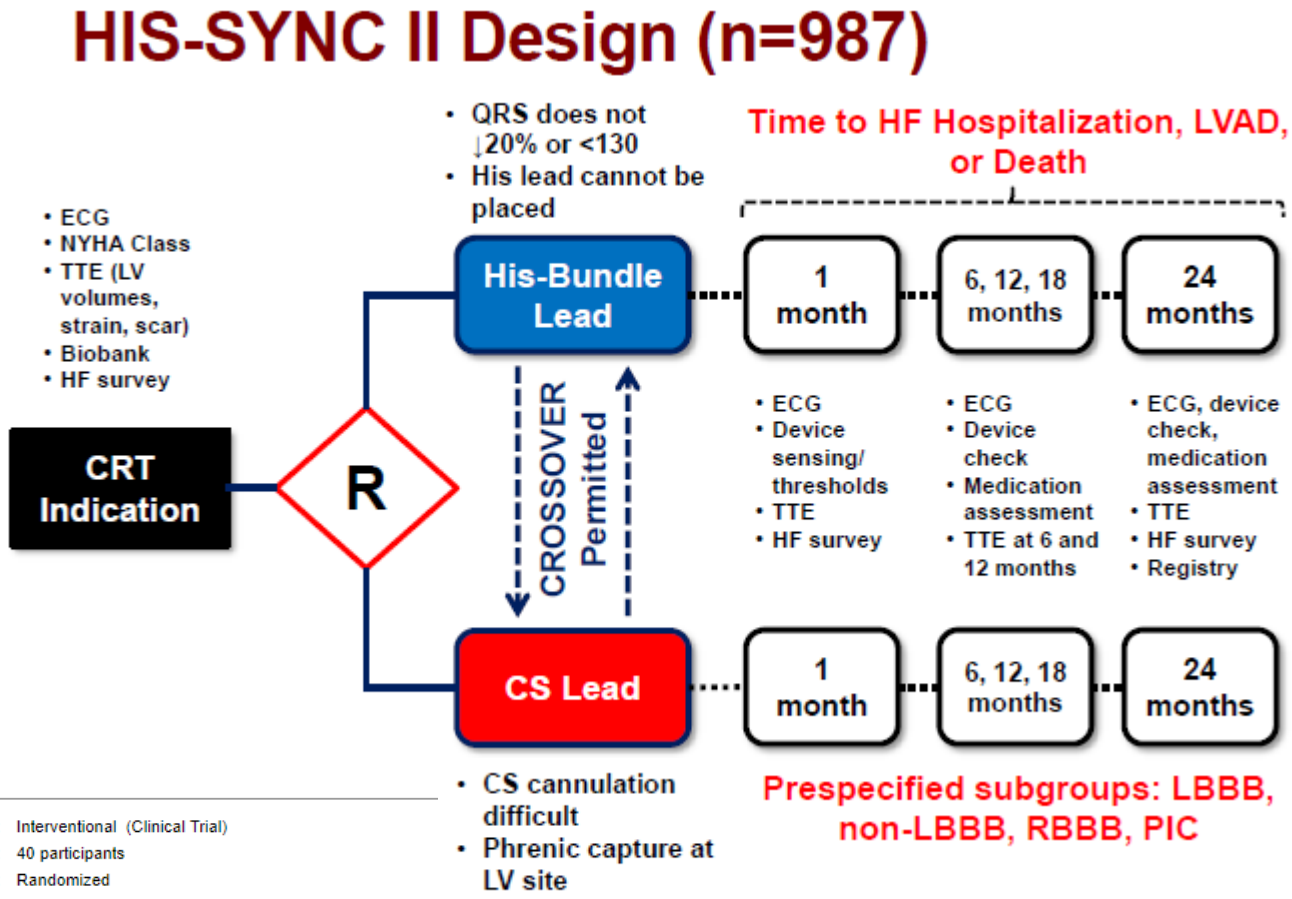
LBBB correction with His pacing—*Theories:*

- Longitudinal dissociation of His bundle
  - Pre-destination of fibers
  - Localized intra/inter-Hisian disease
- Left bundle conduction delay
  - Reset/accelerate with pacing impulse
  - Source/sink mismatch overcome with current load
- Left bundle block—proximal/high
  - Leapfrog with virtual electrode

His Bundle Pacing in lieu for CRT



His Bundle Pacing in lieu for CRT



Study Design

Study Type:	Interventional (Clinical Trial)
Estimated Enrollment:	40 participants
Allocation:	Randomized
Intervention Model:	Parallel Assignment
Masking:	Single (Participant)
Primary Purpose:	Treatment
Official Title:	His Bundle Pacing Versus Coronary Sinus Pacing for Cardiac Resynchronization Therapy
Actual Study Start Date:	May 17, 2016
Estimated Primary Completion Date:	June 2019
Estimated Study Completion Date:	June 2021

Estimulação Hissiana - A Verdadeira Estimulação Fisiológica

HRS 2018

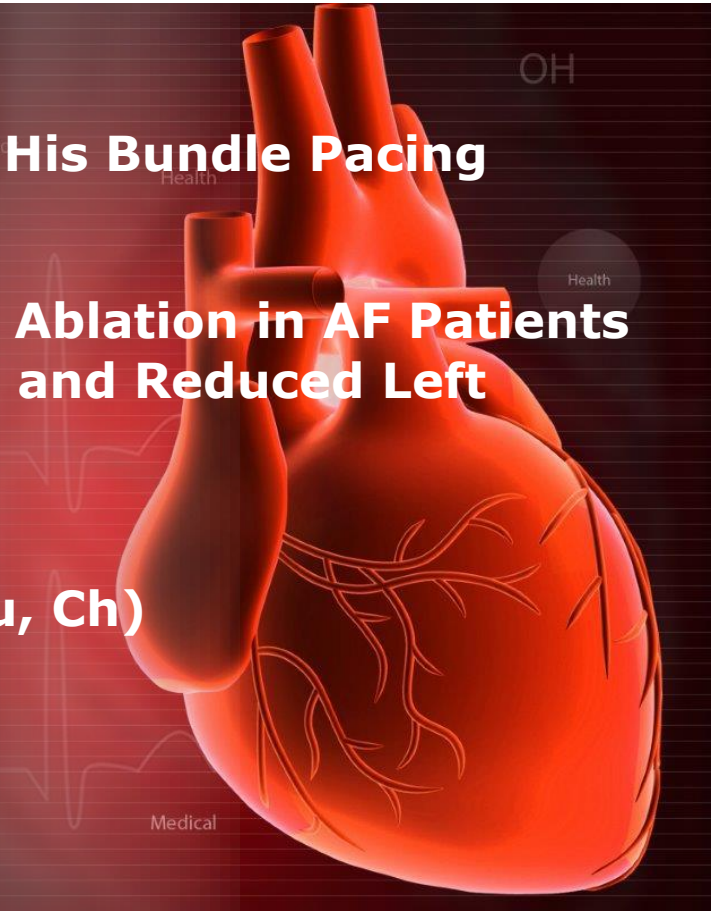
Sessão: **All You Need to Know About His Bundle Pacing**

Título: **HBP Combined With AV Node Ablation in AF Patients With HF With Both Preserved and Reduced Left Ventricular Ejection Fraction**

Palestrante: **Weijian Huang (Wenzhou, Ch)**

Data: **10/05/2018**

Hora: **11:30h**



CardioLights International Conferences Review

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HBP with AVN ablation in AF and HFpEF and HFrEF

'Ablate and Pace' therapy, CRT is superior to RV apical pacing in reducing the clinical manifestations of HF

- **Left Ventricular-Based Cardiac Stimulation Post AV Nodal Ablation Evaluation (The PAVE Study)**

J Cardiovasc Electrophysiol, Vol. 16,pp. 1160-1165, November 2005

- **Biv pacing improves cardiac function and prevents further left atrial remodeling in patients with symptomatic AF after AVNA (AVAIL CLS/CRT)**

Am Heart J 2010;159:264-70

- **CRT in patients undergoing AVNA for permanent AF: a randomized trial**

European Heart Journal (2011) 32, 2420–2429

HBP with AVN ablation in AF and HFpEF and HFrEF

Benefits of Permanent His Bundle Pacing Combined With Atrioventricular Node Ablation in Atrial Fibrillation Patients With Heart Failure With Both Preserved and Reduced Left Ventricular Ejection Fraction

J Am Heart Assoc. 2017;6:e005309. DOI: 10.1161/JAHA.116.005309.

Weijian Huang, MD; Lan Su, MD; Shengjie Wu, MD; Lei Xu, MD; Fangyi Xiao, MD; Xiaohong Zhou, MD; Kenneth A. Ellenbogen, MD

HBP post AVNA in HF patients with AF and narrow QRS

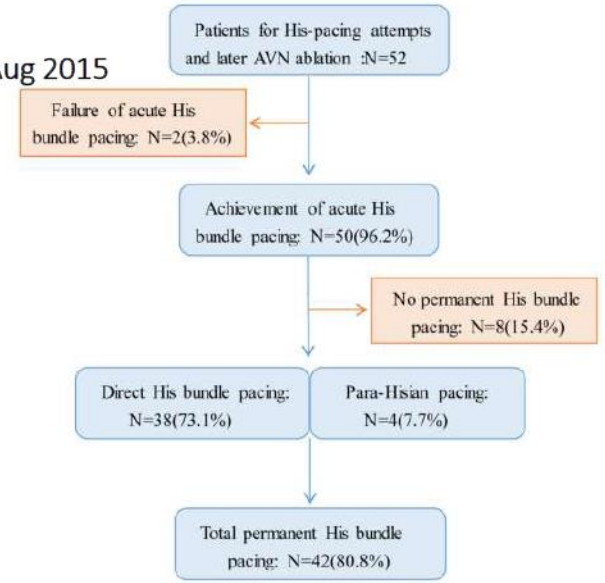
Consecutive 52 patients enrolled between Aug 2012 and Aug 2015
A single-center prospective registry study

Patients with long-lasting persistent or permanent AF, even though their heart rate well controlled with pharmacological treatment

(1) Symptomatic HF and/or hemodynamic Test or

(2) Echo: low EF<40%

Patients were at least18 years old and not pregnant



Schematic summary of study and patient flow.

Department of Cardiology , The First Affiliated Hospital of Wenzhou Medical University, Wenzhou, China

HBP with AVN ablation in AF and HFpEF and HFrEF

Table 2. Comparison of the Echocardiographic Measurements at the Specific Time Points of HBP

	LVEDd (mm)	*P* Value	LVEF (%)	*P* Value
All patients (N=42)				
Baseline	55.8±8.1	Ref.	44.9±14.6	Ref.
3 months	52.7±5.3	0.031	56.5±8.7	<0.001
1 year	50.6±5.4	<0.001	59.7±9.8	<0.001
Last FU	51.0±5.1	<0.001	60.0±8.1	<0.001
HFpEF patients (N=22)				
Baseline	51.5±5.4	Ref.	56.6±9.9	Ref.
3 months	50.2±4.4	0.385	60.1±8.0	0.231
1 year	49.0±4.4	0.073	63.2±8.2	0.010
Last FU	49.6±3.9	0.159	62.6±6.9	0.019
HFrEF patients (N=20)				
Baseline	60.6±8.0	Ref.	32.2±4.8	Ref.
3 months	54.5±5.3	0.005	53.9±8.4	<0.001
1 year	52.3±6.0	<0.001	55.7±10.2	<0.001
Last FU	52.6±5.9	<0.001	57.2±8.7	<0.001

Table 3. Comparison of the Number of Patients Receiving Medications Before and 1 Year After HBP

	Baseline	After HBP	*P* Value
All patients (N=42)			
Diuretics	38 (90.5)	23 (54.8)	<0.001
β-Blockers	40 (95.2)	32 (76.2)	0.011
ACE inhibitors	36 (85.7)	38 (90.5)	0.480
Digoxin	20 (47.6)	2 (4.8)	<0.001
HFpEF patients (N=22)			
Diuretics	18 (81.8)	9 (40.9)	0.003
β-Blockers	21 (95.5)	14 (63.6)	0.020
ACE inhibitors	20 (90.9)	19 (86.4)	0.564
Digoxin	7 (31.8)	1 (4.5)	0.034
HFrEF patients (N=20)			
Diuretics	20 (100.0)	14 (70.0)	0.014
β-Blockers	19 (95.0)	18 (90.0)	0.317
ACE inhibitors	16 (80.0)	19 (95.0)	0.180
Digoxin	13 (65.0)	1 (5.0)	<0.001

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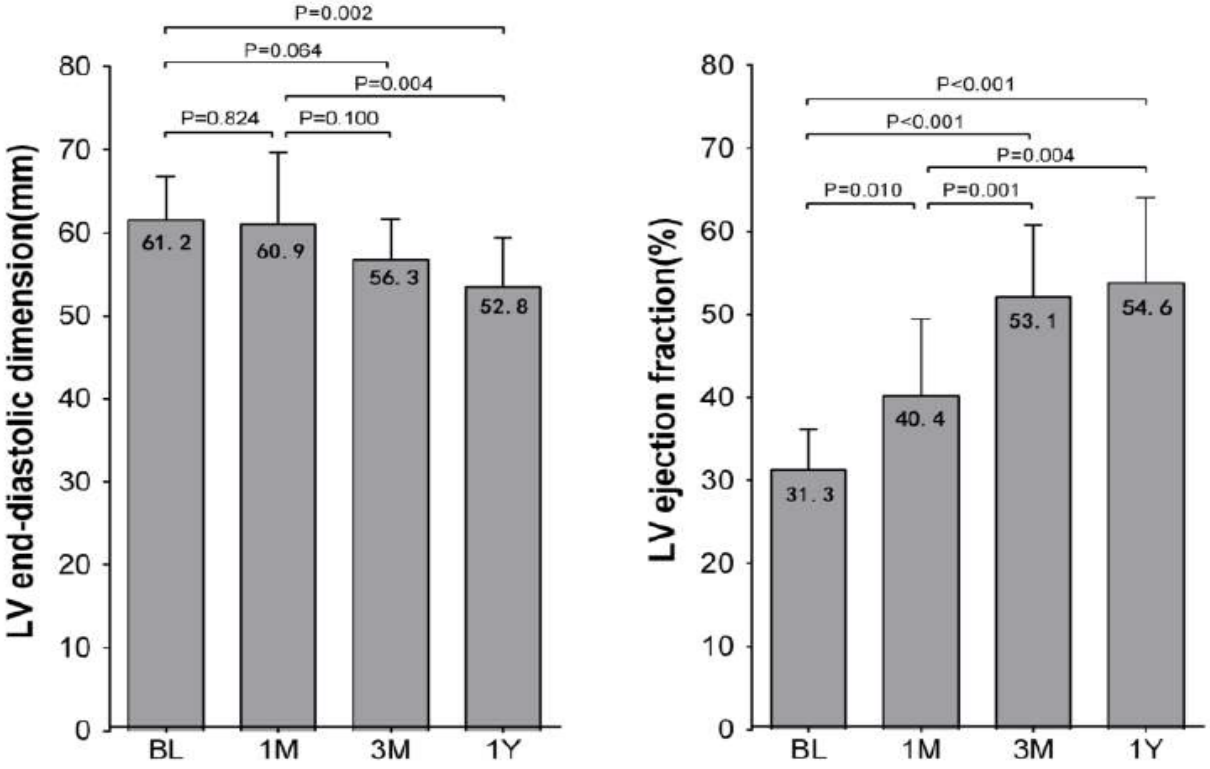
HBP with AVN ablation in AF and HFpEF and HFrEF



Acute and long-term improvement in LVEDd and LVEF after HBP in patients with HFrEF

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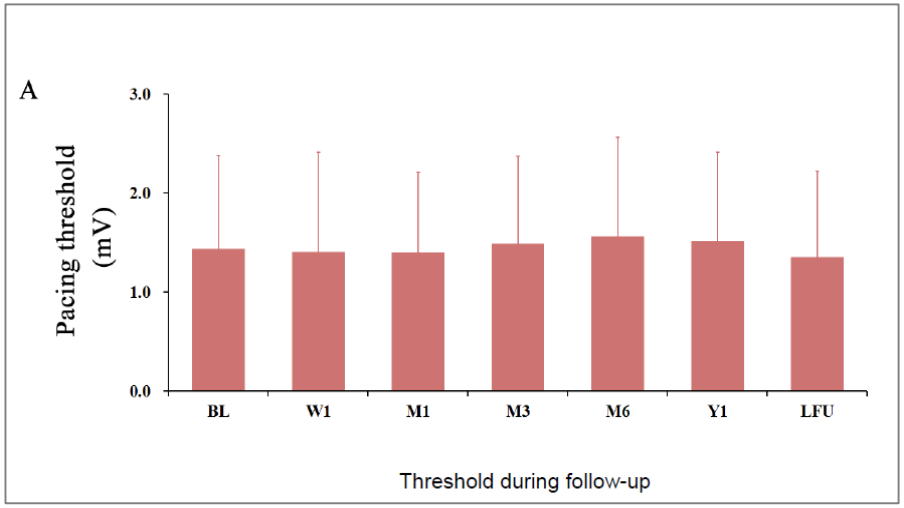
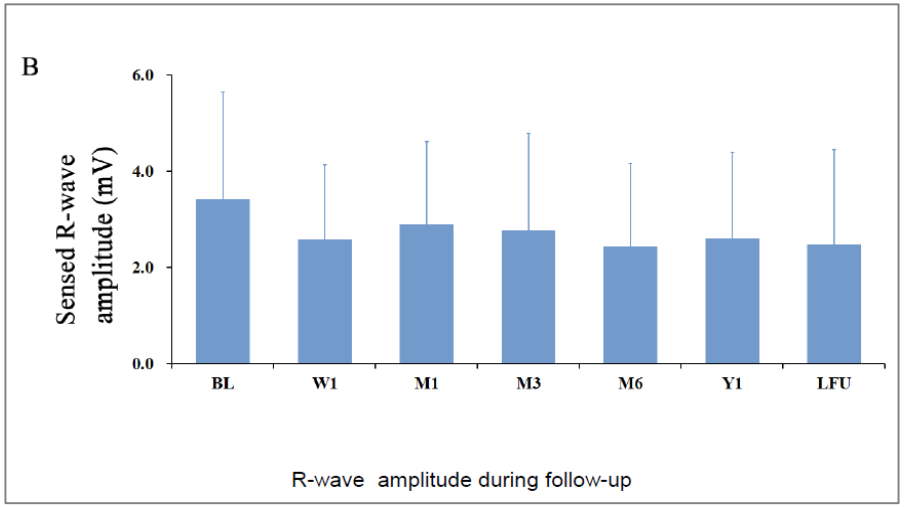
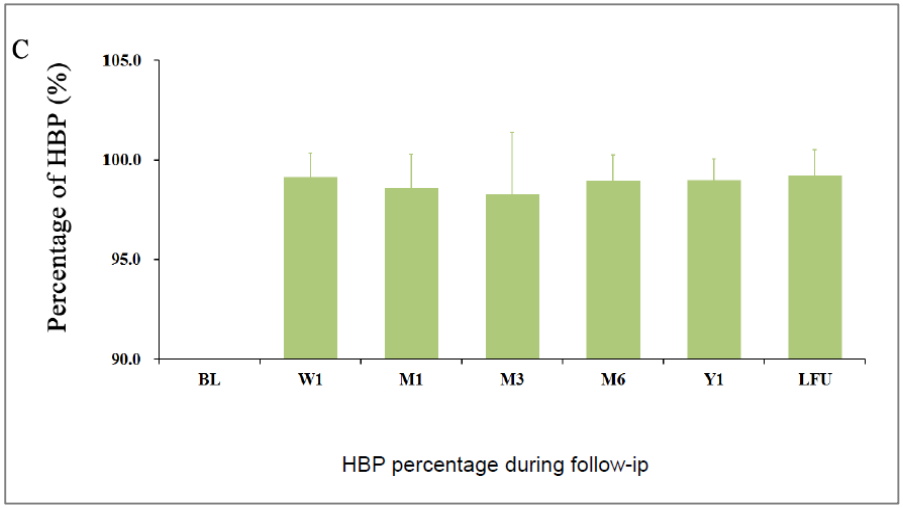
HBP with AVN ablation in AF and HFpEF and HFrEF







HBP with AVN ablation in AF and HFpEF and HFrEF

Studies： A-V node ablation+HBP in AF patients

Consistent results of small sample trials

HBP was safe and effective in improvement of cardiac function

Time （year）	Magezine	No. of patients	trial contents	author	Result in favor of HBP
2000	Circulation	12	AV-node ablation+HBP Feasibility & effectiveness	Pramod Deshmukh	+
2001	Rev Esp Cardiol	12	AV-node ablation+ HBPvs.RVAP	Pablo Moriña Vázquez	+
2004	Proc West Pharmacol		AV-node ablation+ HBP vs. Amiodarone	Kirkutis A	+
2004	PACE	39	AV-node ablation+ HBPvs.RVAP	PRAMOD. M	+
2006	JACC	16	AV-node ablation+ HBPvs.RVAP	Eraldo Occhetta	+
2011	HRS Abstract	11	AV-node ablation+HBP Safety & ffectiveness	Pierre Znojkiewicz	+
2017	JAHA	42	AV-node ablation +HBP	Weijian Huang	+

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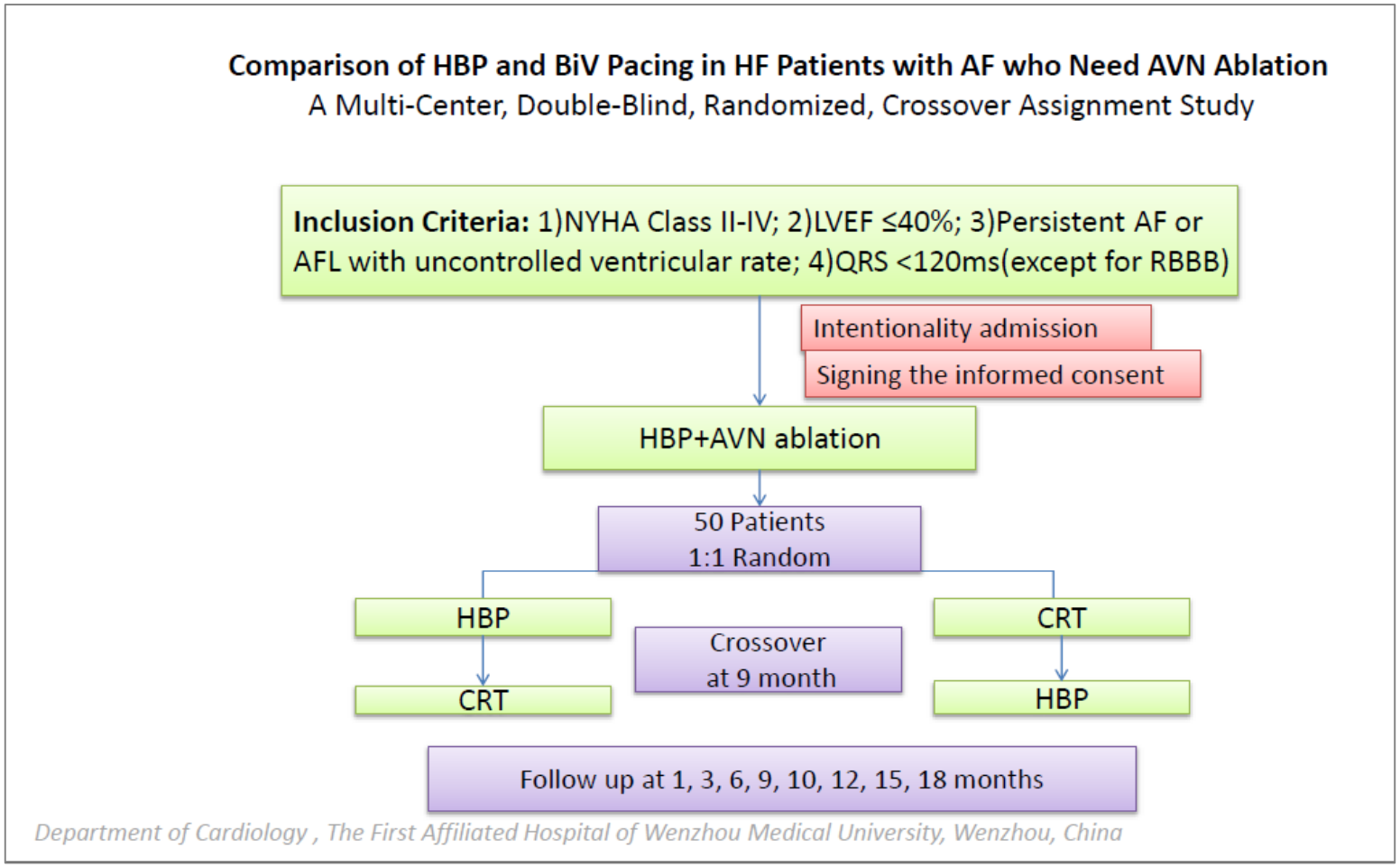
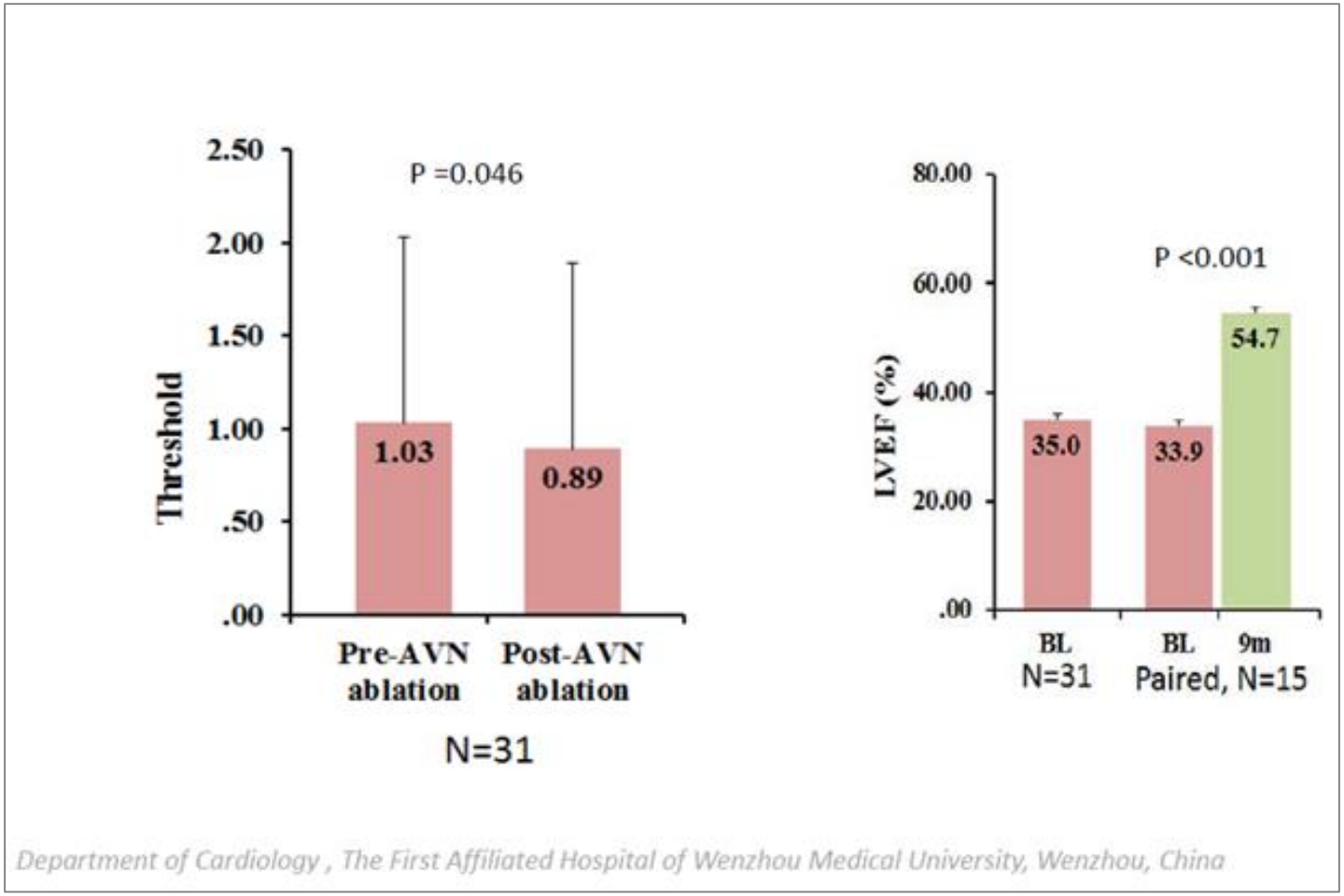
HBP with AVN ablation in AF and HFpEF and HFrEF



HBP with AVN ablation in AF and HFpEF and HFrEF



Conclusão

- **O marcapassamento permanente do feixe de His é factível, elegante e fisiológico.**
- **Se mostrou terapia alternativa e eficaz nos casos de falência no implante do eletrodo de VE via seio coronário e naqueles pacientes não respondedores a TRC.**
- **Pode ser opção primária de estimulação em populações selecionadas.**
- **Para os pacientes submetidos a ablação da junção atrioventricular para controle de frequência e tratamento da insuficiência cardíaca, o marcapassamento do feixe de His melhora a fração de ejeção e a classe functional especialmente naqueles com fração de ejeção reduzida.**

Conclusão

No entanto,

- **Sem resultados de estudos clínicos grandes randomizados.**
- **Pouca experiência da maioria dos centros – experiência conta: inabilidade de registro de His, inabilidade de correção do distúrbio de condução, obtenção de altos limiares e limiares crescentes, inabilidade de fixação.**
- **Qual a largura de QRS é recomendada?**
- **Resultados de longo prazo em doenças progressivas.**
- **Desenvolvimento da tecnologia com mais opções de ferramentas para entrega, registros e implante do sistema.**

Obrigada!

Updates on

EHRA and Heart Rhythm

2018

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