



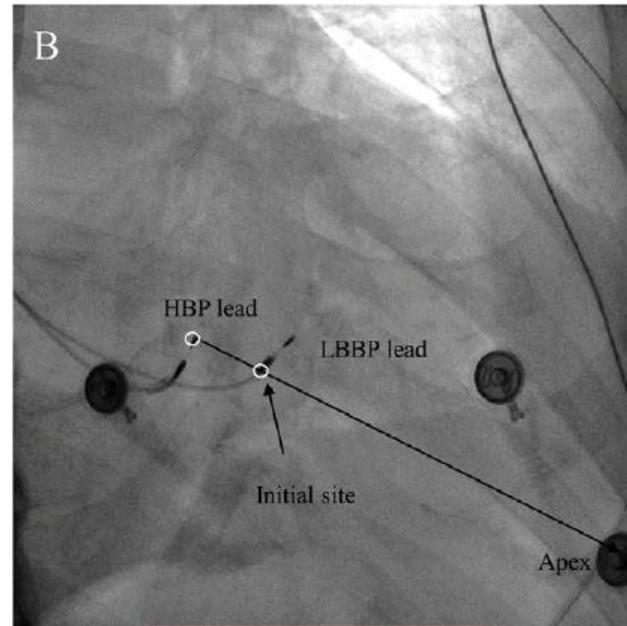
LBBP vs. LBBAP

Existují mezi nimi rozdíly?

MUDr. Karol Čurila

Co je LBBP, a jak rozpoznat jeho stimulaci?

- Přímá stimulace kmene LBB a jeho proximálních fascikulů
- Typy stimulace:
 - a/ selektivní LBBP
 - b/ neselektivní LBBP



Paced morphology of RBBB pattern

Recording LBB potential

Stimulus-peak LVAT shortens abruptly and then constant with high and low output

Selective LBBP and Non-selective LBBP

Recording retrograde His potential or anterograde LBB potential during pacing (not routine in clinical practice)

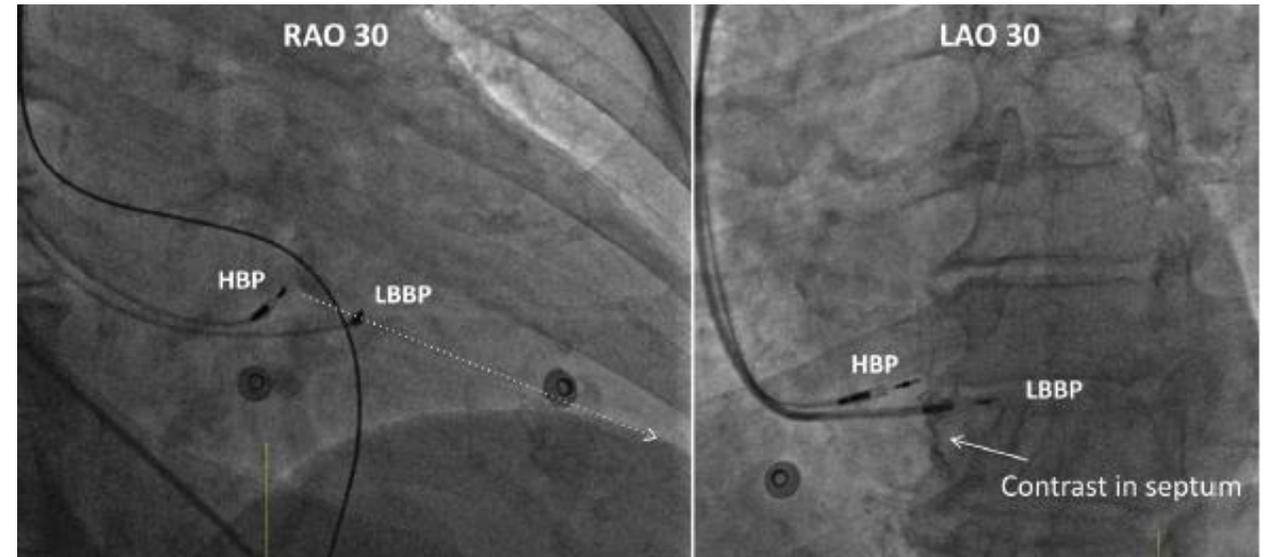
Kde se vzala LBBAP?

Prospective evaluation of feasibility and electrophysiologic and echocardiographic characteristics of left bundle branch area pacing

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- 100 pacientů
- Úspěšnost 93%
- Potvrzení LBBP pomocí transice u **66 pacientů**:
 - 41 nsLBBp to sLBBP
 - 25 nsLBBP to LVSP
- 27 pacientů s r ve V1 a úzkým QRS komplexem, ale bezprůkazu LBBP (transice) – **jak je nazvat????**



Co to je LBBAP? = LBBP + LVSP

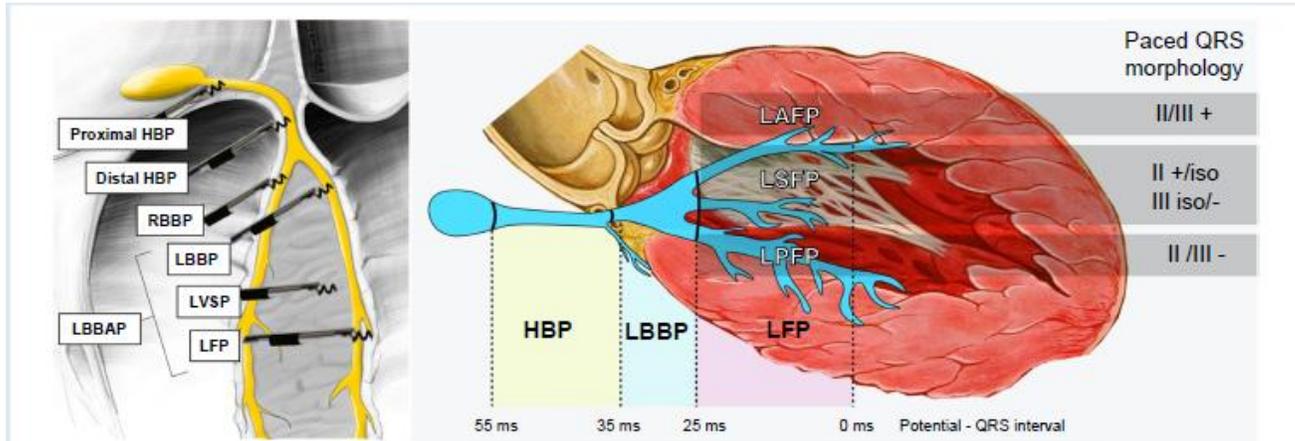


Figure 1 Categories of conduction system pacing. Anatomical position of the pacing lead, potential to QRS interval (if visualized), and paced QRS morphology in leads II and III are used to determine the level of CSP. RBBP and LVSP are not shown on the right panel. HBP = His bundle pacing; iso = isoelectric; LAFP = left anterior fascicle pacing; LBBAP = left bundle branch area pacing; LBBP = left bundle branch pacing; LFP = left fascicular pacing; LPPF = left posterior fascicle pacing; LSFP = left septal fascicle pacing; LVSP = left ventricular septal pacing; RBBP = right bundle branch pacing. Modified with permission from Filip Plesinger and from Jastrzebski et al.⁷

EHRA clinical consensus statement on conduction system pacing implantation: endorsed by the Asia Pacific Heart Rhythm Society (APHRS), Canadian Heart Rhythm Society (CHRS), and Latin American Heart Rhythm Society (LAHRS)

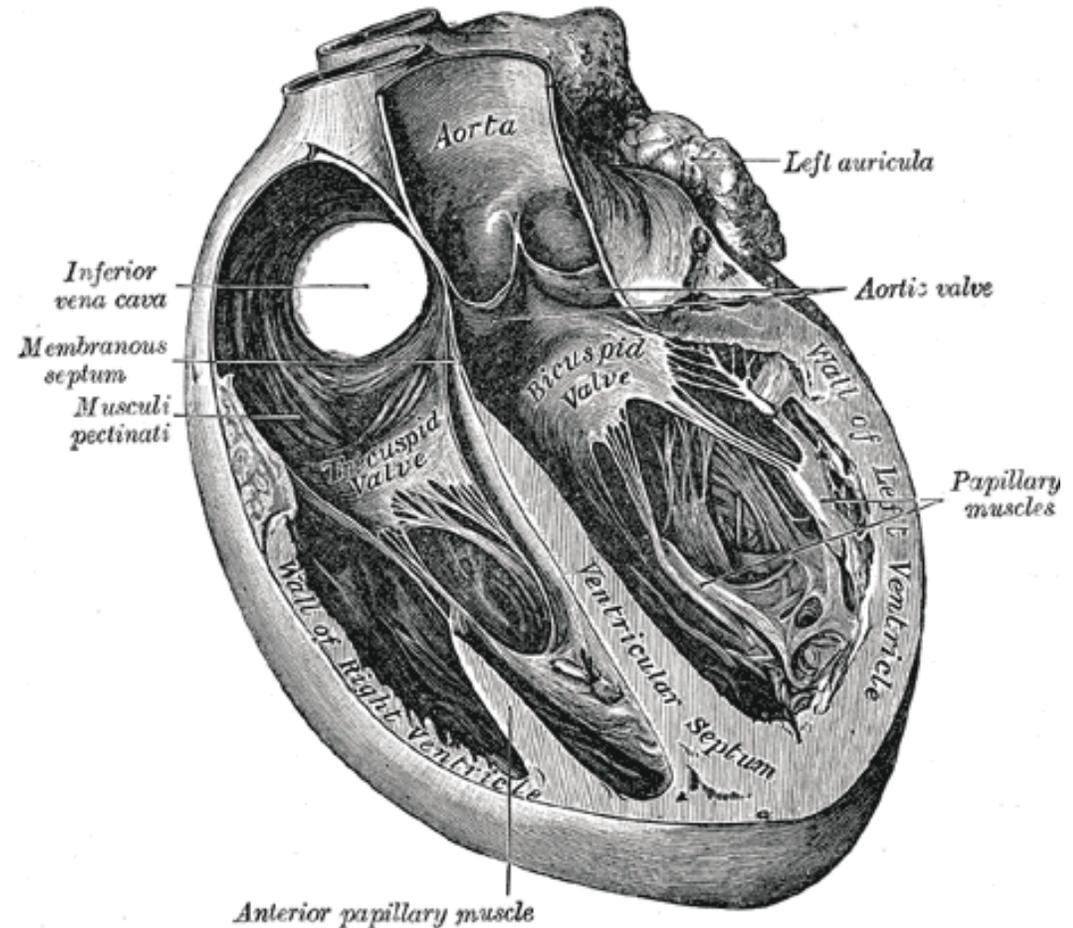
Haran Burri^{1*}, Marek Jastrzebski², Óscar Cano^{3,4}, Karol Čurila⁵, Jan de Pooter⁶, Weijian Huang⁷, Carsten Israel⁸, Jacqueline Joza⁹, Jorge Romero¹⁰, Kevin Vernooij¹¹, Pugazhendhi Vijayaraman¹², Zachary Whinnett¹³, and Francesco Zanon¹⁴

Left bundle branch area pacing

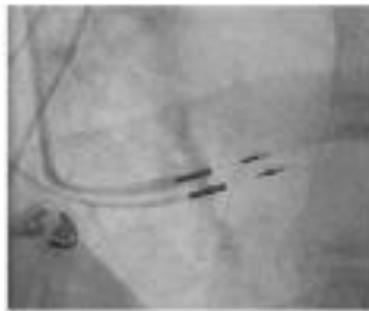
LBBAP is defined as capture of the subendocardial area on the left side of the interventricular septum,¹³ with or without simultaneous conduction system capture, and includes LBBP, LFP, and LVSP. This term rests on the anatomical lead position and QRS characteristics (terminal R-wave in lead V1)—although in some cases, this may be absent). LBBAP is a practical designation intended to reflect the common scenario when differentiation between LBBP/LFP/LVSP is impossible, uncertain, or not feasible. Such situations can result from equal capture thresholds or similar refractoriness between conduction tissue and myocardium and/or nearly identical paced QRS morphology between LVSP and LBBP/LFP.

Definice a kritéria pro LVSP

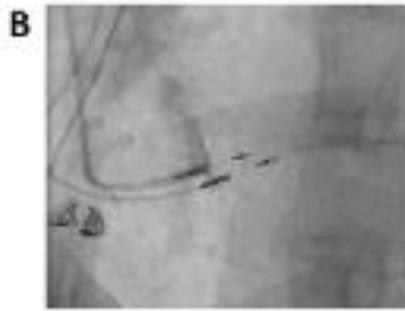
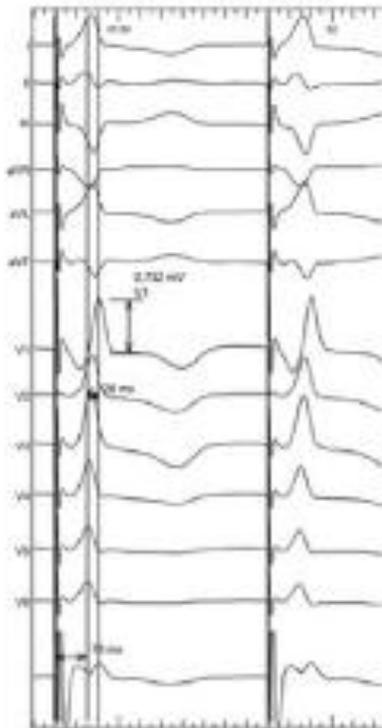
- LVSP = stimulace levokomorové septa
 - kde se tato anatomická struktura nachází?
- LVSP je charakterizované :
 - a/ hlubokou septální pozicí stimulační elektrody + pozdní r/R ve V1
 - c/ nepřítomností kritérií pro LBBP



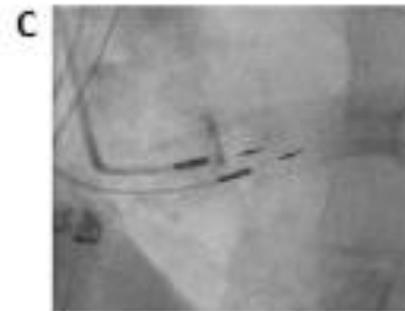
Jak Nám EKG lže v tom co je LVSP (LBBAP)



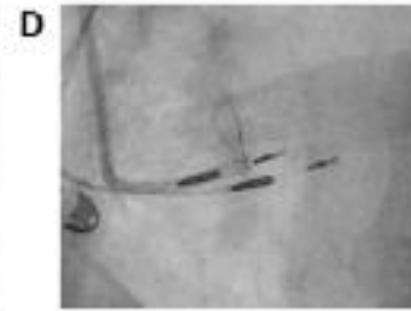
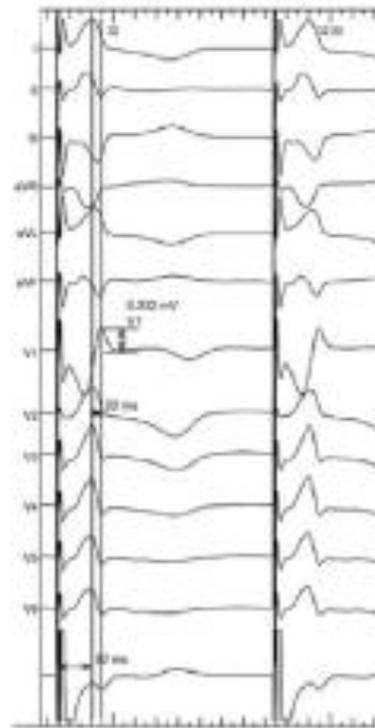
12 mm; QRSd 132 ms



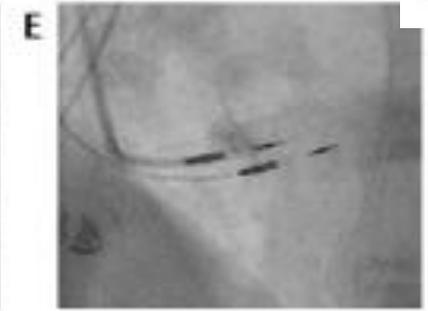
10 mm; QRSd 128 ms



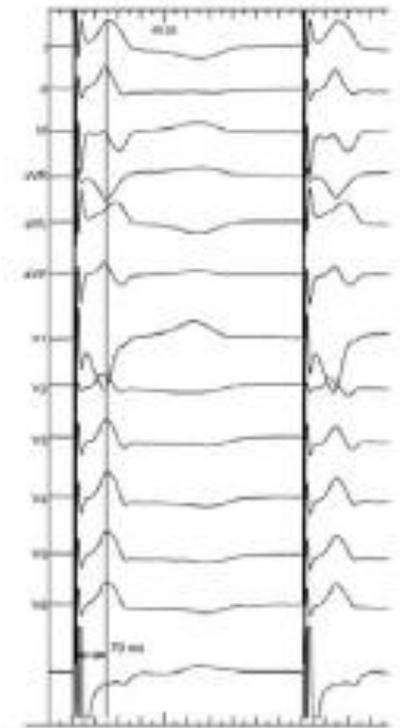
8 mm; QRSd 124 ms



6 mm; QRSd 120 ms



5 mm; QRSd 128 ms

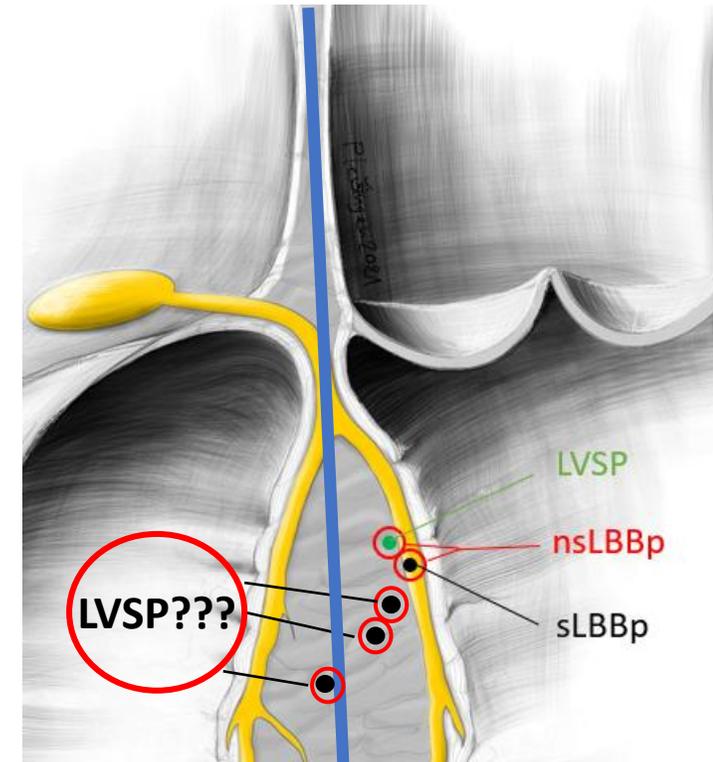
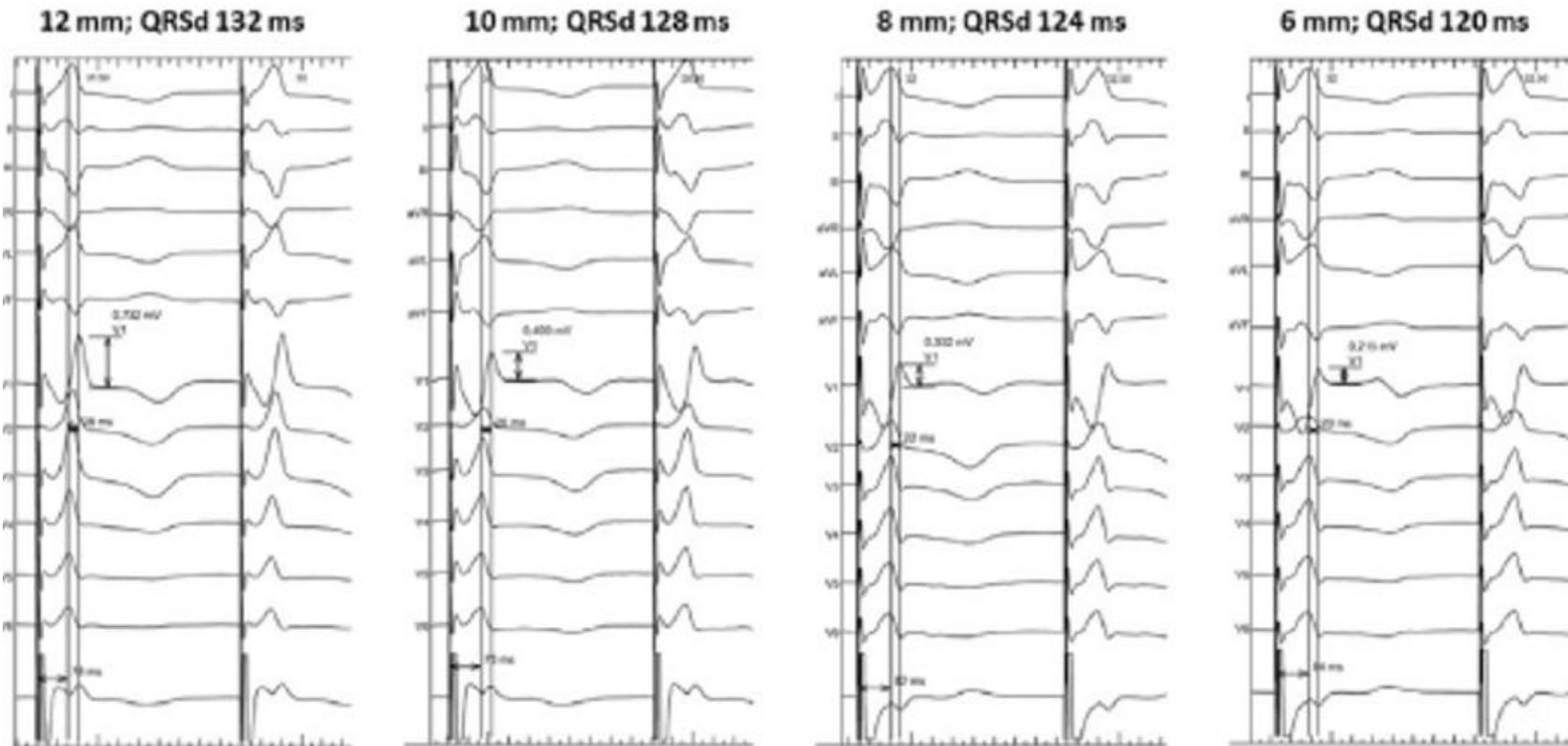


Které z toho je LVSP/LBBAP? – dle EKG všechny, anatomicky pouze jedna

LVSP je charakterizované :

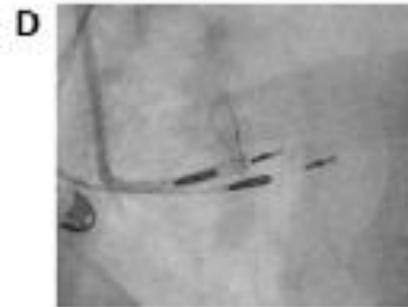
a/ hlubokou septální pozicí stimulační elektrody + pozdní r/R ve V1

c/ nepřítomností kritérií pro LBBP

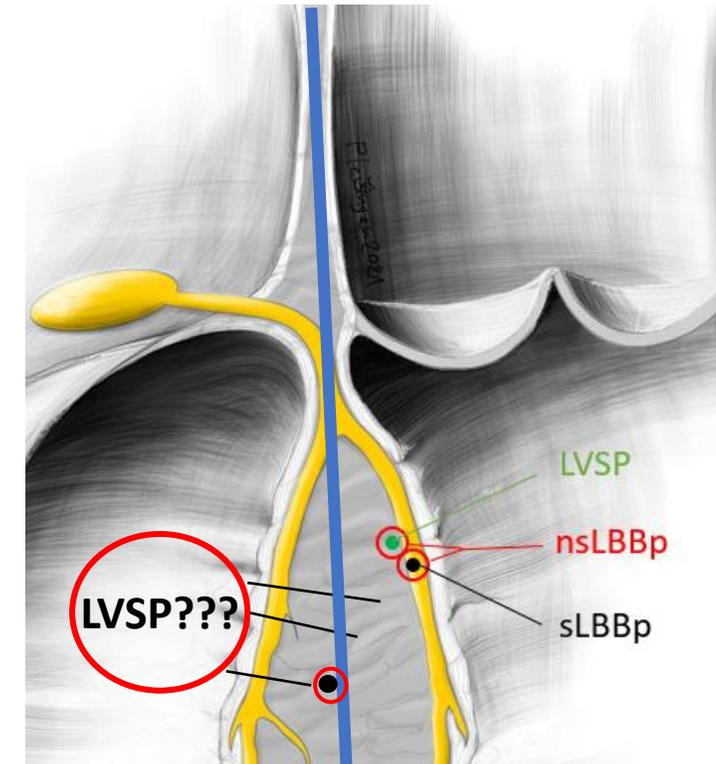
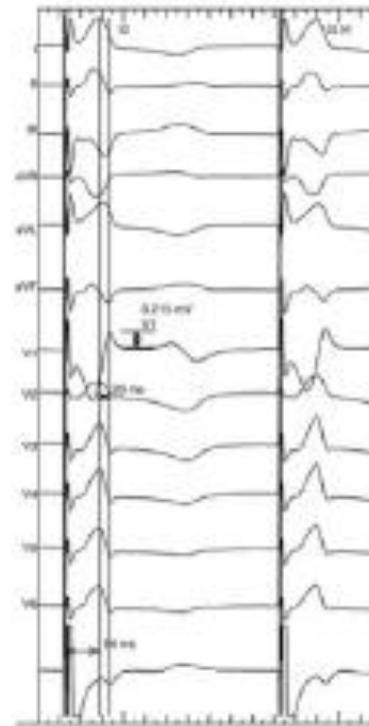


Jedná se o LBBAP/LVSP dle stávajících doporučení?

LVSP je charakterizované :
a/ hlubokou septální pozicí
stimulační elektrody
b/ pozdní r/R ve V1
c/ nepřítomností kritérií pro LBBP

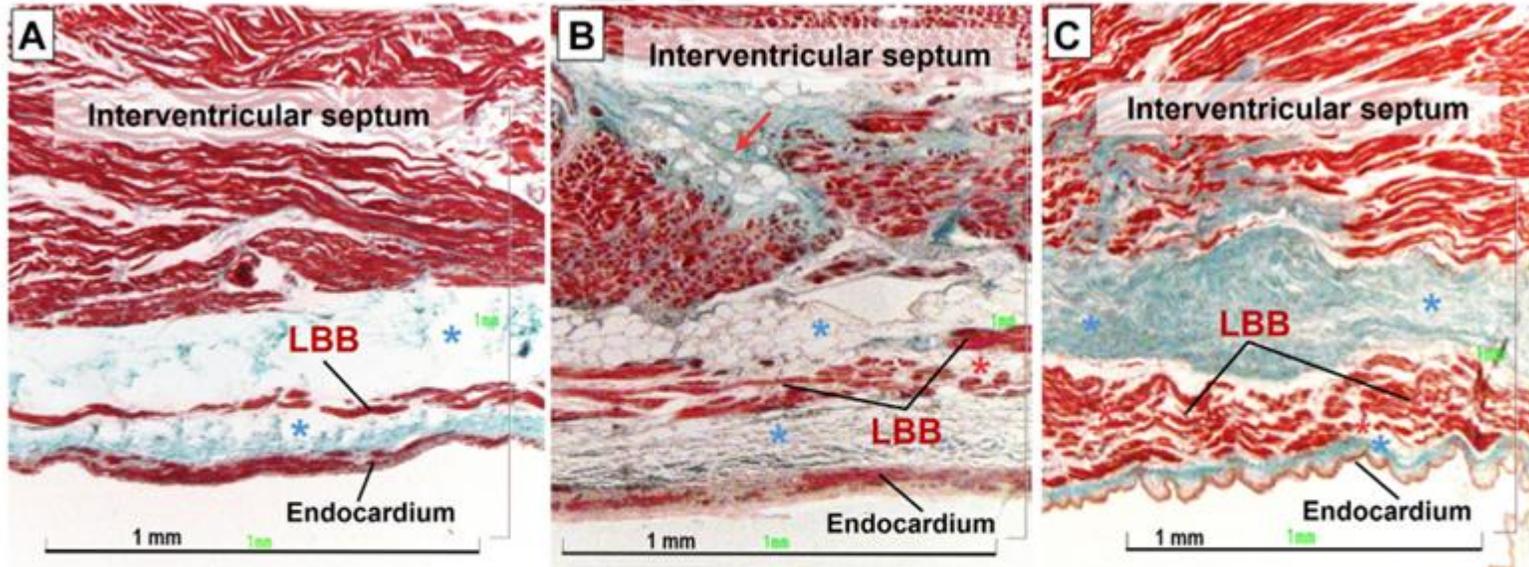


6 mm; QRSd 120 ms

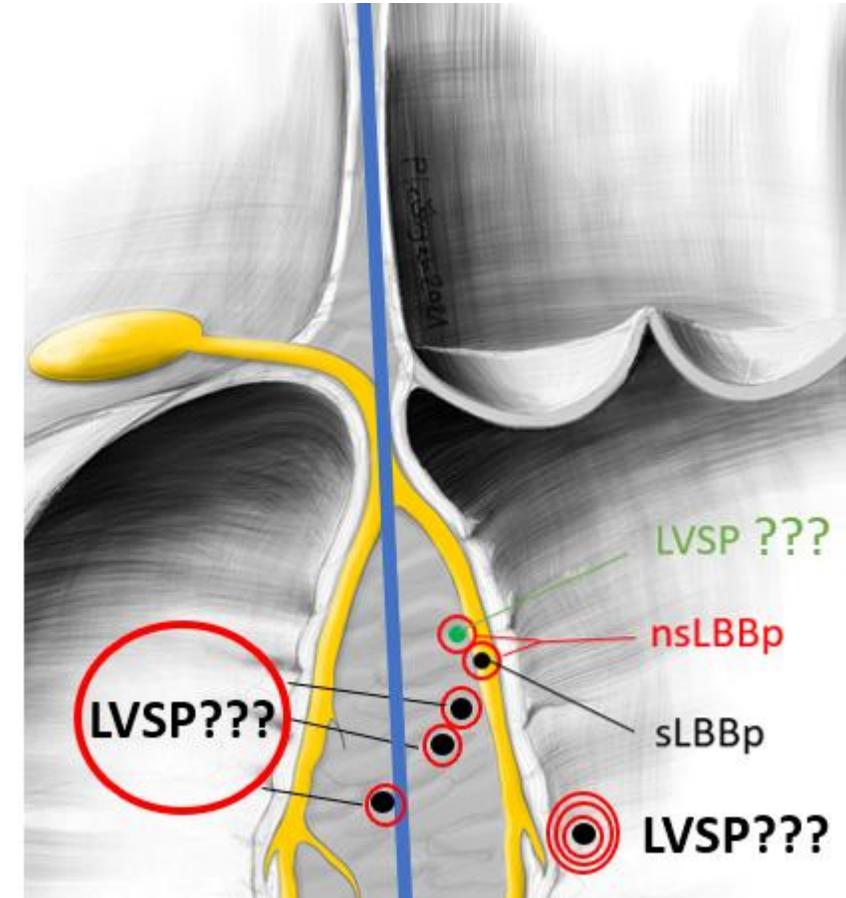


Co je levé raménko a jeho oblast?

FIGURE 4 LBB: Comparison of the 3 Different Types



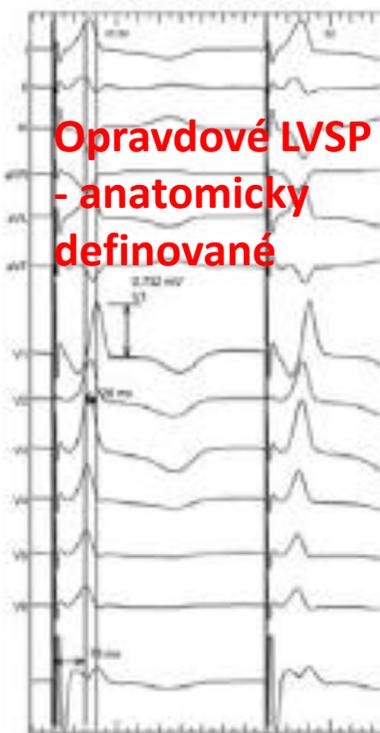
The left bundle branch (LBB) thickness can be extremely variable, from 2 to 25 cellular layers of specialized smooth myocardium conducting tissue. The ranges of cell layers and total LBB thickness measured in all specimens are summarized as follows: (A) "Thin and discrete": 2 to 3 cellular layers and LBB area thickness from 0.4 to 0.6 mm. (B) "Thin and complex": 3 to 9 cellular layers and LBB area thickness from 0.5 to 0.7 mm and a progressive increase of connective tissue within the bundle (0.2-0.3 mm). (C) "Thick and complex": 11 to 25 cellular layers with a LBB area thickness from 0.9 to 1 mm. This subtype shows the largest amount of connective tissue within the LBB (0.4-0.6 mm). Blue asterisk: connective tissue and fibro-fatty tissue isolating the LBB. Red asterisk: connective tissue within the LBB. Arrow: fibrous tissue within the interventricular septum.



Proč nemůžeme věřit EKG?



12 mm; QRSd 132 ms



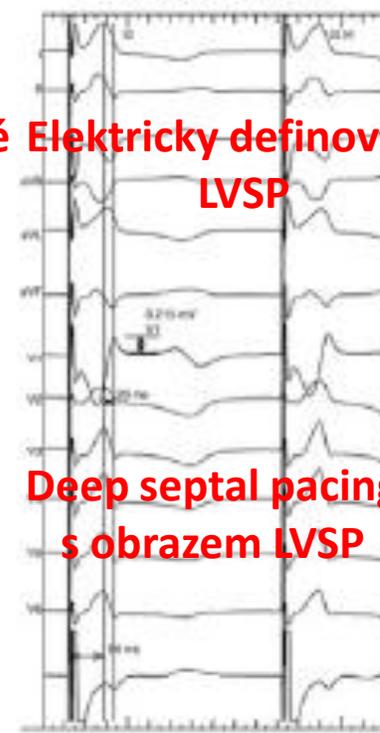
10 mm; QRSd 128 ms



8 mm; QRSd 124 ms



6 mm; QRSd 120 ms

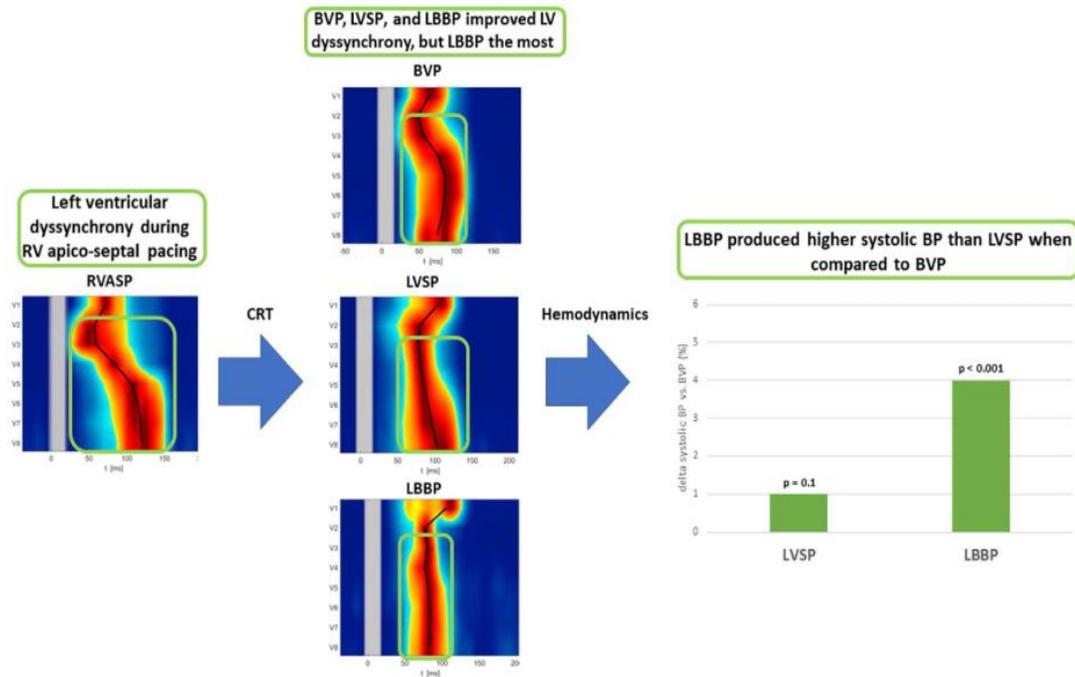


5 mm; QRSd 128 ms

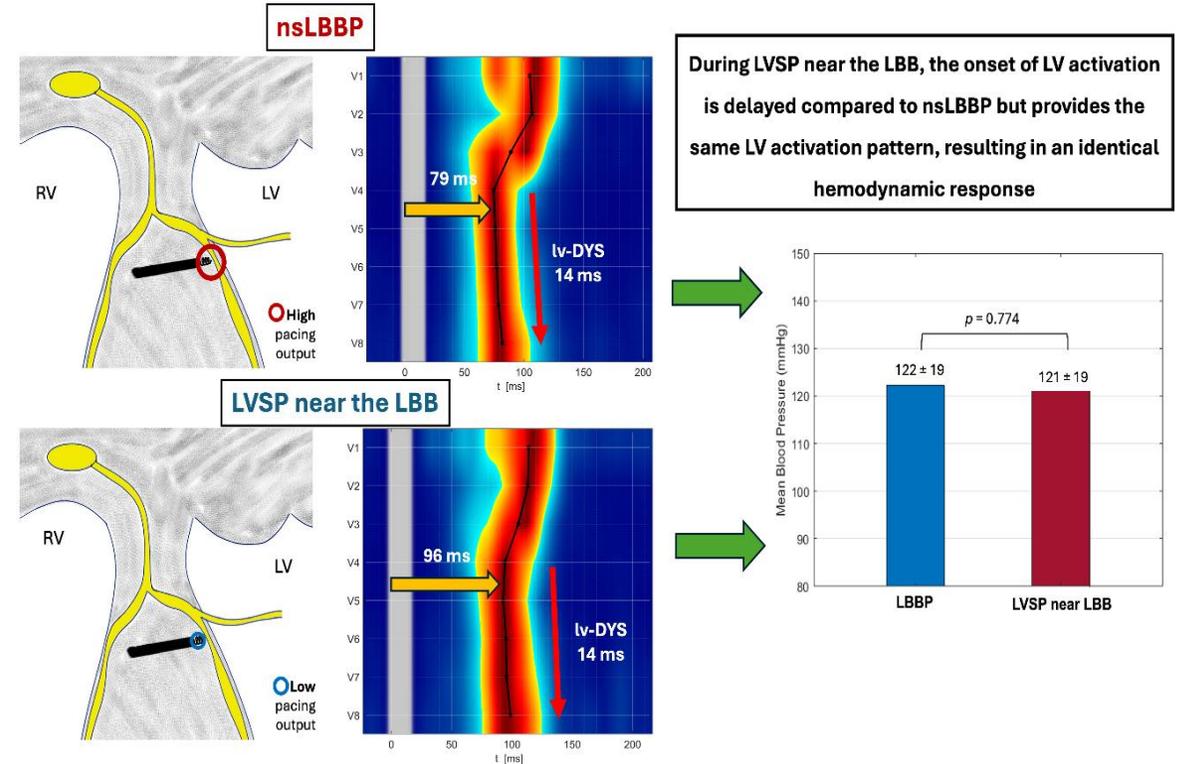


Různé druhy LVSP vedou k různé synchronii efektivitě práce LKS

CENTRAL ILLUSTRATION: BVP, LVSP, and LBBP Lead to LV Resynchronization Compared With RVASP. Better LV Synchrony During LBBP Translates to Higher Systolic Blood Pressure Increase Than During LVSP Compared With BVP



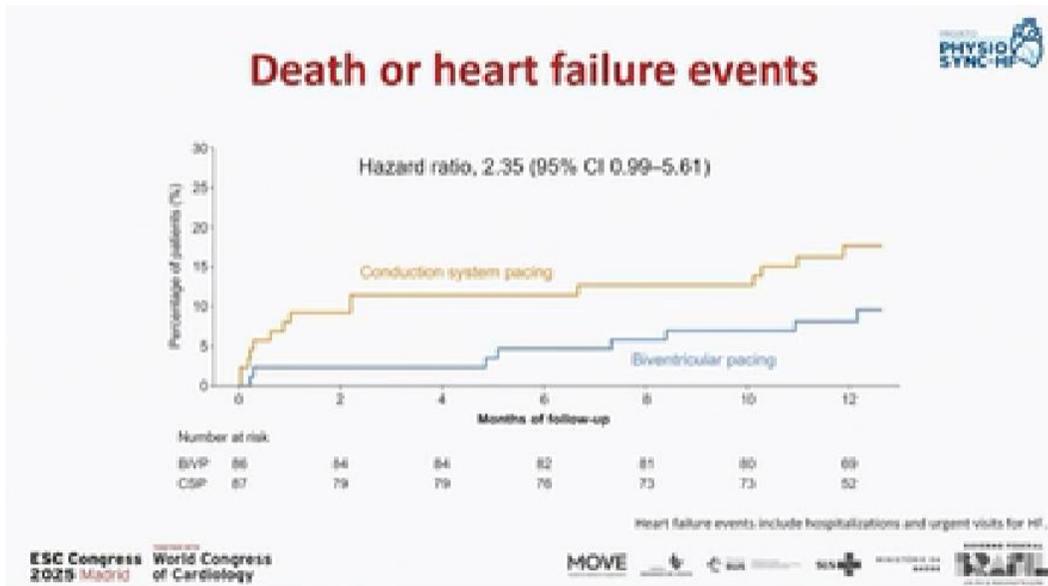
Curila et al. JACEP. 2024.



Poviser et al. Under review.

Proč je důležité odlišovat LBBP od LBBAP?

PhysioSync trial



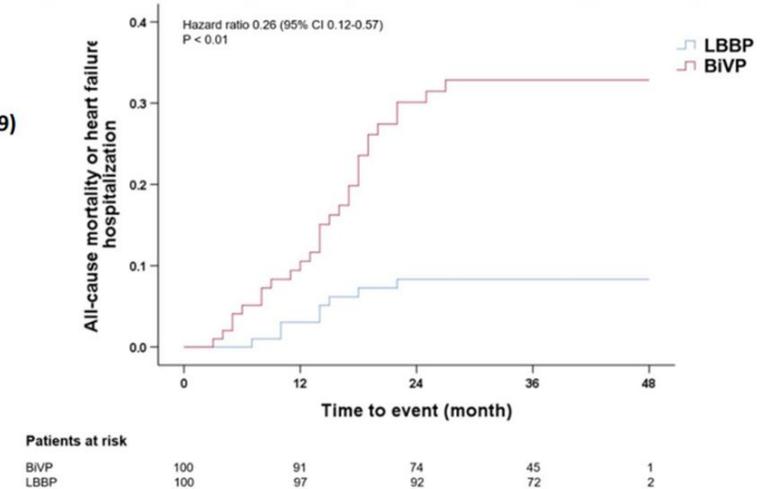
Zimmerman et al. ESC. 2025

HeartSync trial

Primary endpoint

- Intention-to-treat analysis showed that the incidence of the primary endpoint (all-cause mortality and HFH) in LBBP was significantly lower than in BVP ($P < 0.01$).

Median follow-up duration: 36 (33, 39) months



Chen et al. EHRA. 2025

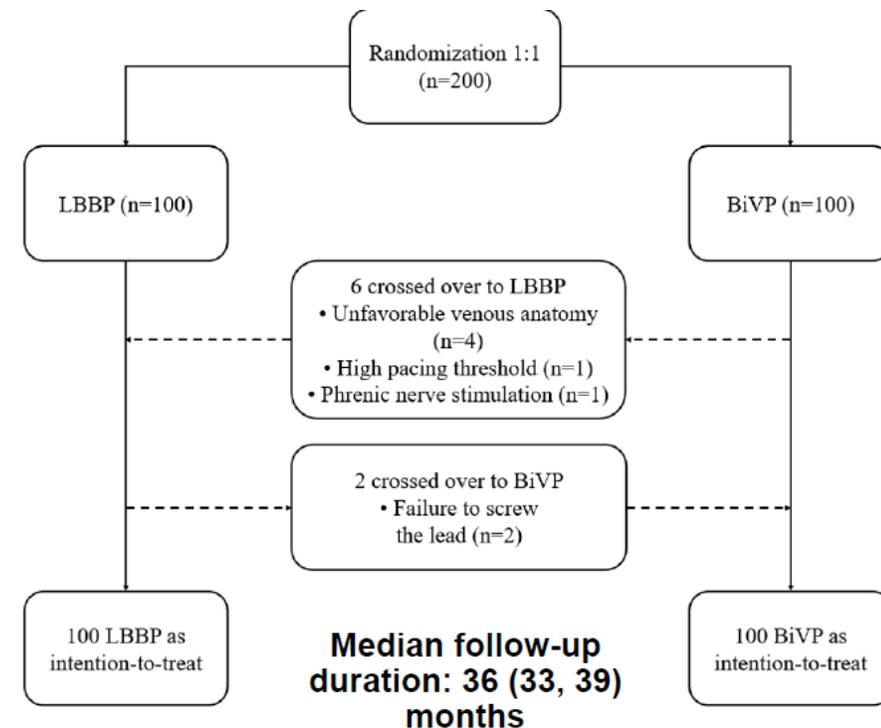
Proč je důležité odlišovat LBBP od LBBAP?

PhysioSync LBBAP vs. BVP

Procedure

Characteristic	Conduction system pacing (n=87)	Biventricular pacing (n=86)
Procedure duration, min	120 (80, 165)	120 (80, 162)
CRT lead location	63% Left bundle branch area 2% His bundle 18% Deep septal 8% LBB area + coronary sinus	91% Coronary sinus
Crossover (index procedure)	7	8
Crossover (total)	10	8
R-wave peak time in lead V6	83 (70, 105)	-
V6-V1 interpeak interval, ms	42 (25, 63)	-
QLV, ms	-	121 (98, 150)
Final QRS duration, ms	120 (103, 133)	126 (118, 138)
Change from baseline, ms	-60 (-80, -45)	-55 (-71, -36)

HeartSync LBB~~A~~P vs. BVP



Jak provádět anatomickou LBBAP (LBBP + anatomicky definovanou LVSP)?

- Hrot elektrody musí být v subendokardiální oblasti LKS. Potvrzeno:

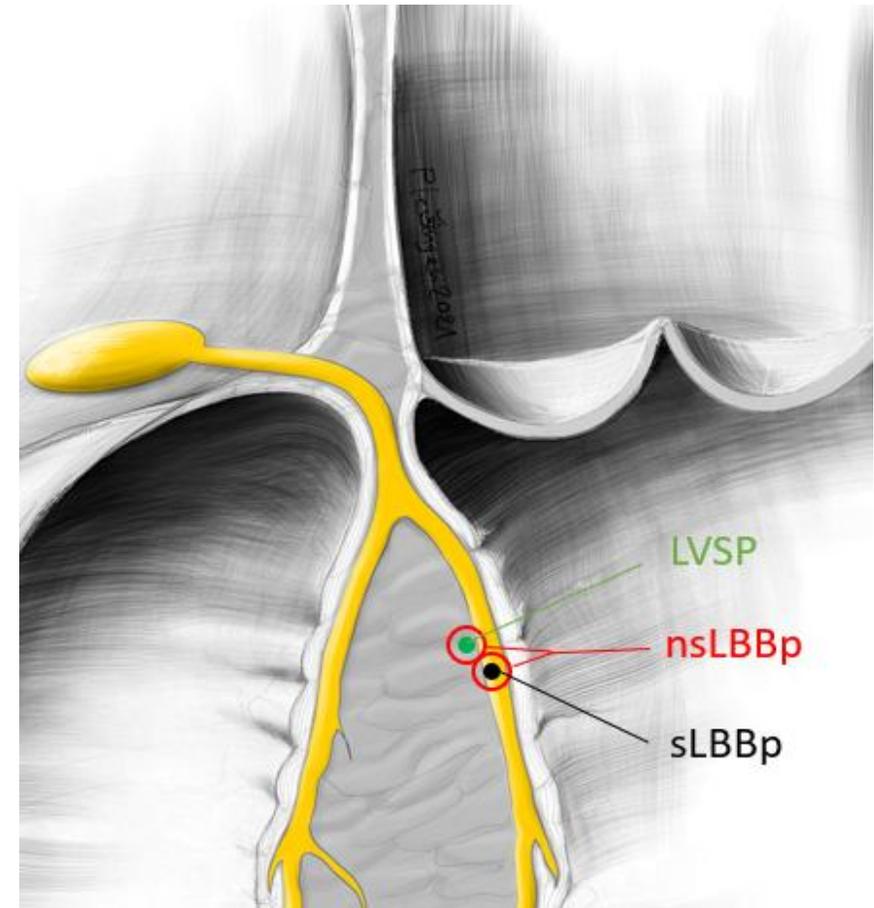
1/ uchvácením převodního systému s transicí LBBP vs. sLBBP

2/ uchvácením převodního systému s transicí LBBP vs. LVSP

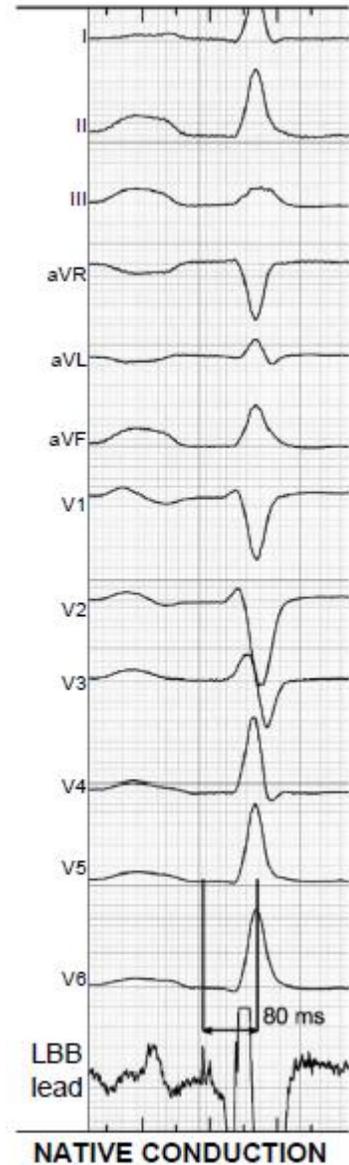
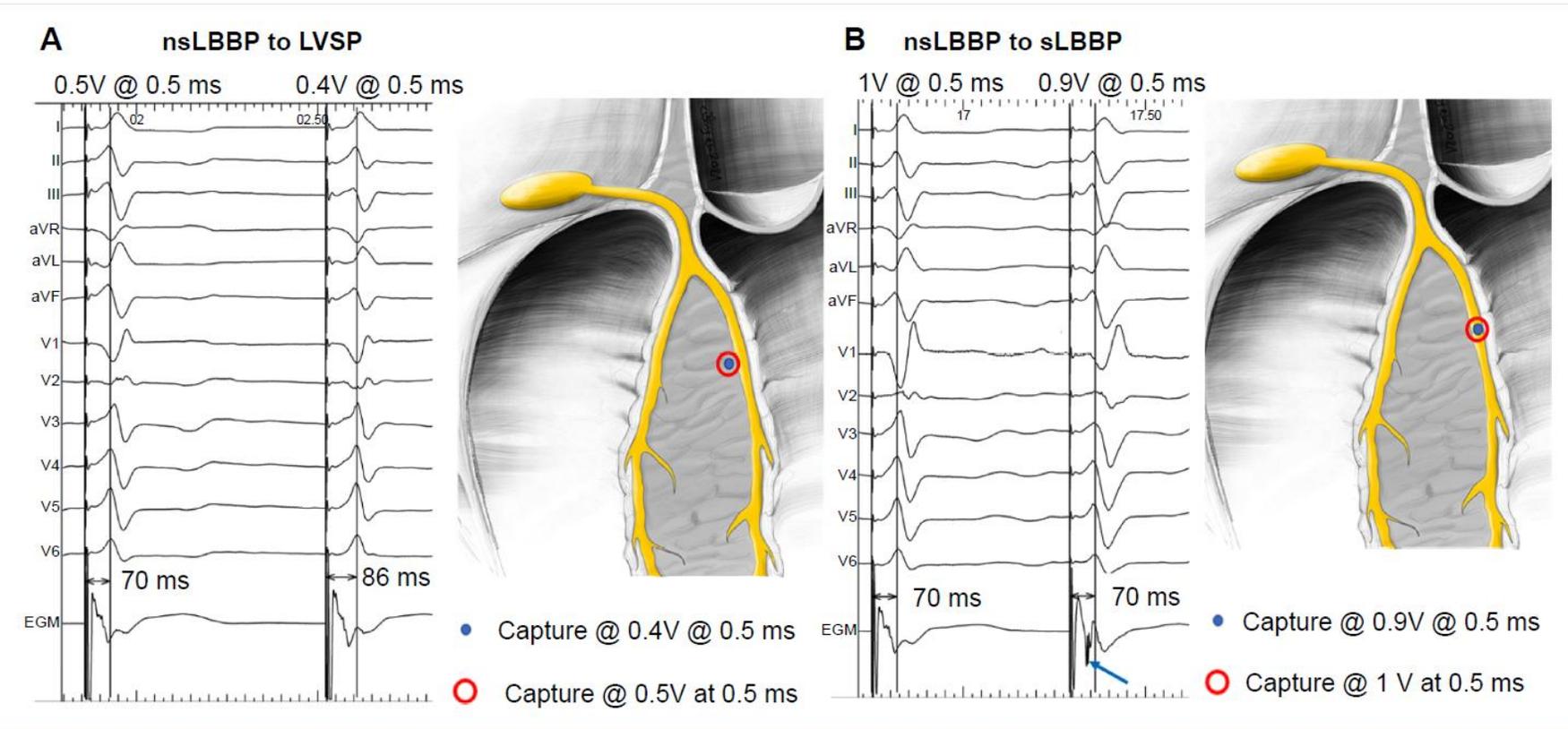
3/ přítomností LBB potenciálu

3/ poklesem current injury?

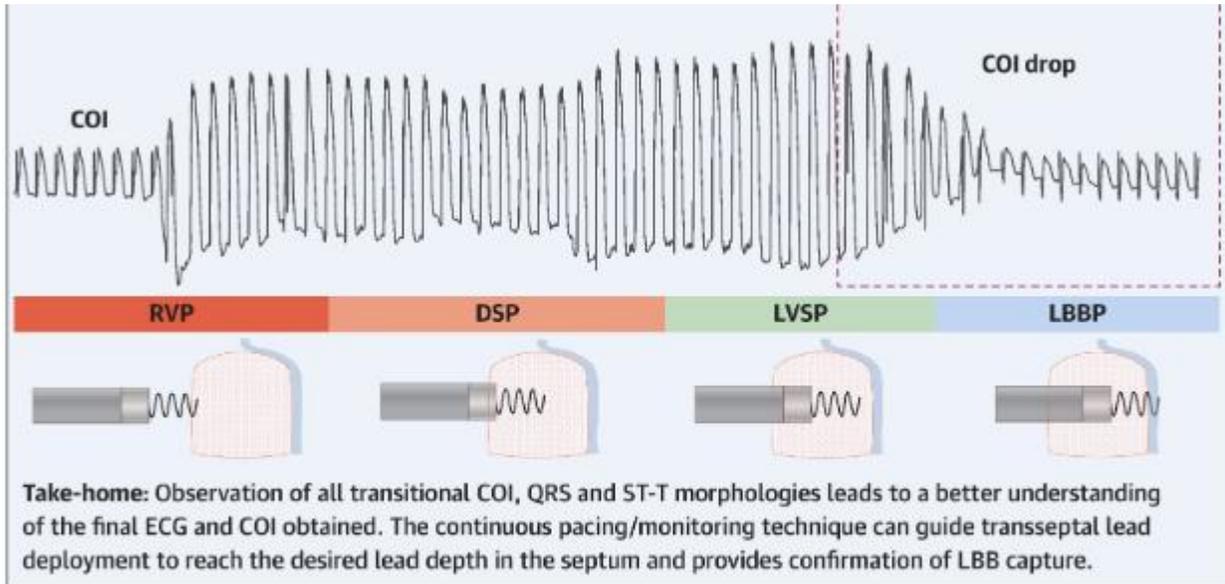
4/ echokardiografickým či jiným zobrazením?



Anatomická LBBAP = transice + potenciál



Anatomická LBBAP = pokles current injury, nebo zobrazení polohy hrotu elektrody



Jastrzębski M, et al. JACC Clin Electrophysiol. 2024;10(11):2471-2484.



Kuang et al. 2023.

Shrnutí

- LBBP a LBBAP jsou 2 různé pojmy, které by se neměly zaměňovat
- LBBP = potvrzené uchvácení převodního systému
 - nejlepší synchronie a efektivita práce LKS
- Anatomicky definovaná LBBAP/ LVSP vede k lepší komorové synchronii a efektivitě její práce než jiné formy LBBAP
- Implantace pouze pomocí EKG může vést k deep septal pacingu s obrazem LBBAP



Friday 21 November 2025
Prague, Czech Republic



EPS 2025

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Děkuji za pozornost



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