Wiesbaden, 09.07.2014

CRT-Implantation

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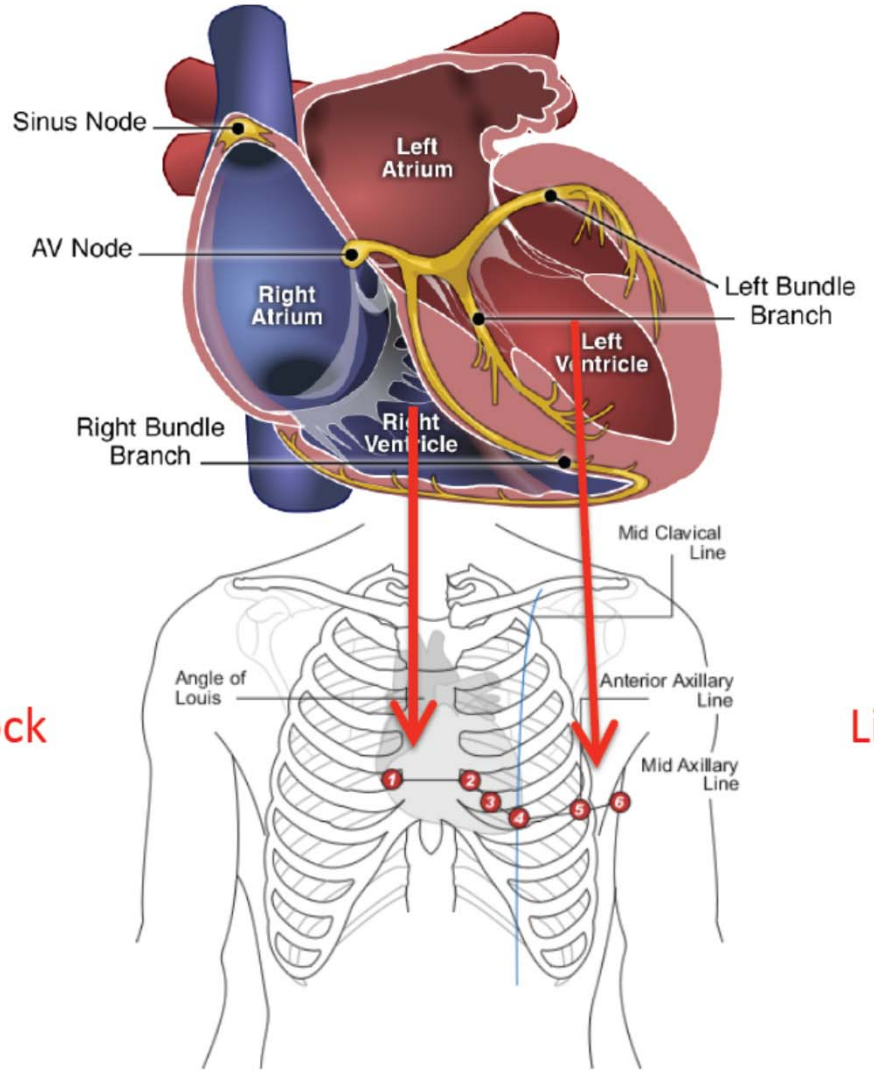
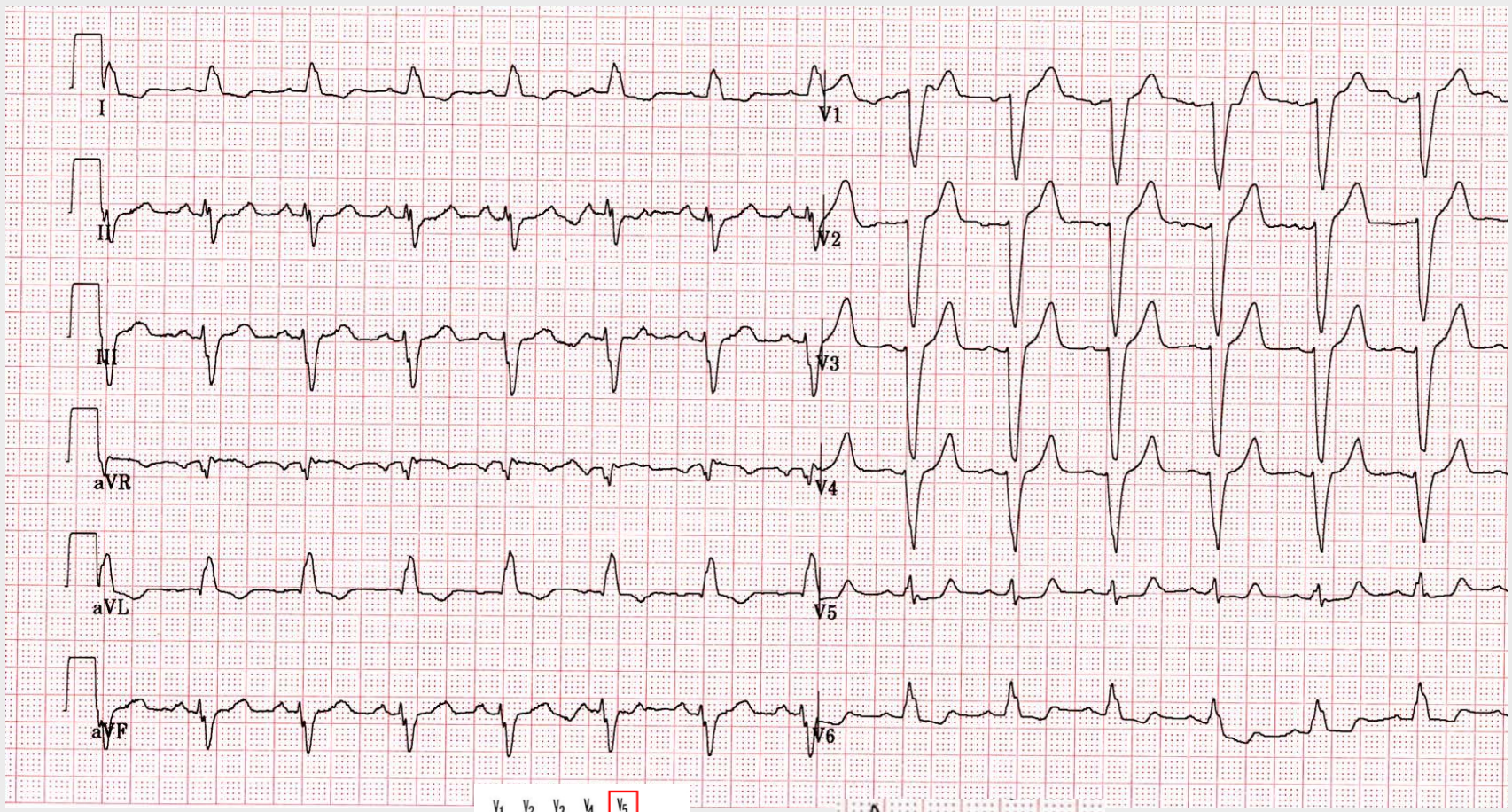
Linksschenkelblock

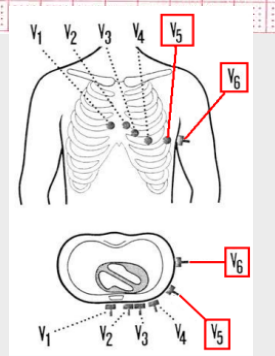


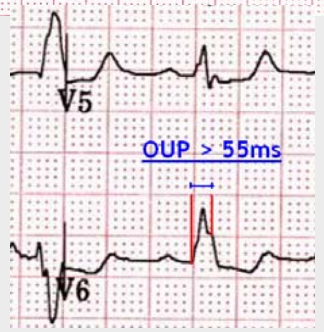
Rechtsschenkelblock (V1 / V2)

Linksschenkelblock (V5 / V6)

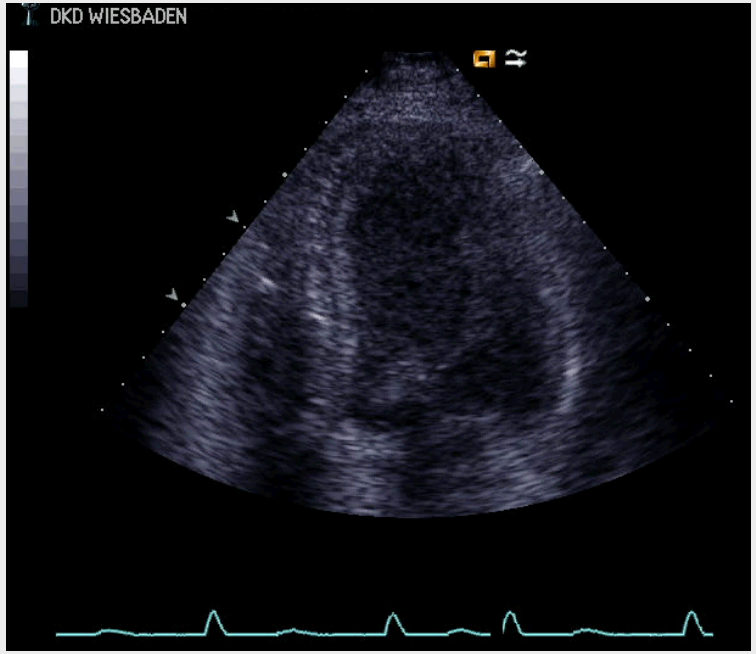
Linksschenkelblock

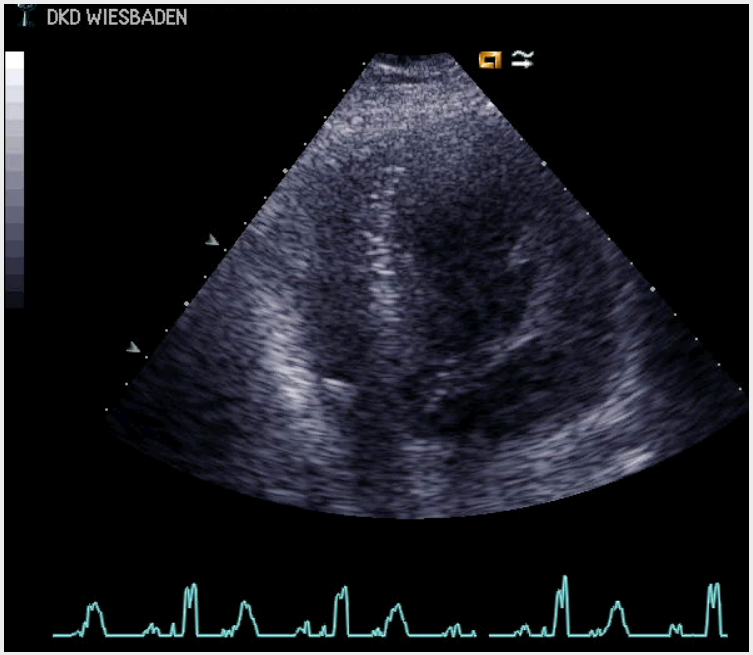






Effekte der kardialen Resynchronisation





- ➔ Wiederherstellung der ventrikulären Synchronie
- ➔ Abnahme der paradoxen Septumwand-Bewegung
- ➔ Verbesserte regionale LV-Wandbewegung
- ➔ Abnahme des endsystolischen Volumens
- ➔ Verbesserung der linksventrikulären Druckanstiegs-geschwindigkeit (dP/dt)

Indikation zu kardialer Resynchronisation

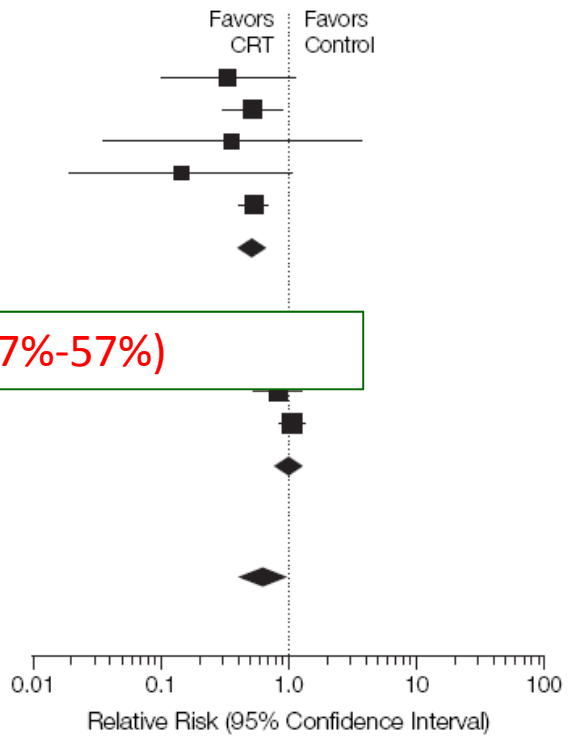
Recommendation	Patient population	Class[a]	Level[b]
CRT-P/CRT-D is recommended to reduce morbidity and mortality[d]	NYHA function class III/IV LVEF ≤35%, QRS ≥120 ms, SR Optimal medical therapy Class IV patients should be ambulatory[e]	I	A

Recommendation	Patient population	Class[a]	Level[b]
CRT preferentially by CRT-D is recommended to reduce morbidity or to prevent disease progression[d]	NYHA function class II LVEF ≤35%, QRS ≥150 ms, SR Optimal medical therapy	I	A

2010 Focused Update of ESC guidelines on device therapy in heart failure

CRT reduziert Hospitalisationen

Source	Hospitalization for Heart Failure, No./Total: CRT	Hospitalization for Heart Failure, No./Total: Control	Relative Risk (95% Confidence Interval)
CRT Alone vs Medical Therapy			
MUSTIC-SR,[9] 2001	3/29	9/29	0.33 (0.10-1.11)
MIRACLE,[8] 2002	18/228	34/225	0.52 (0.30-0.90)
MUSTIC-AF,[11] 2002	1/25	2/18	0.36 (0.04-3.67)
RD-CHF,[14] 2003	1/22	7/22	0.14 (0.02-1.07)
CARE-HF,[19] 2005	72/409	133/404	0.53 (0.42-0.69)
Subtotal	95/713	185/698	0.51 (0.41-0.64)
Test for Heterogeneity: $\chi^2_4 = 2.27$; $P = .69$; $I^2 = 0\%$			
Test for Overall Effect: $Z = 5.88$; $P < .001$			
CRT + ICD v			
CONTAK-CD, [illegible]	[illegible]	[illegible]	[illegible]
MIRACLE-ICD,[10] 2003	85/187	78/182	1.06 (0.84-1.33)
Subtotal	117/432	117/427	1.00 (0.80-1.24)
Test for Heterogeneity: $\chi^2_1 = 1.10$; $P = .29$; $I^2 = 8.8\%$			
Test for Overall Effect: $Z = 0.04$; $P = .97$			
Total	212/1145	302/1125	0.63 (0.43-0.93)
Test for Heterogeneity: $\chi^2_6 = 23.08$; $P < .001$; $I^2 = 74.0\%$			
Test for Overall Effect: $Z = 2.34$; $P = .02$			

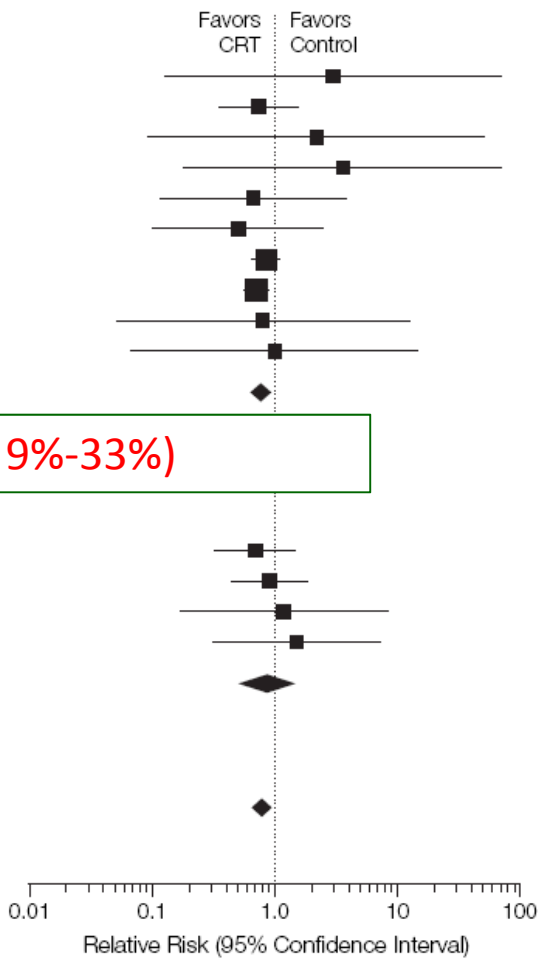


Reduktion der Hospitalisationen 73% (95% CI, 7%-57%)

McAlister et. al. JAMA. 2007;297:2502-2514

CRT reduziert Mortalität

Source	All-Cause Mortality, No./Total: CRT	All-Cause Mortality, No./Total: Control	Relative Risk (95% Confidence Interval)
CRT Alone vs Medical Therapy			
MUSTIC-SR,[9] 2001	1/29	0/29	3.00 (0.13-70.74)
MIRACLE,[8] 2002	12/228	16/225	0.74 (0.36-1.53)
MUSTIC-AF,[11] 2002	1/25	0/18	2.19 (0.09-50.93)
PATH-CHF,[12] 2002	2/24	0/17	3.60 (0.18-70.54)
PATH-CHF II,[16] 2003	2/43	3/43	0.67 (0.12-3.79)
RD-CHF,[14] 2003	2/22	4/22	0.50 (0.10-2.45)
COMPANION,[15] 2004	131/617	77/308	0.85 (0.66-1.09)
CARE-HF,[19] 2005	92/409	129/404	0.70 (0.56-0.89)
VECTOR,[20] 2005	1/59	1/47	0.80 (0.05-12.40)
HOBIPACE,[17] 2006	1/16	1/16	1.00 (0.07-14.64)
Subtotal	245/1472	231/1129	0.77 (0.66-0.91)
Test for			
Test for			
CRT + ICD vs ICD Alone			
CONTAK-CD,[13] 2003	11/245	16/245	0.69 (0.33-1.45)
MIRACLE-ICD,[10] 2003	14/187	15/182	0.91 (0.45-1.83)
MIRACLE ICD II,[18] 2004	2/85	2/101	1.19 (0.17-8.26)
RHYTHM-ICD,[21] 2005	6/119	2/60	1.51 (0.31-7.27)
Subtotal	33/636	35/588	0.86 (0.54-1.39)
Test for Heterogeneity: $\chi^2_3 = 0.97$; $P = .81$; $I^2 = 0\%$			
Test for Overall Effect: $Z = 0.60$; $P = .55$			
Total	278/2108	266/1717	0.78 (0.67-0.91)
Test for Heterogeneity: $\chi^2_{13} = 4.90$; $P = .98$; $I^2 = 0\%$			
Test for Overall Effect: $Z = 3.18$; $P = .001$			

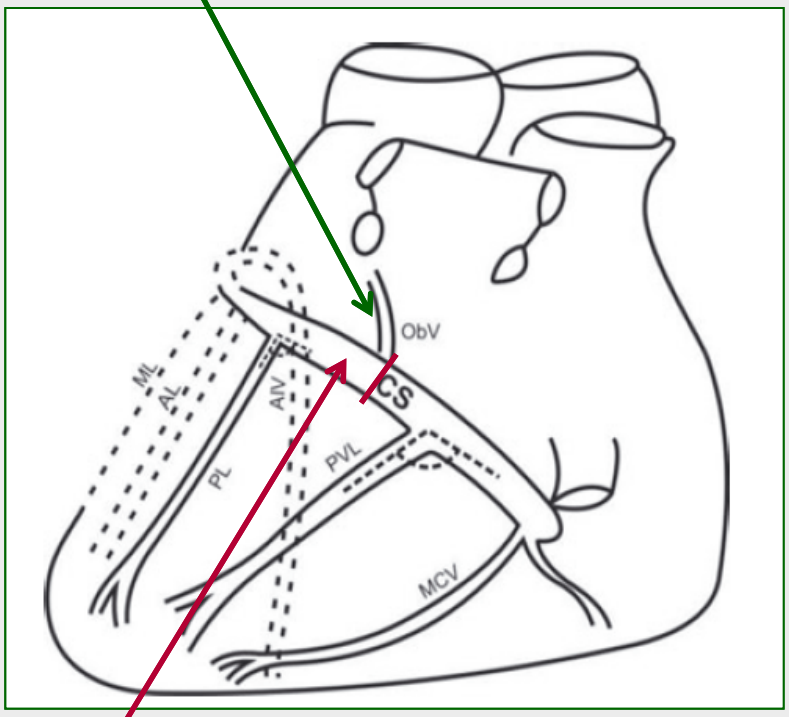


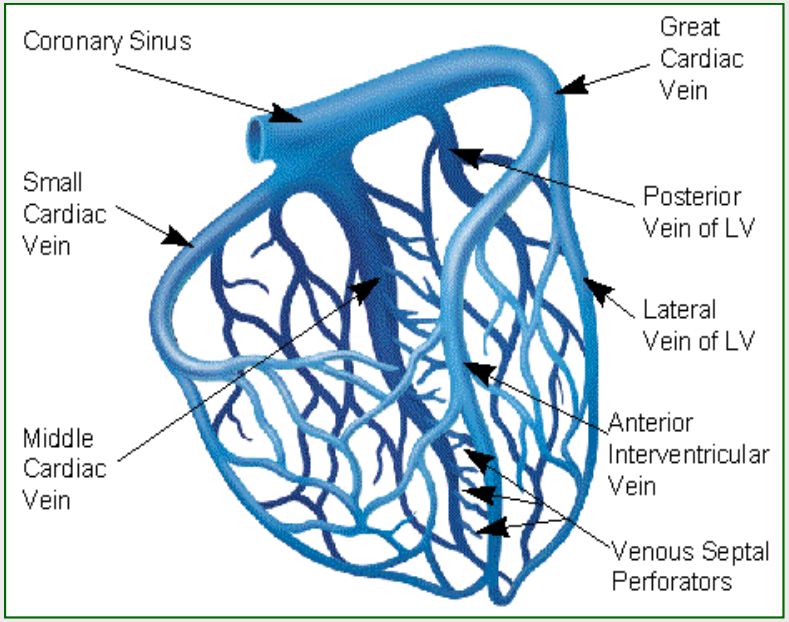
Reduktion der Gesamtmortalität 22% (95% CI, 9%-33%)

McAlister et. al. JAMA. 2007;297:2502-2514

Anatomie des Coronarsinus

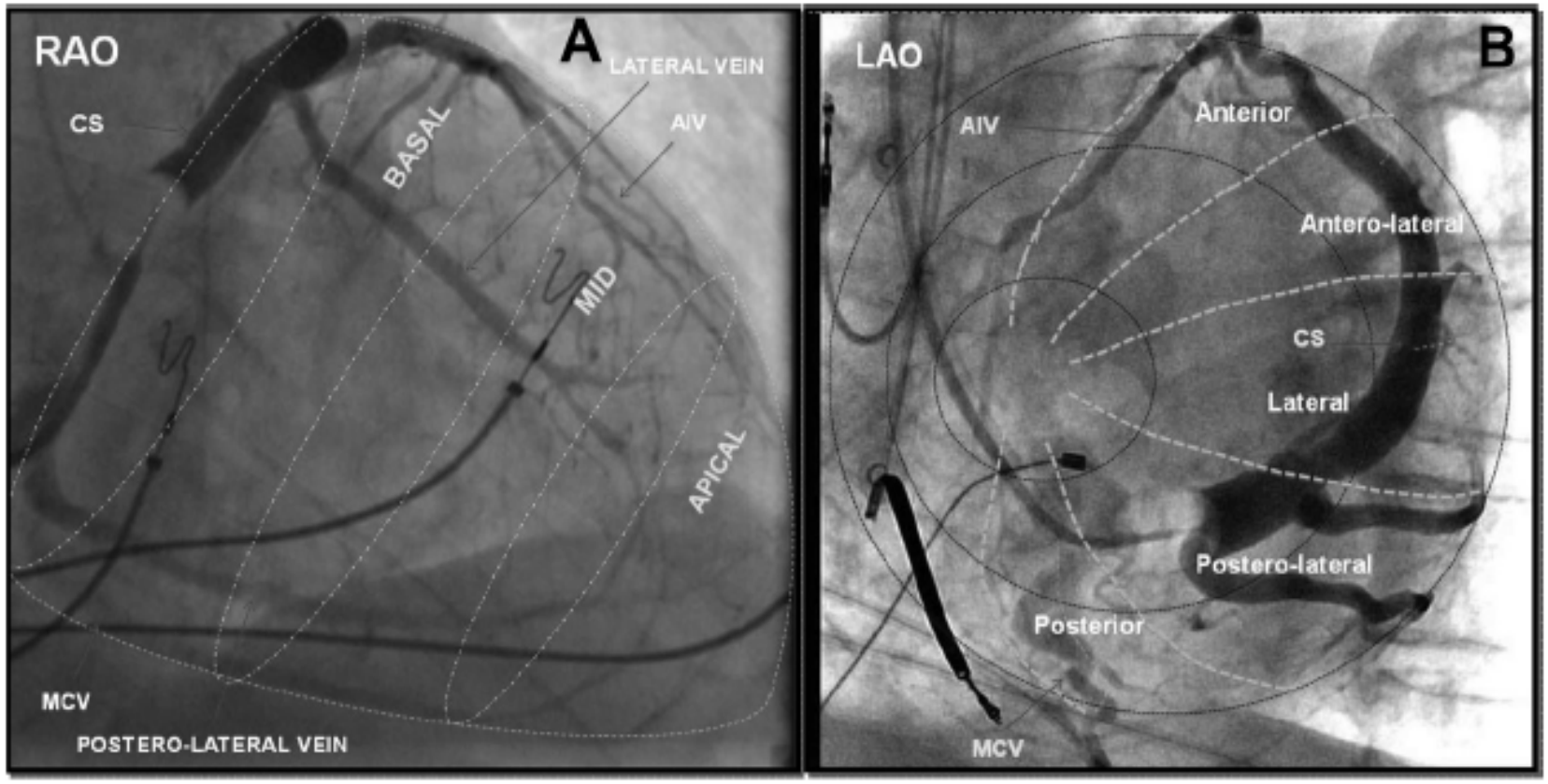
Marschall-Vene





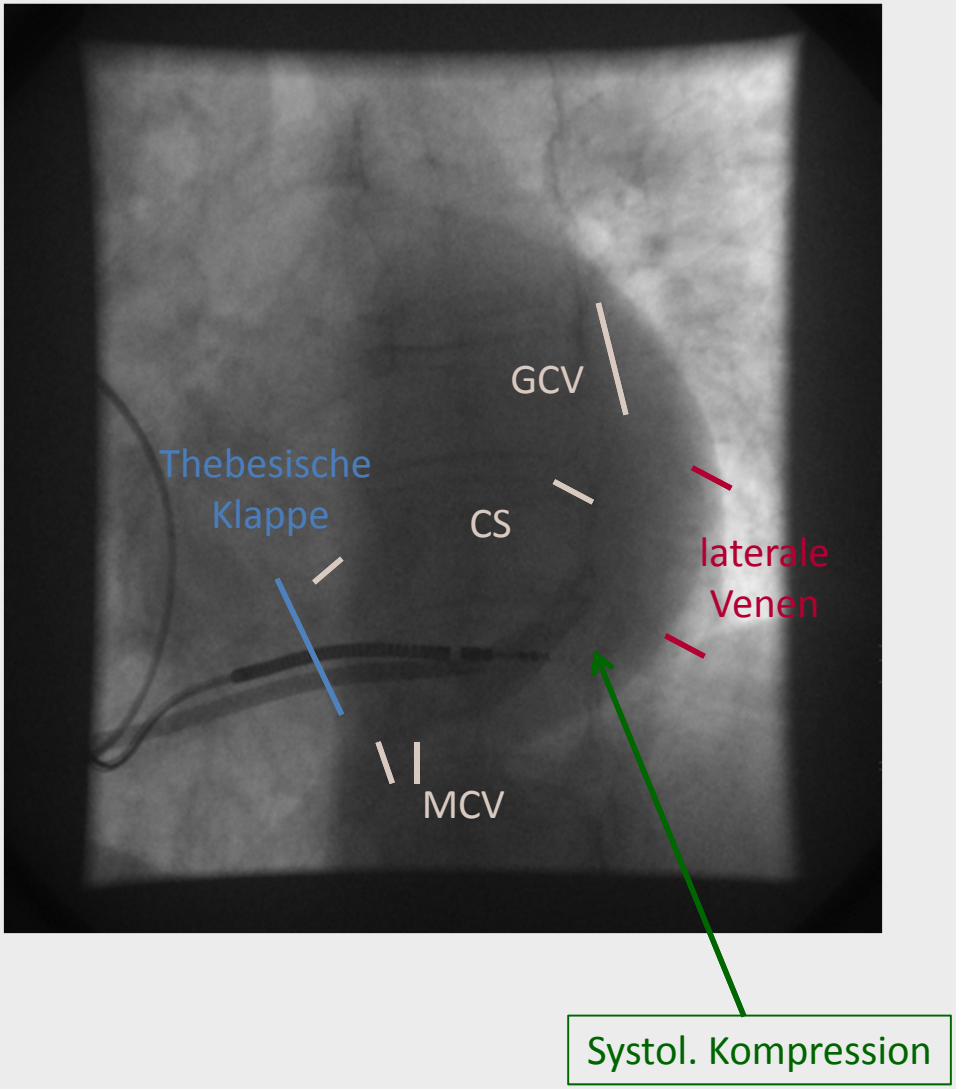
great cardiac vein / anteriore inter-ventrikuläre Vene

Anatomie des Coronarsinus



Singh et al. Circulation 2011; 123: 1159-1166

Anatomie des Coronarsinus



Fallvorstellung

54jährige Patientin

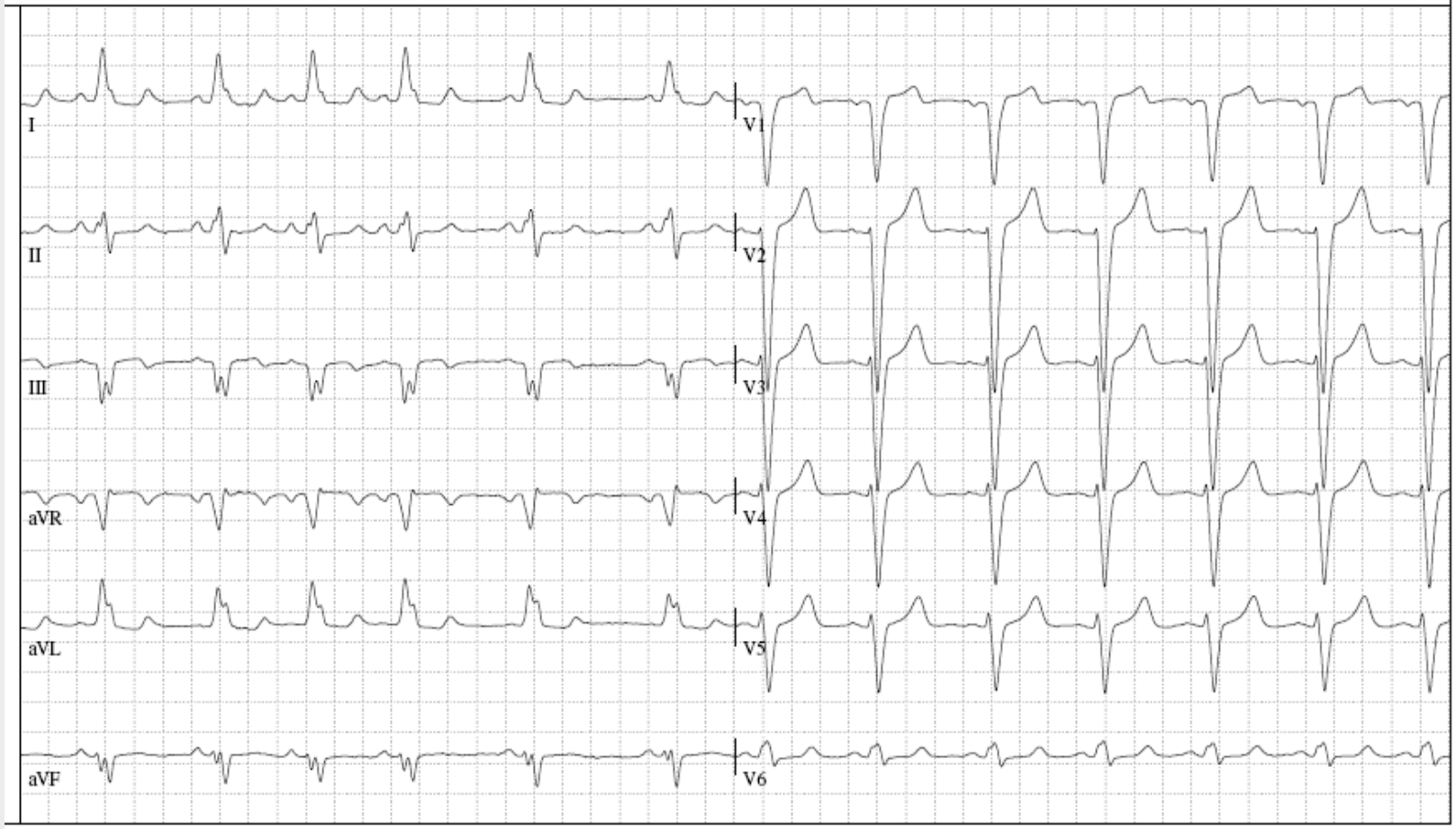
Dilatative Kardiomyopathie, LVEF 25%
- Z.n. invasiv Ausschluß KHK
- NYHA III
- NT-proBNP 863 pg/ml

Diabetes mellitus Typ 2

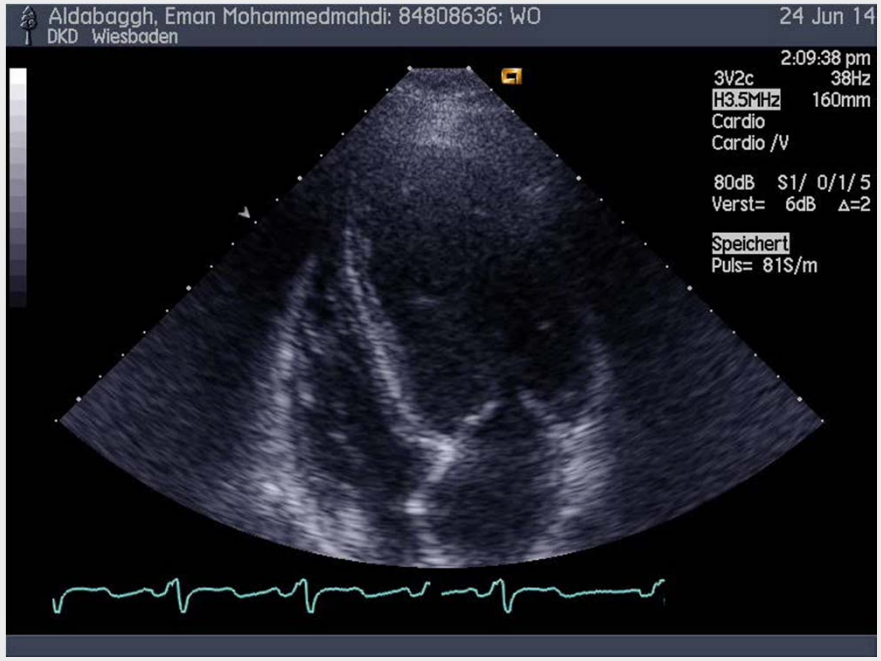
Adipositas (BMI 33 kg/m²)

Fallvorstellung

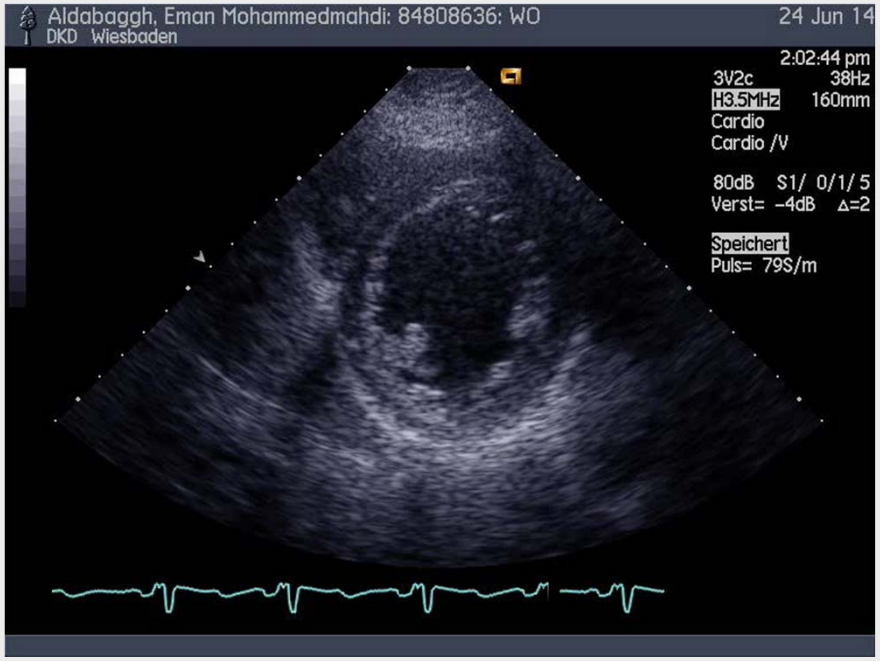
Herzfrequenz	82/min
PQ Intervall	152ms
QRS Dauer	150ms
QT/QTc	448/510ms
P-QRS-T Winkel	51/-23/35°
P Dauer	122ms
RR/PP Intervall	772/765ms



Echokardiografie



Apikaler 4-Kammerblick

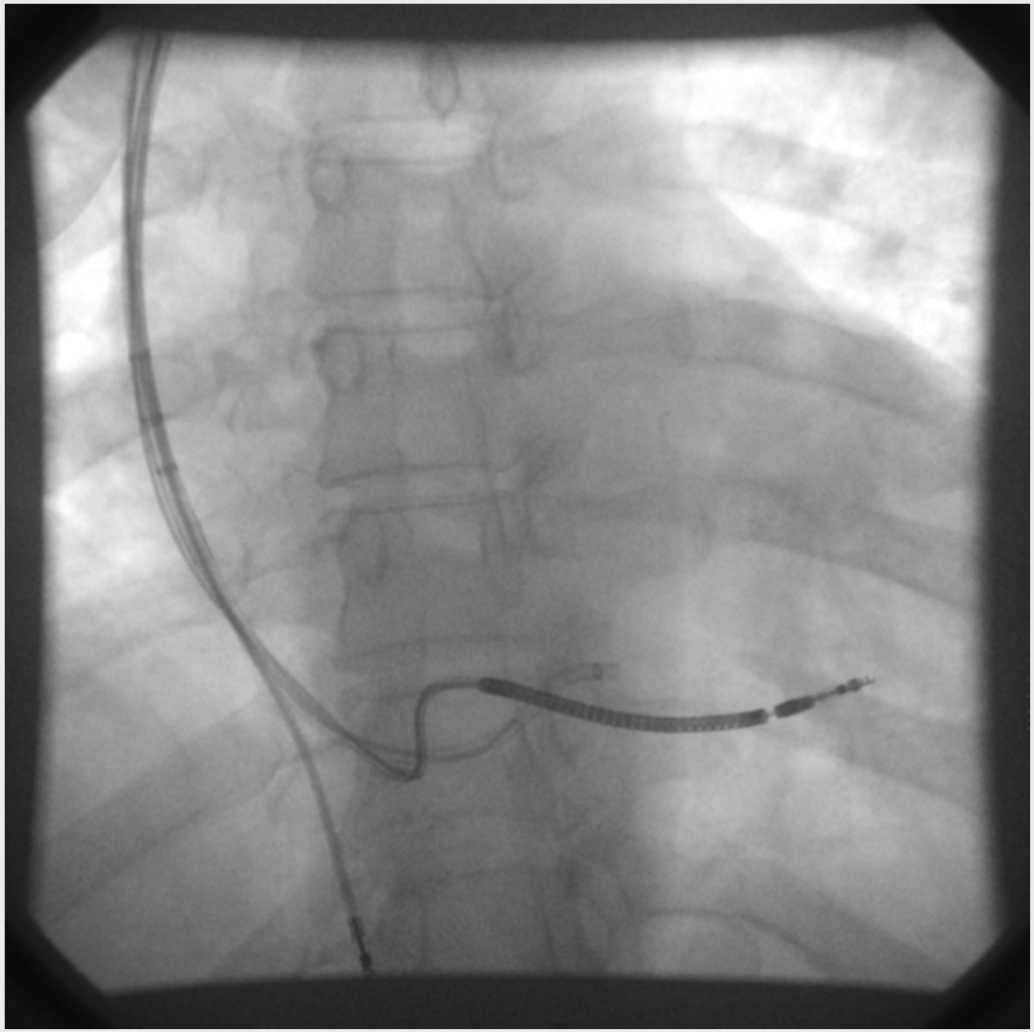


Parasternal kurze Achse

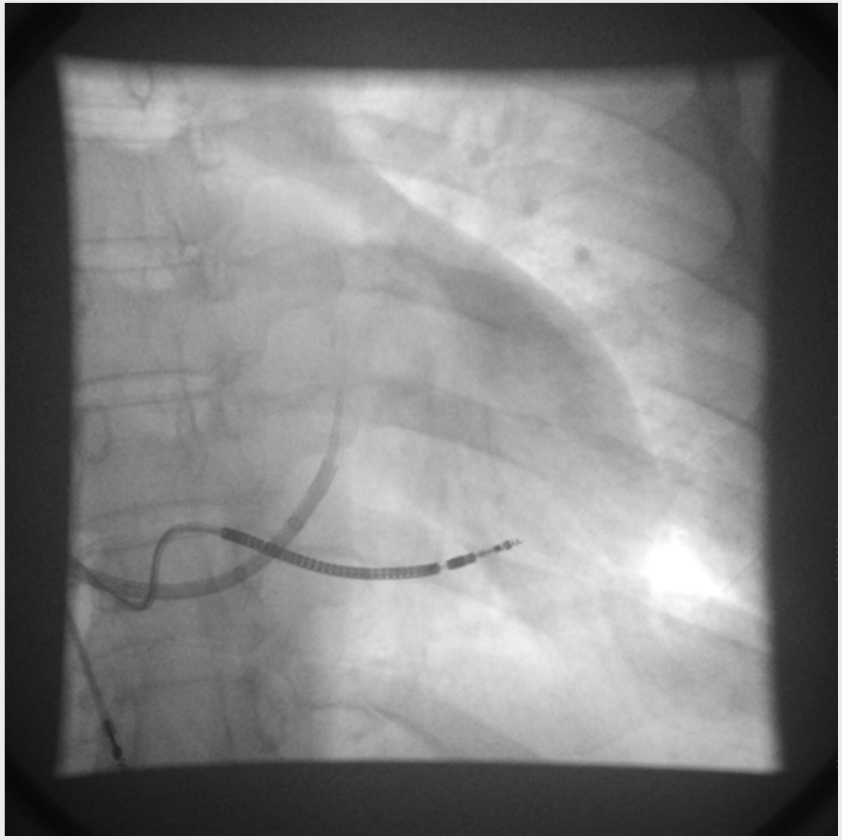
CRT Implantation

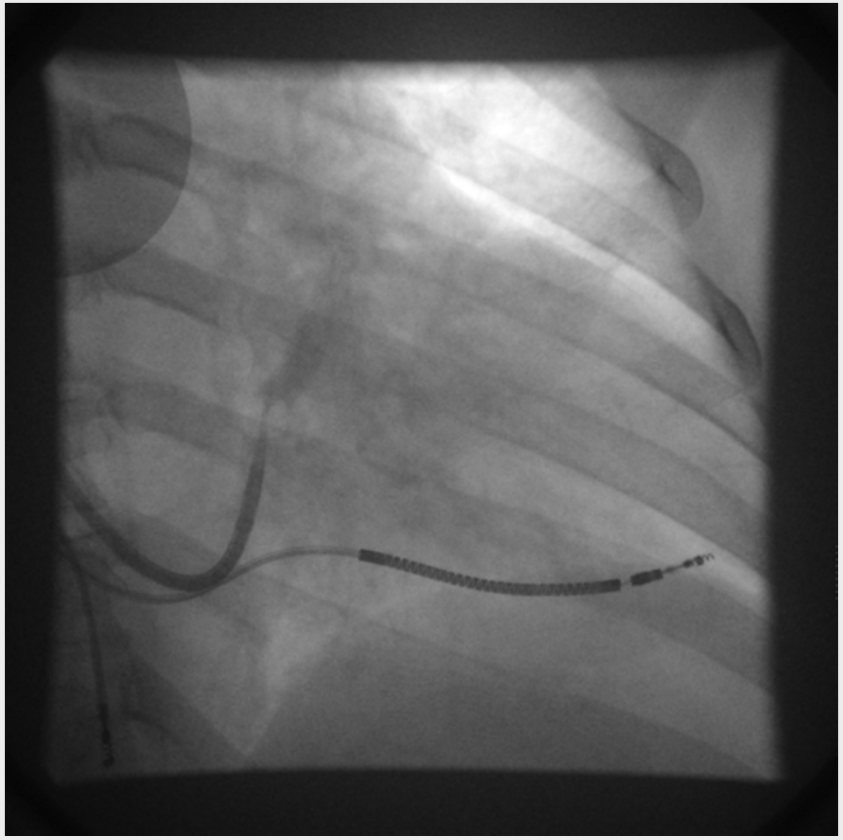
1) Vorbereitung
2) RV Sonde

Aufnahmen während Sondenpositionierung



Angiografie mit Ballon

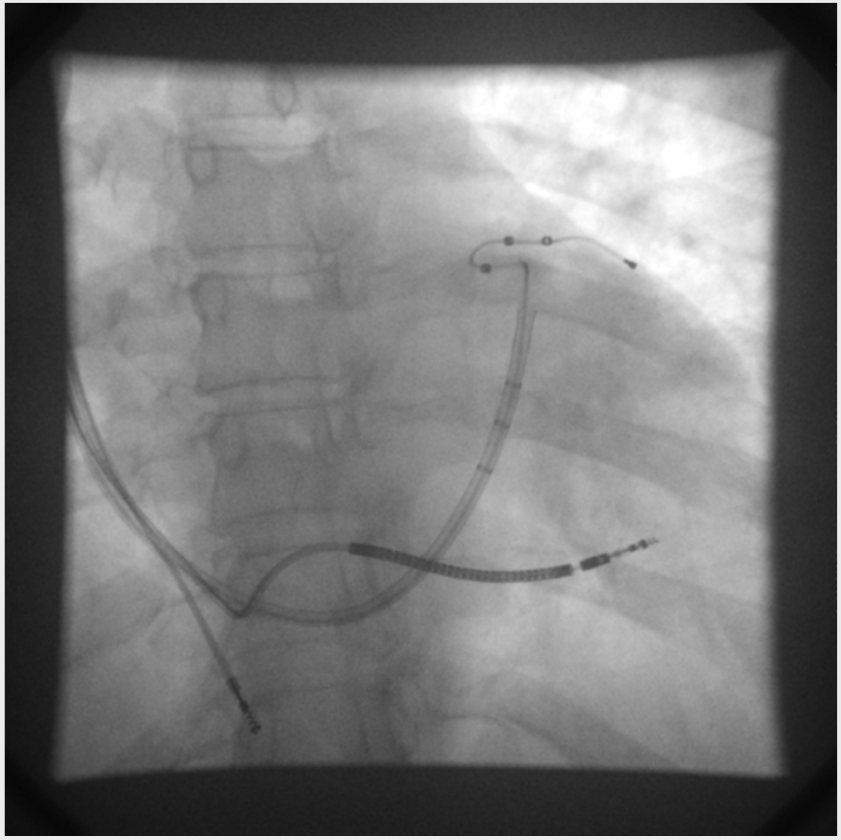


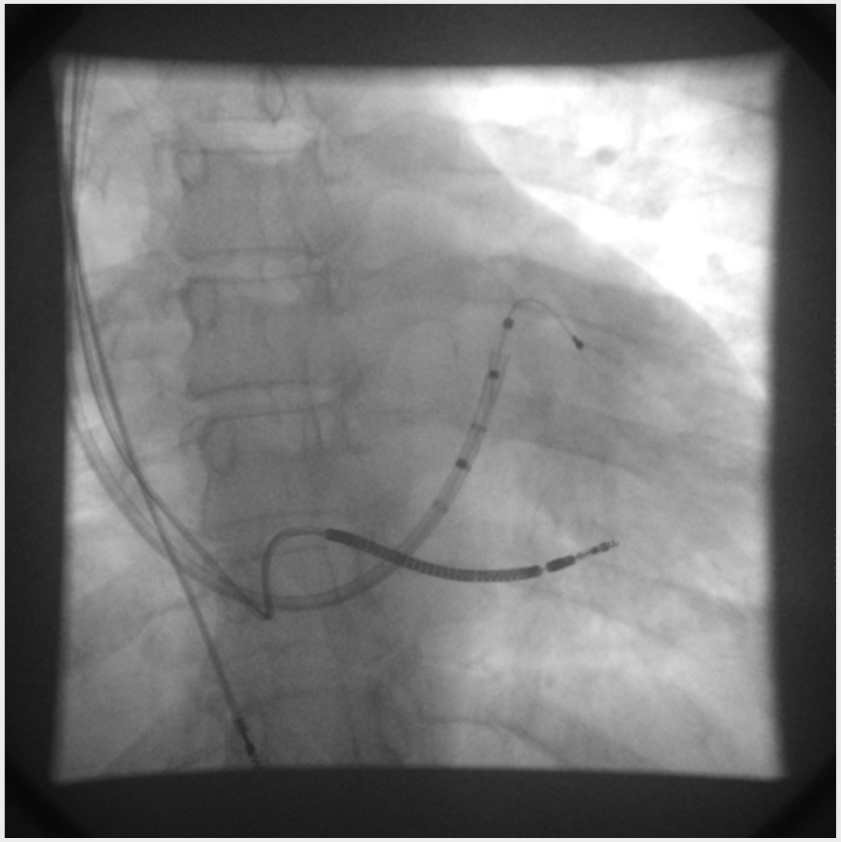


CRT Implantation

3) Ballonangio

Platzierung der LV Sonde

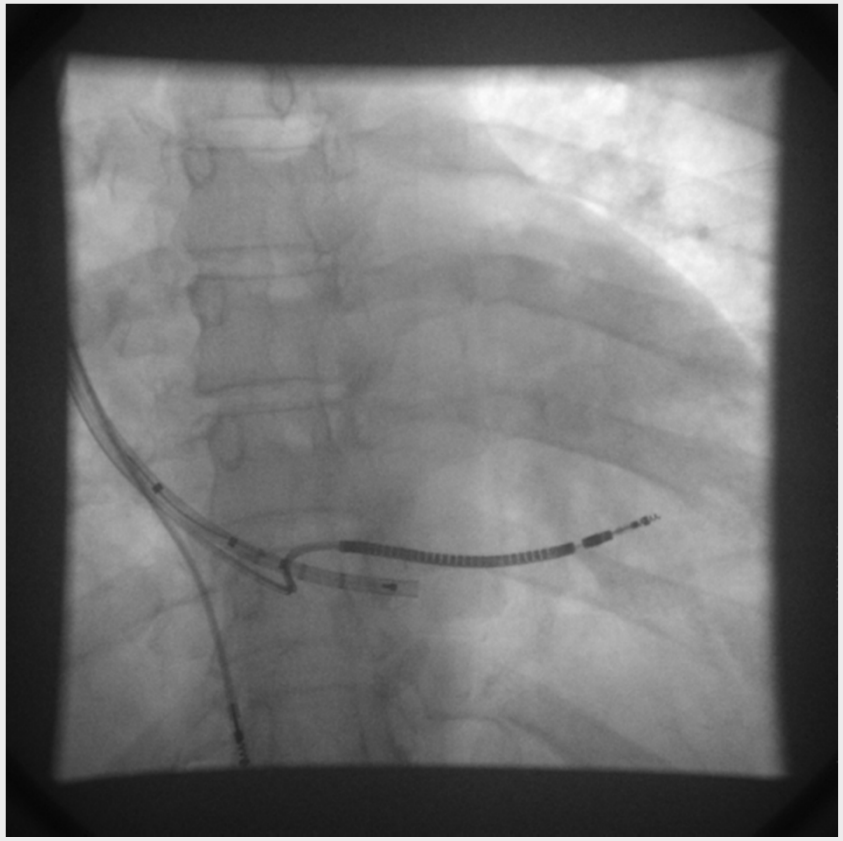


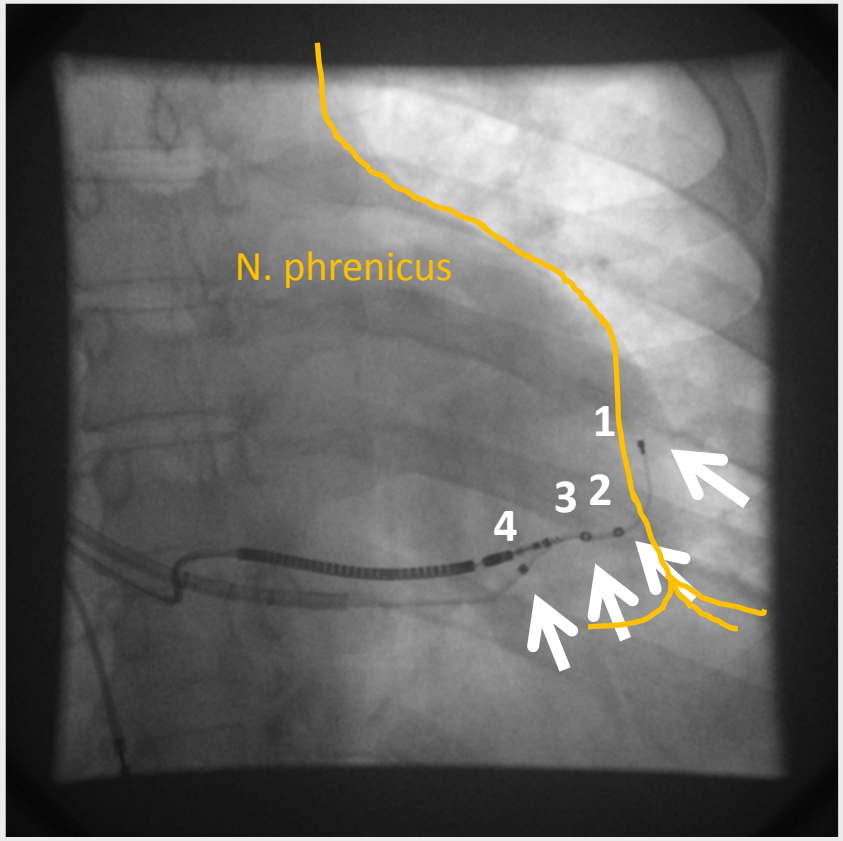


CRT Implantation

3) Ballonangio

Weitere Zielvenen



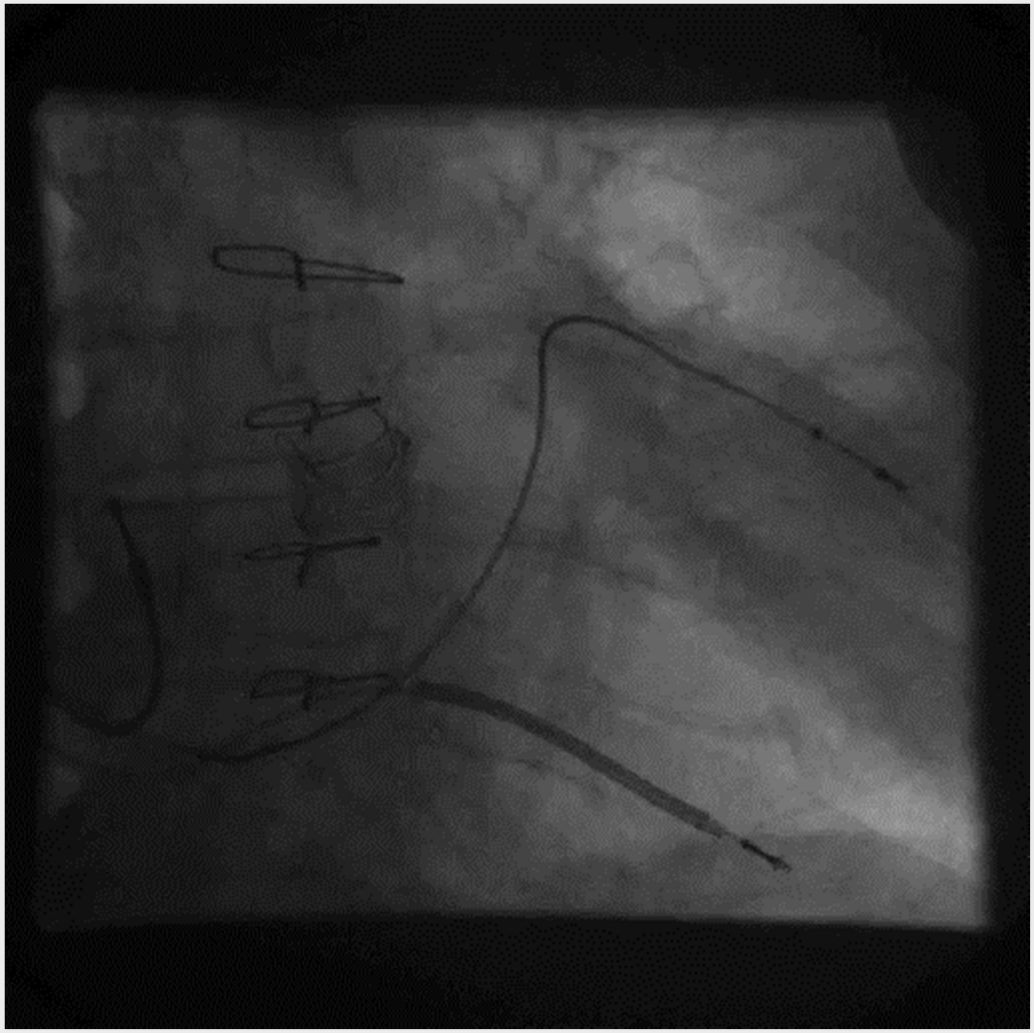


1-2 = Zwerchfellzucken bei 3 V, Reizschwelle 2,0 V / 1,0 ms
2-3 = Zwerchfellzucken bei 5 V, Reizschwelle 2,4 V / 1,0 ms
3-4 = kein Zwerchfellzucken, Reizschwelle >3,0 V / 1,0 ms
3-RV coil = kein Zwerchfellzucken, Reizschwelle 1,7 V / 0,5 ms
4-RV coil = kein Zwerchfellzucken, Reizschwelle 1,3 V / 0,5 ms

CRT Implantation

4) Schlitzen der CS Sonde

Schocktestung?



SIMPLE

Primary efficacy hypothesis
ICD implantation without intra-operative DFT is non-inferior
to implantation with DFT against the composite end-point
of inneffective first appropriate clinical shock or arrhythmic death

Secondary safety hypotheses
ICD implantation without intra-operative DFT will reduce the rate of
Serious peri-operative complications (30 days)

No impact on all-cause mortality

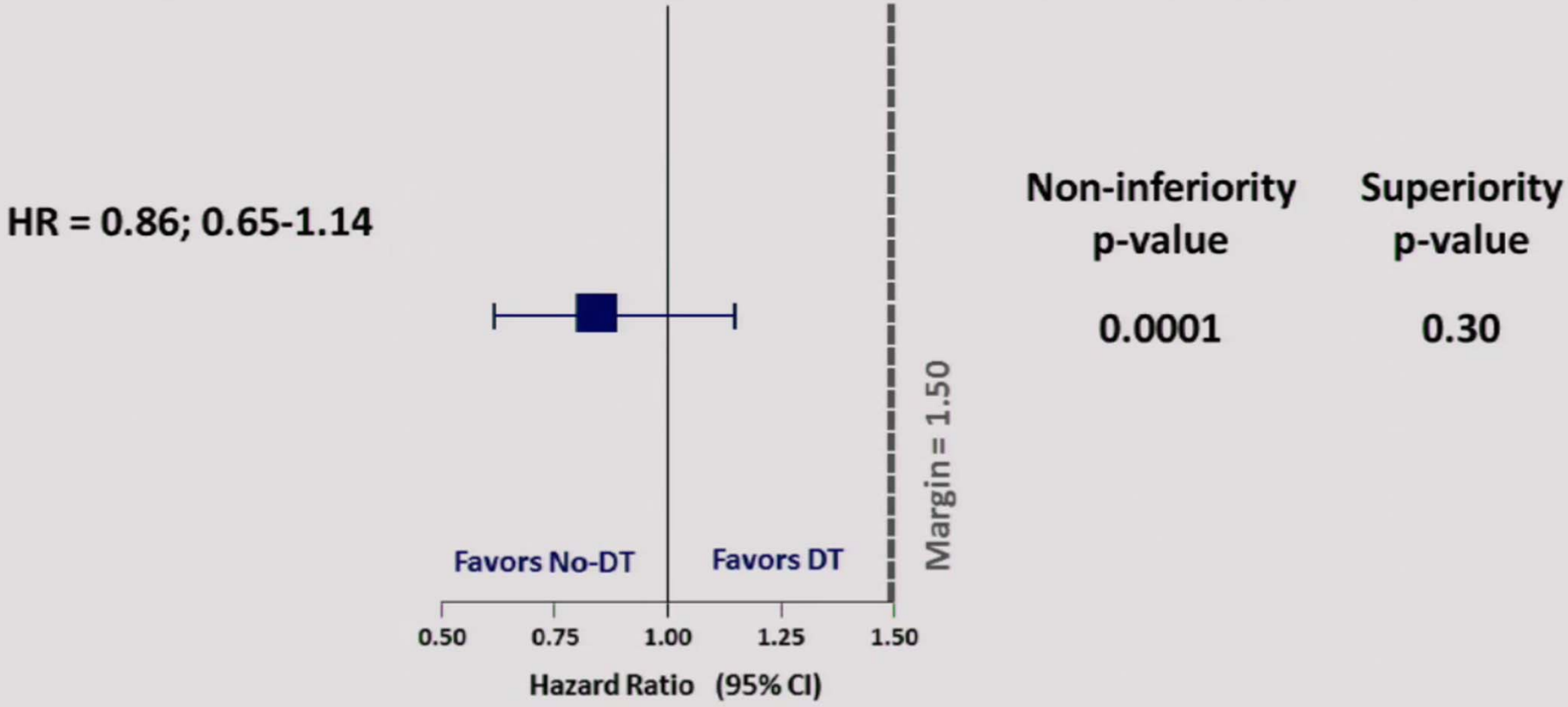
DFT arm
Achieve one successful defib at 17J or two at 21J
Reasonable efforts to achieve goal (SQ array, lead repositioning)

No-DFT arm
No testing done at implant or during follow-up

Healey et al. Heart Rhythm 2014 – late breaking clinical trials

Failed appropriate shock or arrhythmic death

2500 patients, 01/2009-04/2011, mean follow-up 3.1±1.0 years
Randomized 1:1



Healey et al. Heart Rhythm 2014 – late breaking clinical trials

Zusammenfassung

- CRT ist eine sehr effektive Therapieform bei systolischer Herz-insuffizienz mit Linksschenkelblock
- CRT reduziert Mortalität und Hsopitalisationen
- DFT Testung nicht mehr routinemäßig notwendig

Danke…