MECHANICKÉ PODPORY A TRANSPLANTACE SRDCE V DĚTSKÉM VĚKU

MUDr. Filip Kučera

Great Ormond Street Hospital

MECHANICKÉ SRDEČNÍ PODPORY

Čerpadla krve schopná u pacientů s pokročilým srdečním selháním částečně nebo úplně převzít úlohu srdce a zajistit tím dostatečný srdeční výdej.

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ROZDĚLENÍ MECHANICKÝCH PODPOR

- **Délka použití**
  - krátkodobé (ECMO) – cca do 3-4 týdnů
  - dlouhodobé (Berlin Heart, Heartware)
- **Typ toku krve**
  - Kontinuální (centrifugální turbína)
  - Pulzatilní (membrána)
- **Druhu podpory**
  - LVAD (**V**entricular **A**ssisst **D**evice)
  - BIVAD

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INDIKACE MECHANICKÝCH PODPOR

- **Bridge to recovery** (myokarditida, po operaci)
- **Bridge to bridge** (např. ECMO ⟶ LVAD)
- **Bridge to transplant**
- **Bridge to decision**

  (nejasná prognóza, získání času)
- **Destinační terapie**

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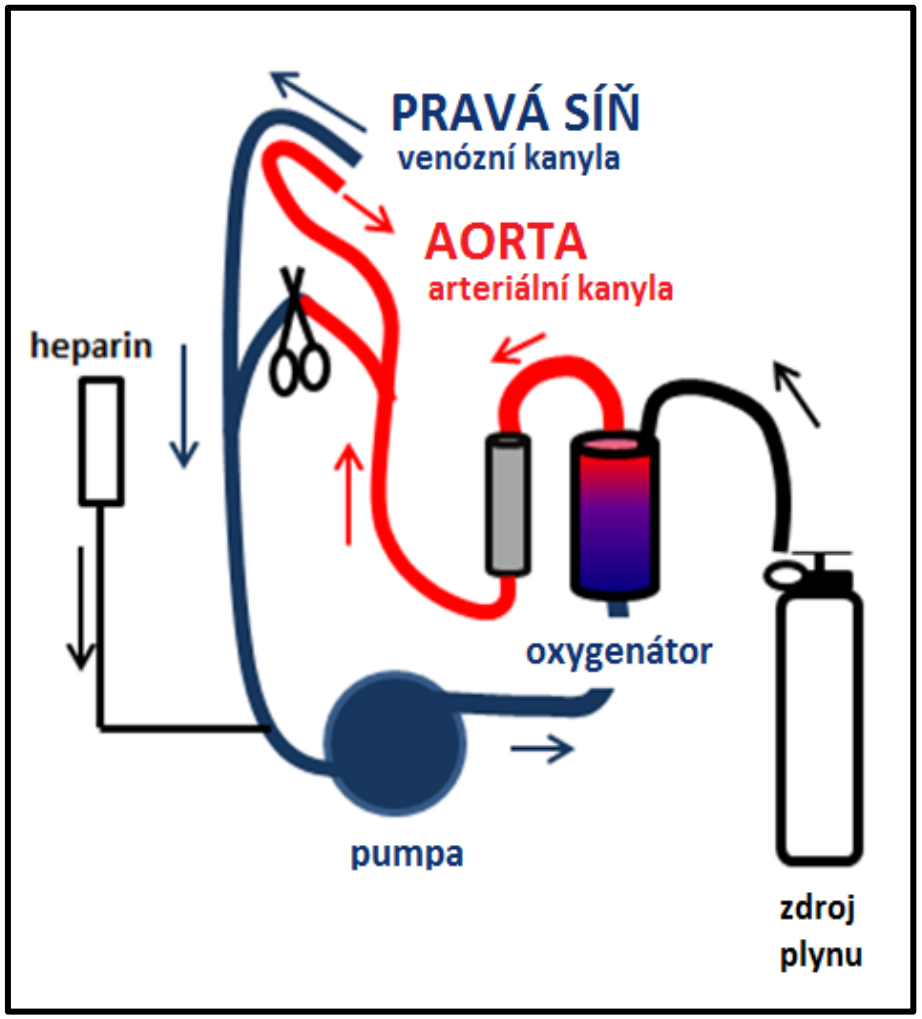
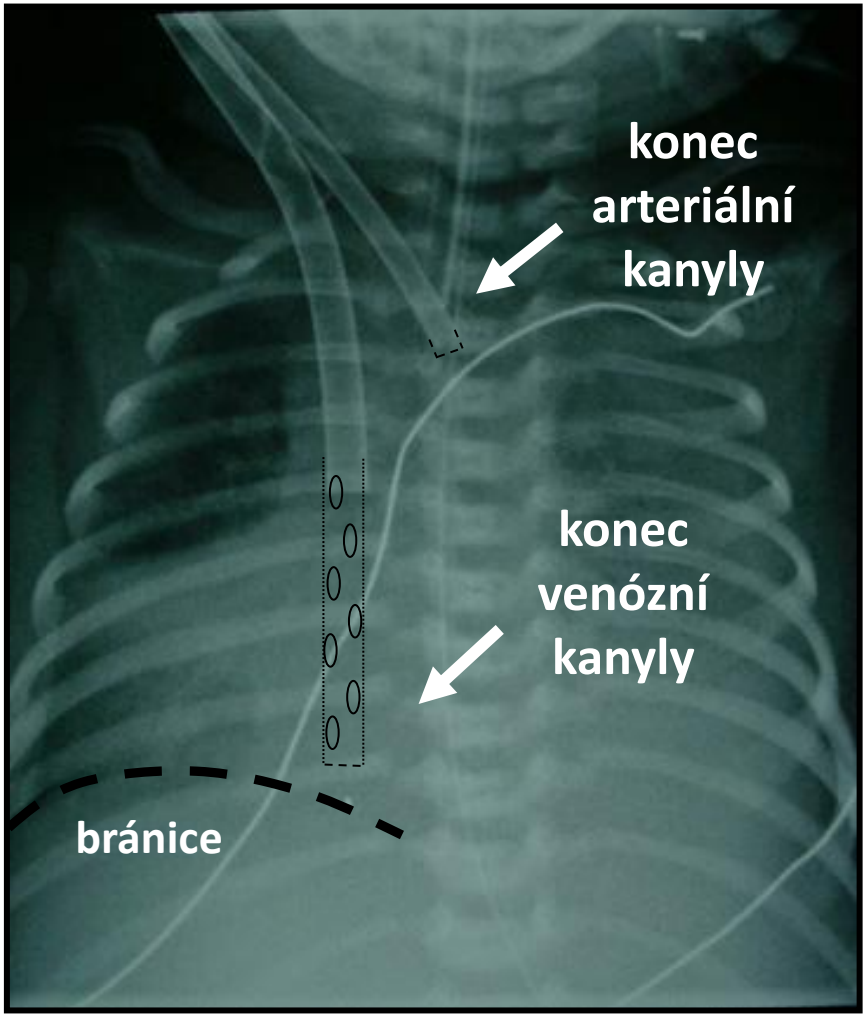
Extracorporeal Membrane Oxygenation (ECMO)





ECMO

ECMO v GOSH n = 326

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Age Group: 0 - 30 days

	Total Runs	Avg Run Time	Longest Run Time	Survived	% Survived
Congenital Defect	74	142	497	31	42%
Cardiac Arrest	1	36	36	1	100%
Myocarditis	8	400	622	3	38%
Other	4	262	634	3	75%

Age Group: 31 days and < 1 year

	Total Runs	Avg Run Time	Longest Run Time	Survived	% Survived
Congenital Defect	54	186	503	29	54%
Cardiomyopathy	6	161	233	3	50%
Myocarditis	9	247	462	8	89%
Other	8	235	611	5	63%

Age Group: 1 year and < 16 years

	Total Runs	Avg Run Time	Longest Run Time	Survived	% Survived
Congenital Defect	37	165	503	16	43%
Cardiac Arrest	2	56	93	1	50%
Cardiogenic Shock	4	152	208	2	50%
Cardiomyopathy	76	206	723	49	64%
Myocarditis	11	162	275	10	91%
Other	25	148	449	17	68%

Age Group: 16 years and over

	Total Runs	Avg Run Time	Longest Run Time	Survived	% Survived
Cardiomyopathy	3	174	408	1	33%
Other	4	166	343	1	25%

KOMPLIKACE ECMO

Mechanical: Oxygenator failure	5	5.7%
Mechanical: Other tubing rupture	2	2.3%
Mechanical: Heat exchanger malfunction	2	2.3%
Mechanical: Clots: oxygenator	5	5.7%
Mechanical: Clots: bridge	6	6.9%
Mechanical: Clots: bladder	2	2.3%
Mechanical: Clots: hemofilter	1	1.1%
Mechanical: Clots: other	12	13.8%
Mechanical: Air in circuit	7	8.0%
Mechanical: Cracks in pigtail connectors	1	1.1%
Mechanical: Cannula problems	16	18.4%
Hemorrhagic: GI hemorrhage	1	1.1%
Hemorrhagic: Cannulation site bleeding	8	9.2%
Hemorrhagic: Surgical site bleeding	50	57.5%
Hemorrhagic: Disseminated intravascular coagulation (DIC)	1	1.1%
Neurologic: Seizures: clinically determined	5	5.7%
Neurologic: Seizures: EEG determined	4	4.6%
Neurologic: CNS infarction by US/CT	1	1.1%
Neurologic: CNS hemorrhage by US/CT	5	5.7%
Renal: Creatinine 1.5 - 3.0	6	6.9%
Renal: Creatinine > 3.0	2	2.3%
Renal: Dialysis required	6	6.9%
Renal: Hemofiltration required	21	24.1%
Renal: CAVHD required	2	2.3%
Cardiovascular: Inotropes on ECLS	31	35.6%
Cardiovascular: CPR required	3	3.4%
Cardiovascular: Myocardial stun by echo	2	2.3%
Cardiovascular: Cardiac arrhythmia	18	20.7%
Cardiovascular: Hypertension requiring vasodilators	24	27.6%
Cardiovascular: PDA: R->L	1	1.1%
Cardiovascular: PDA: unknown	2	2.3%
Cardiovascular: Tamponade: blood	11	12.6%
Pulmonary: Pneumothorax requiring treatment	2	2.3%
Pulmonary: Pulmonary hemorrhage	7	8.0%
Infectious: Culture proven infection (see Infections)	13	14.9%
Infectious: WBC < 1,500	1	1.1%
Metabolic: pH < 7.20	1	1.1%
Metabolic: pH > 7.60	2	2.3%

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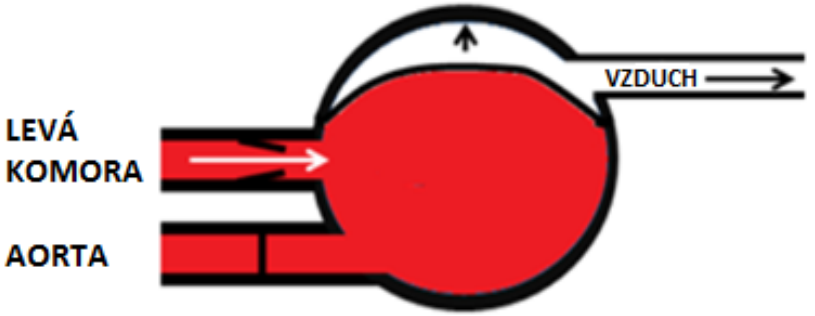
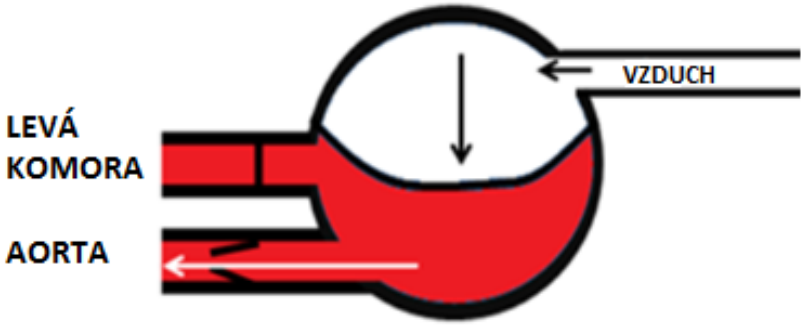
BERLIN HEART



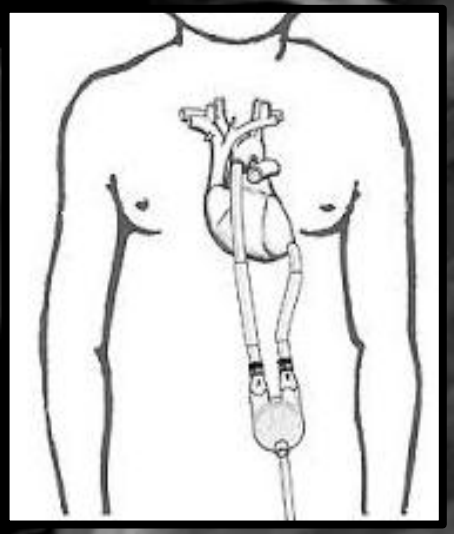
NASÁTÍ KRVE Z LK



VYPRÁZDNĚNÍ DO AORTY

BERLIN HEART - BIVAD

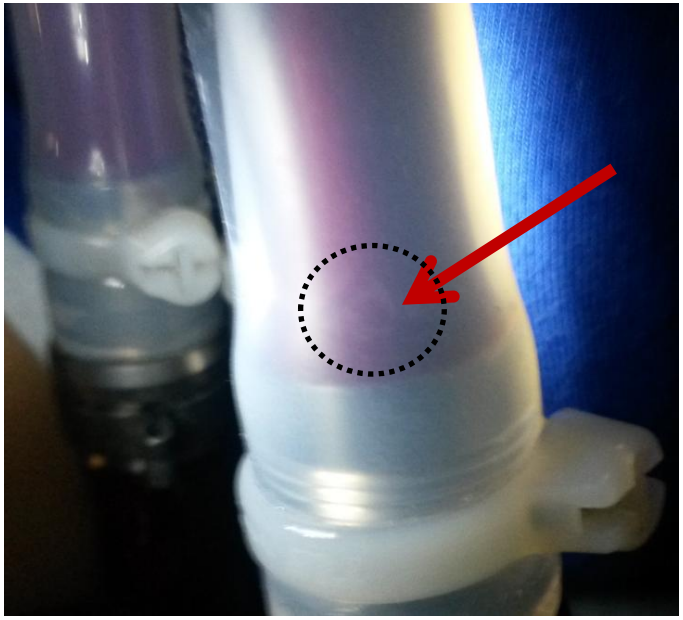

P25P 25ml
EXCOR VAD

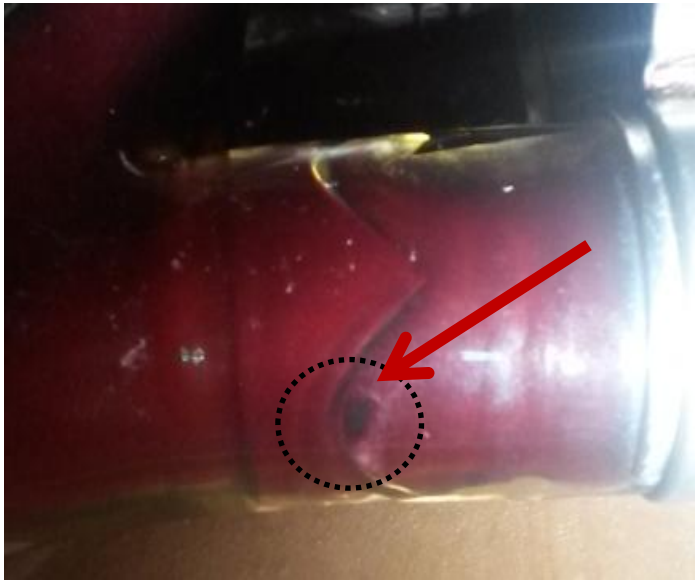


APIKÁLNÍ KANYLA

AORTÁLNÍ KANYLA

Se svolením rodičů





Soubor před implantací (2004-2016)

n= 102

• Ženské pohlaví	59 (57,8%)
• Věk	30,5 měs. (0 měs. – 16,9 roků)
• Hmotnost	11,6kg (3 – 90kg)
• Diagnóza	
– **Dilatační kardiomyopatie**	68 (66,7%)
– Myokarditida	10 (9,8%)
– Vrozená srdeční vada	13 (12,7%)
– Ostatní	11 (10,8%)
• Srdeční zástava před VAD	24 (23,5%)
• ECMO	25 (24,5%)
• Mechanická ventilace	95 (93%)

S laskavým svolením Dr Karimové

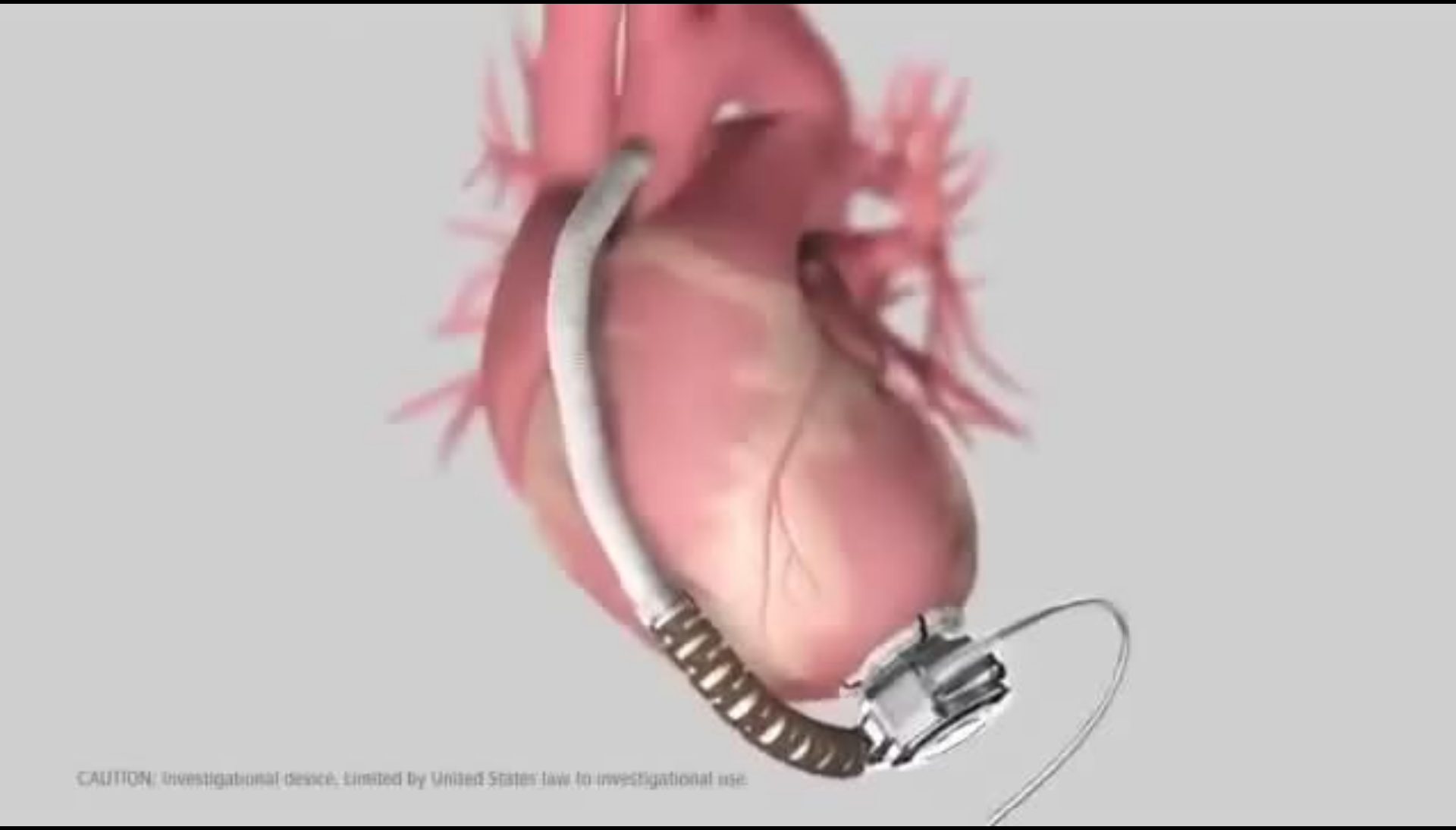
Pacienti po implantaci (2004-2016)

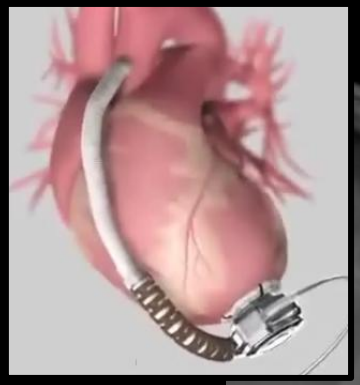
n= 102

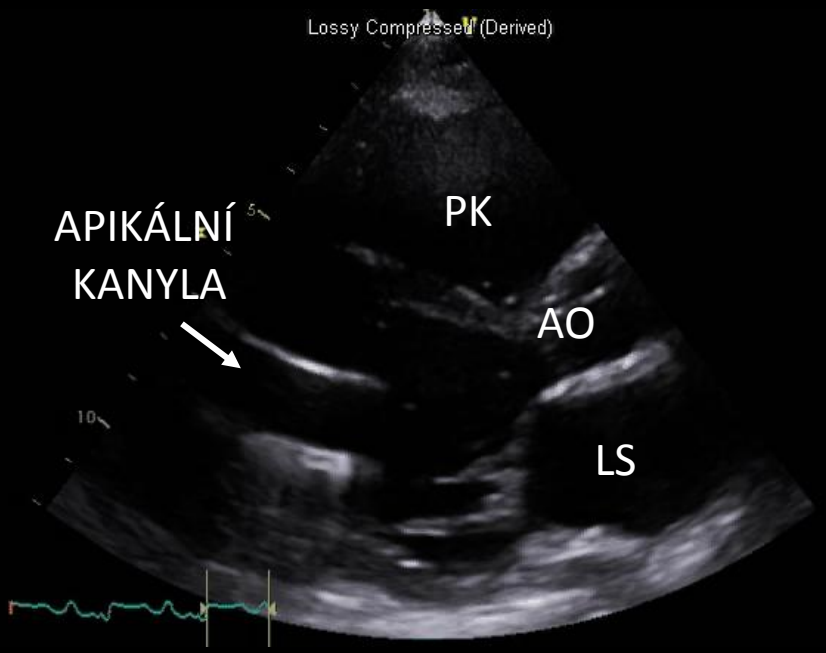
- Mozková příhoda 26 (25,5%)
- Mechanická ventilace po celou dobu VAD 28 (27,5%)
- Selhání ledvin 21 (20,6%)
- BIVAD 38 (37,3%)
- Sepse 31 (29,4%)
- **Přežití (Tx nebo explantace VAD) 86 (84,3%)**

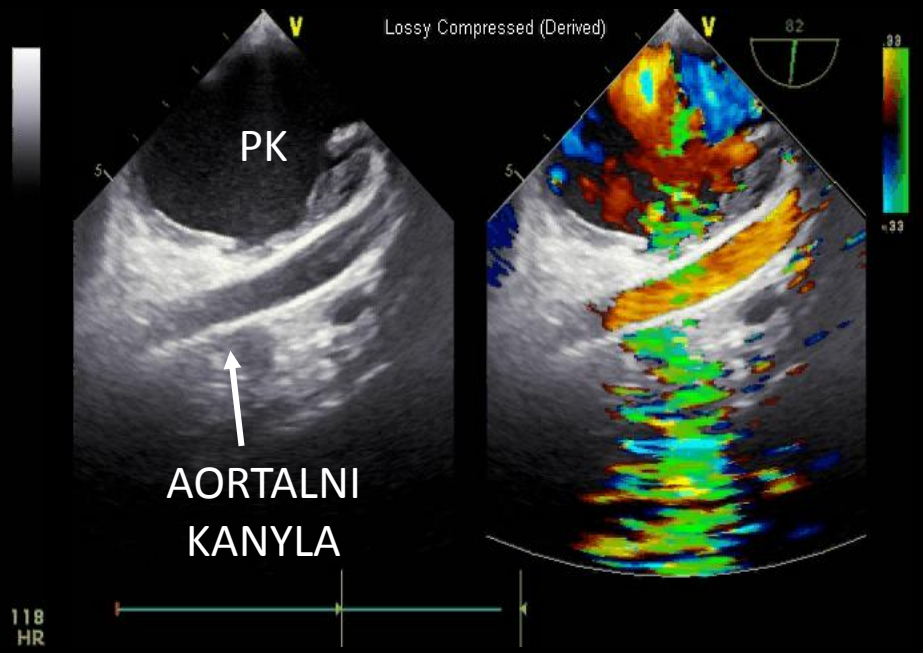
S laskavým svolením Dr Karimové

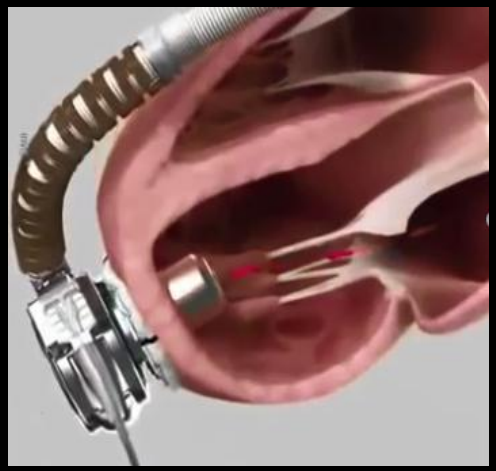
HEARTWARE

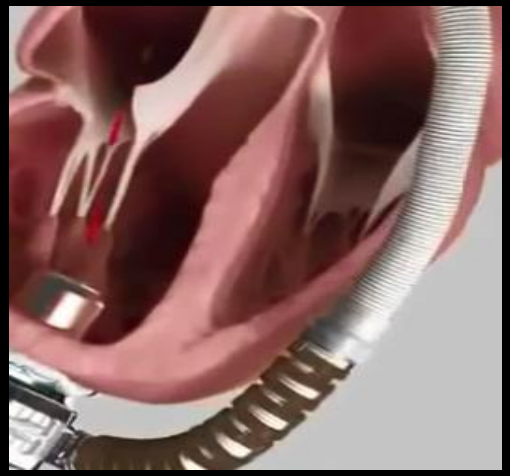

CAUTION: Investigational device. Limited by United States law to investigational use.

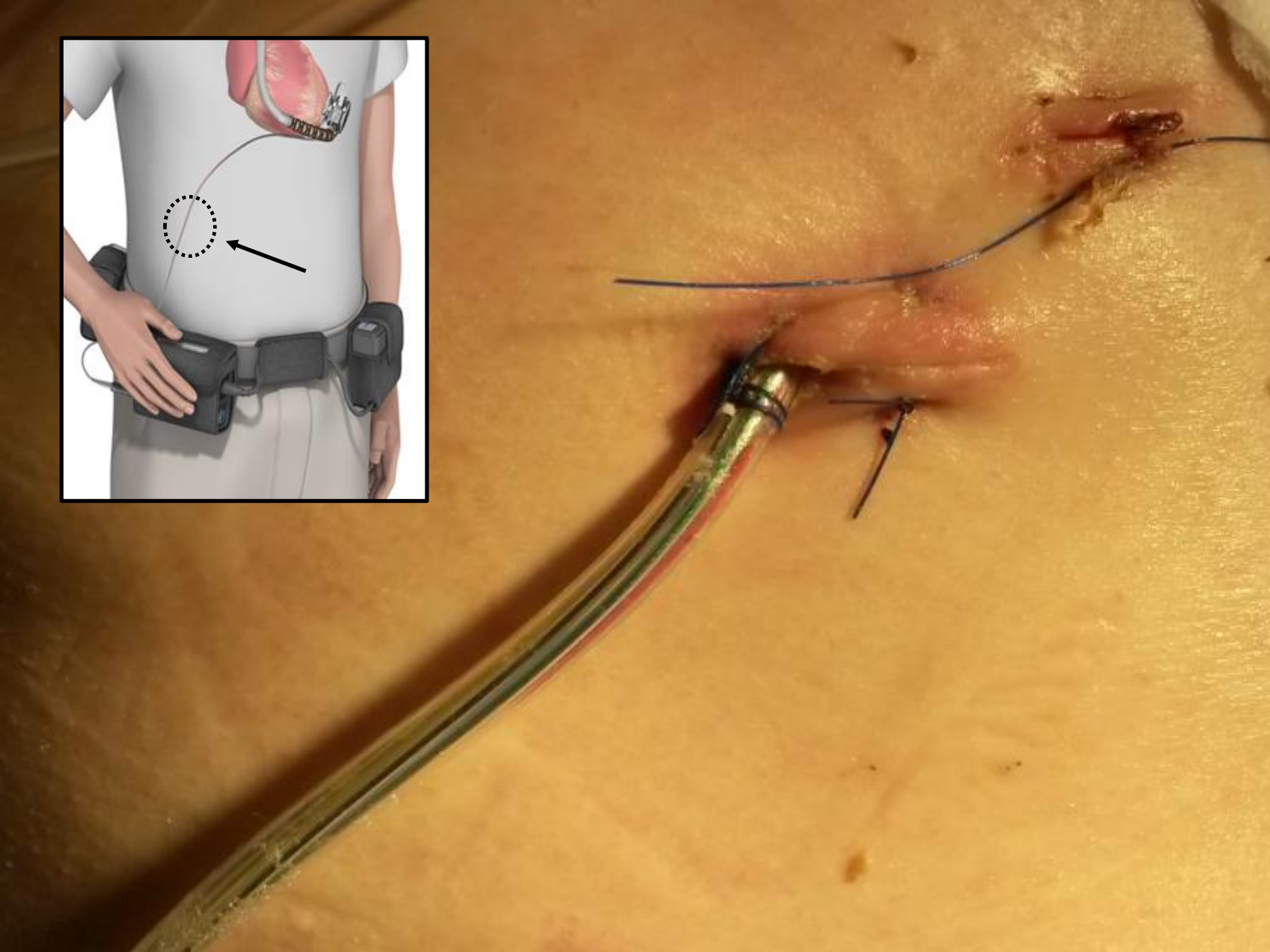


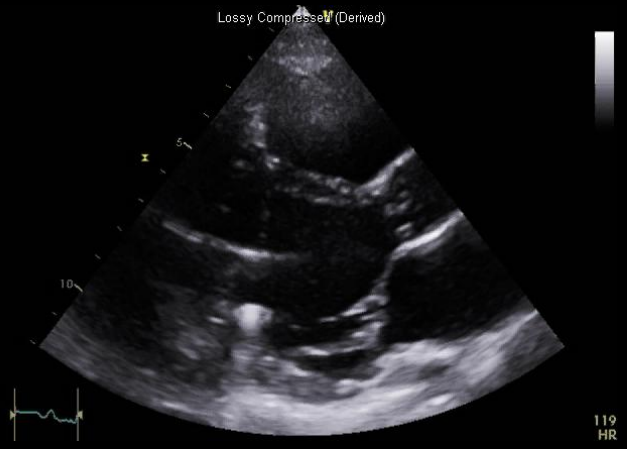

Lossy Compressed (Derived)
APIKÁLNÍ
KANYLA
PK
AO
LS


Lossy Compressed (Derived)
PK
AORTALNI
KANYLA
118
HR

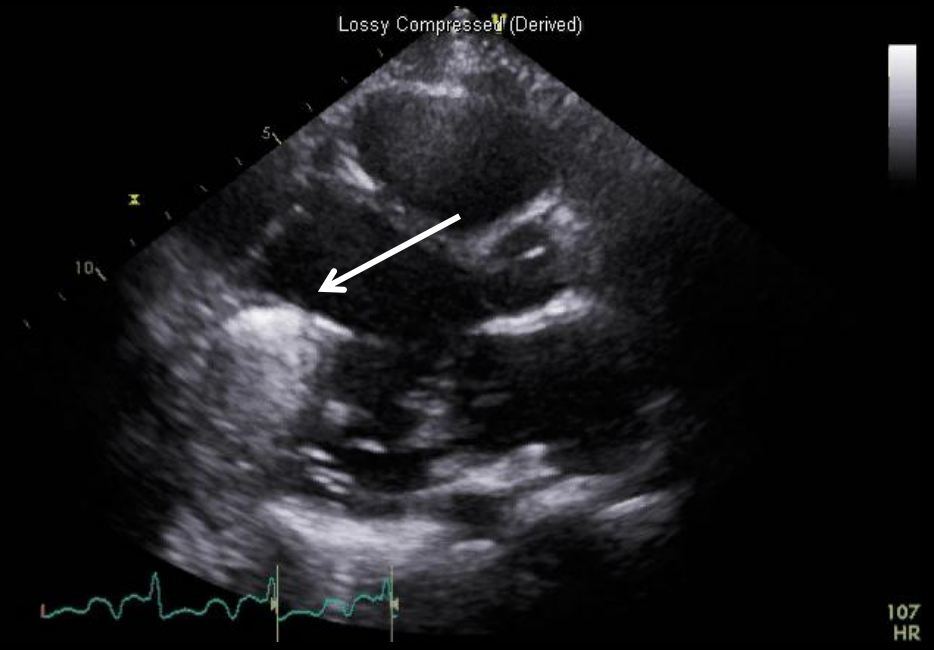






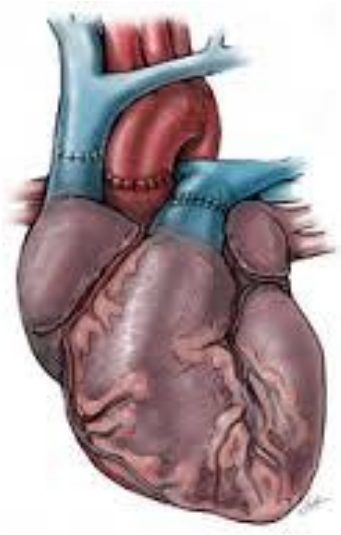


TROMBÓZA PUMPY



INFEKCE

TRANSPLANTACE SRDCE



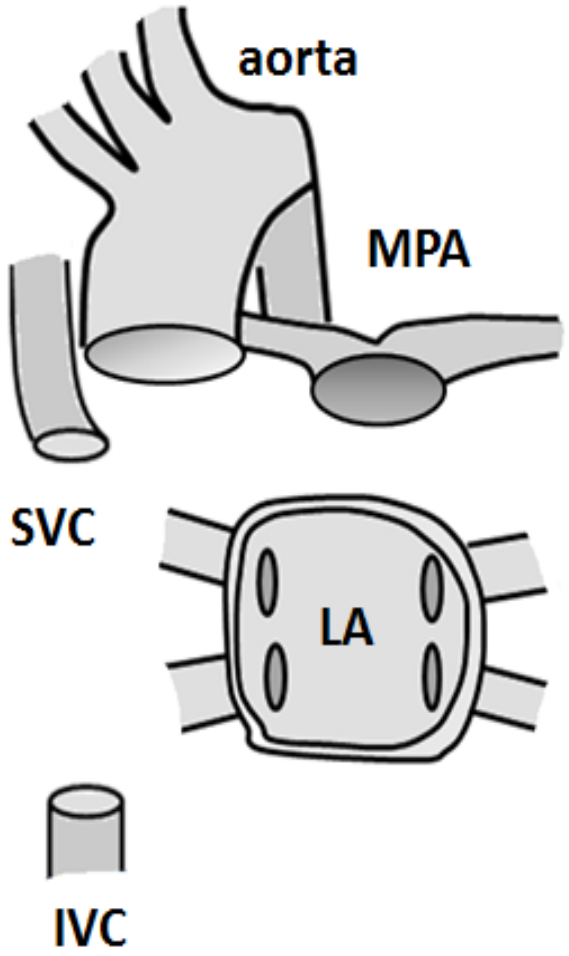
INDIKACE K Tx SRDCE

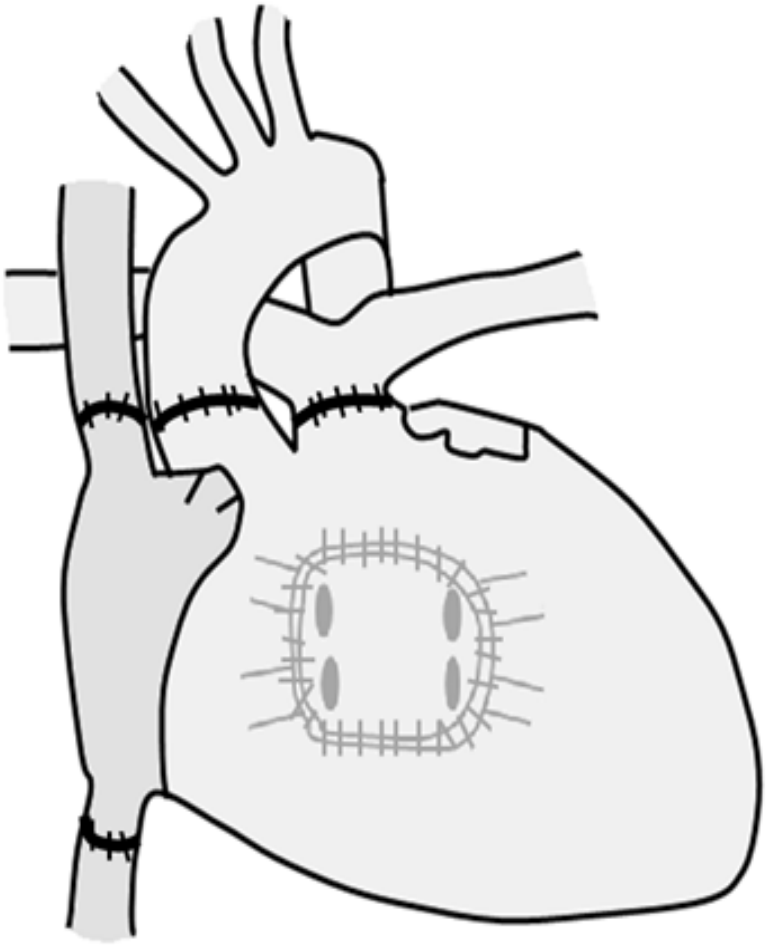
- **Refraktorní kardiogenní šok, srdeční selhání vyžadující kontinuální inotropní nebo mechanickou oběhovou podporu**
- **Vrcholová spotřeba kyslíku (VO_2) 14 ml/kg/min. (s β-blokátorem) nebo VO_2 12 ml/kg/min. (bez β-blokátoru) nebo $VO_2 \leq 50\%$ predikované hodnoty**
- **Progresivní zhoršení srdeční funkce nebo funkční kapacity i přes maximální medikamentózní léčbu**
- **Nepřijatelná kvalita života, neschopnost provádět denní aktivity**
- **Vrozená srdeční vada nevhodná k chirurgické korekci nebo paliaci**
- **Život ohrožující maligní arytmie rezistentní k medikamentózní léčbě, katetrové ablaci, chirurgickému zákroku nebo implantaci ICD**
- **Progresivní plicní hypertenze, která by se mohla potenciální stát kontraindikací k transplantaci srdce v budoucnosti**

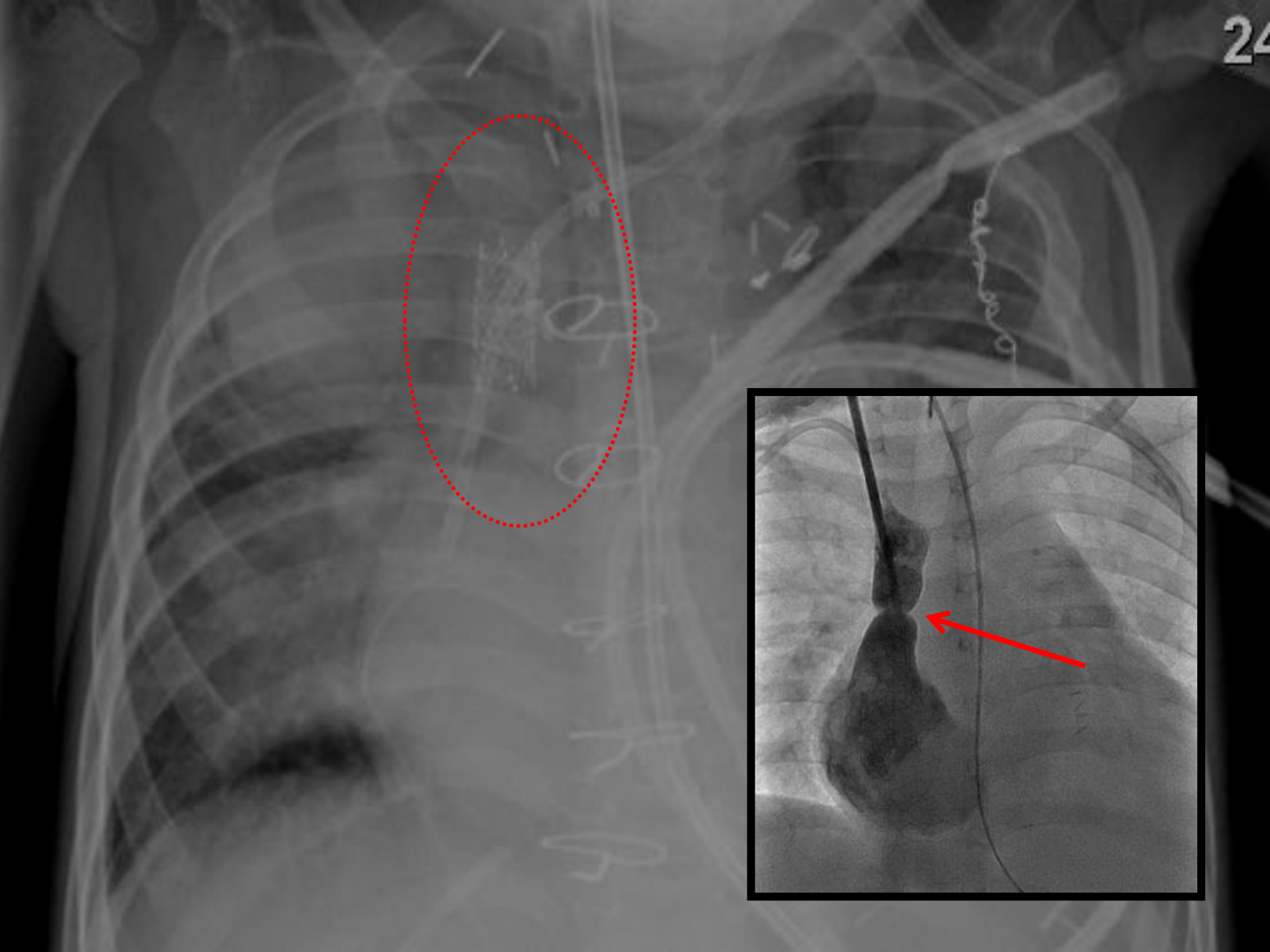
KONTRAINDIKACE K Tx SRDCE

- Ireverzibilní elevace **plicní cévní rezistence > 6 Wood jednotek/m²** nebo transpulmonární gradient > 15 mm Hg
- Aktivní nebo recentně diagnostikovaná **malignita**
- **Patologie CNS** se špatnou nebo nejasnou prognózou
- Závažná progresivní **metabolická choroba** s multiorgánovým postižením
- Závažný **genetický syndrom**
- Závažné ireverzibilní **orgánové poškození** (plic a/nebo ledvin a/nebo jater)
- **Nízká hmotnost, nedonošenost**
- Mentální choroba, **závislost** na drogách, alkoholu, cigaretách
- Závažná aktivní **infekce** nebo sepse
- Léková **non compliance**, nedostatečné rodinné zázemí
- HIV, chronická žloutenka B a C (relativní kontraindikace)

Tx SRDCE – BIKAVÁLNÍ TECHNIKA

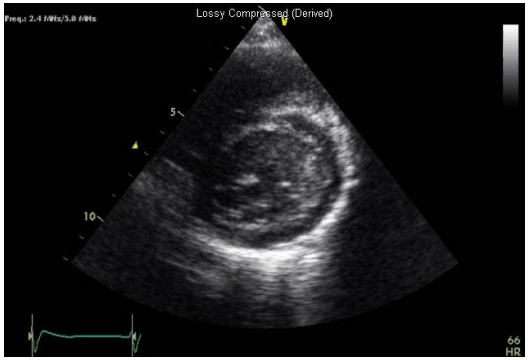






PRIMÁRNÍ SELHÁNÍ ŠTĚPU (PGF)

- Incidence 10%
- Rizikové faktory PGF
  - **- Ischemický čas**
  - - Věk
  - - Nízká EF
  - - Vysoká inotropní podpora
  - - Multiorgánové selhání
  - - Plicní hypertenze
- Vyloučit tamponádu, hyperakutní rejekci



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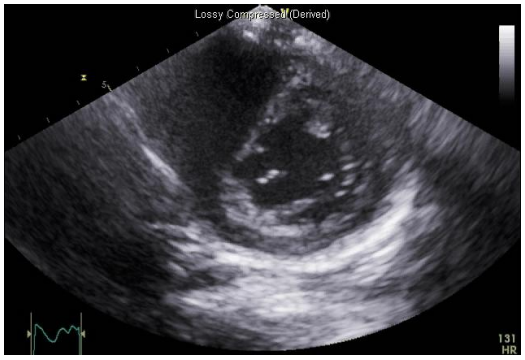
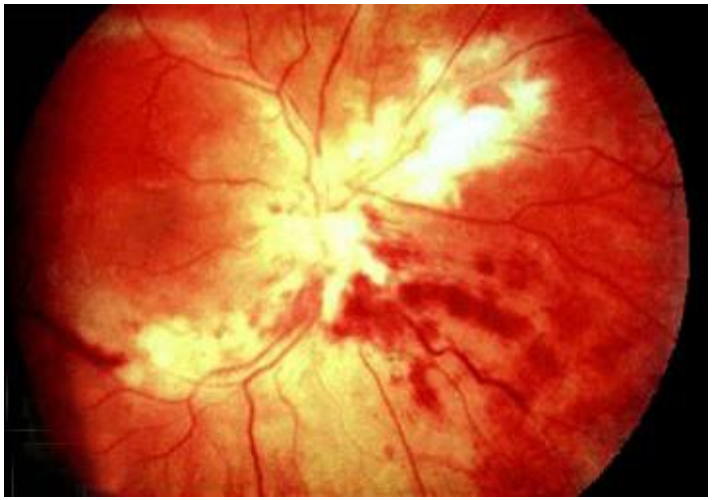


INFEKCE

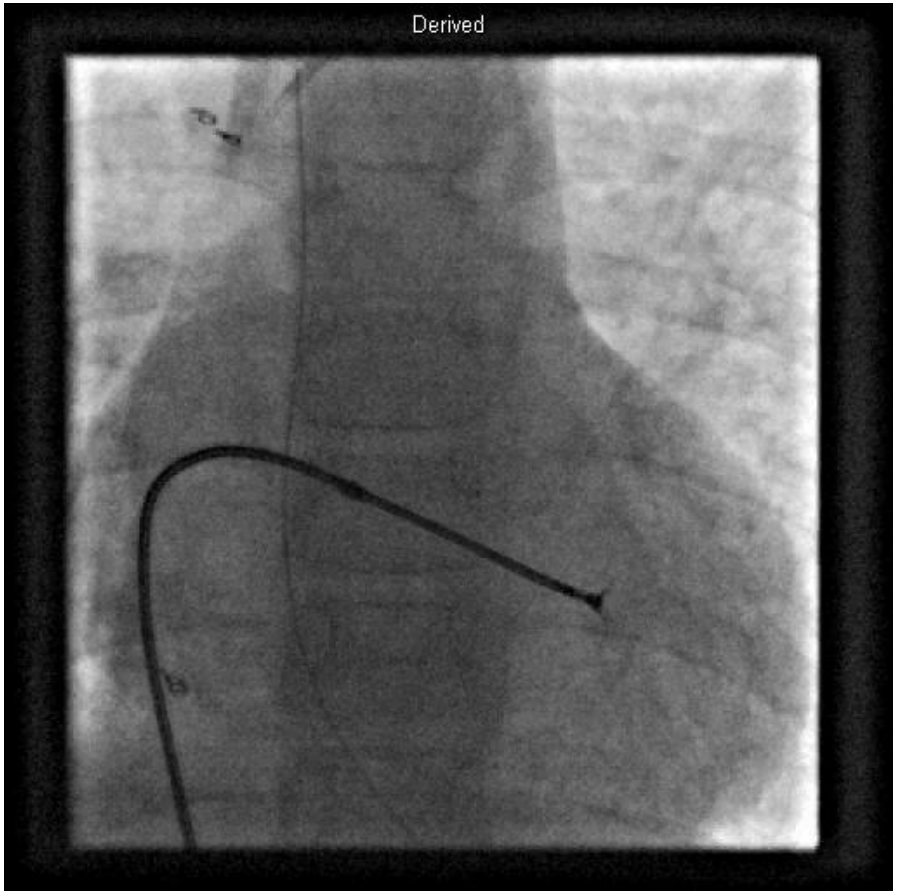


- Nozokomiální infekce
- CMV
- Toxopazmoza
- plísňové infekce

- **Profylaxe** (3 měs.):
  - Acyclovir
  - Sulfamethoxazol + Trimethoprim
  - Nystatin

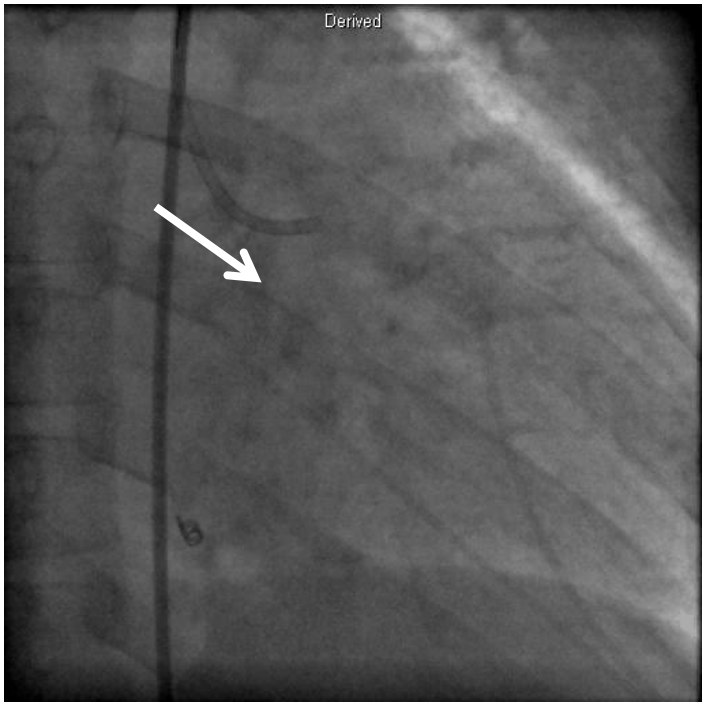
REJEKCE ŠTĚPU

- **Akutní rejekce**
  - celulární
  - humorální
- **Imunosuprese**
  - Basiliximab (indukce)
  - Tacrolimus
  - MMF
  - Steroidy (3 měs.)
- **Rutinní biopsie**



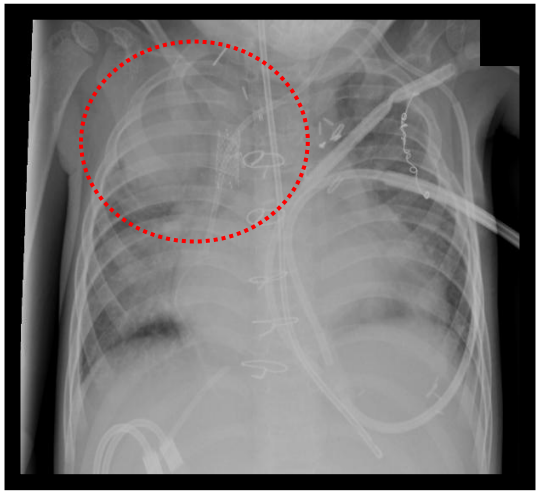
Koronární nemoc štěpu (CAV)

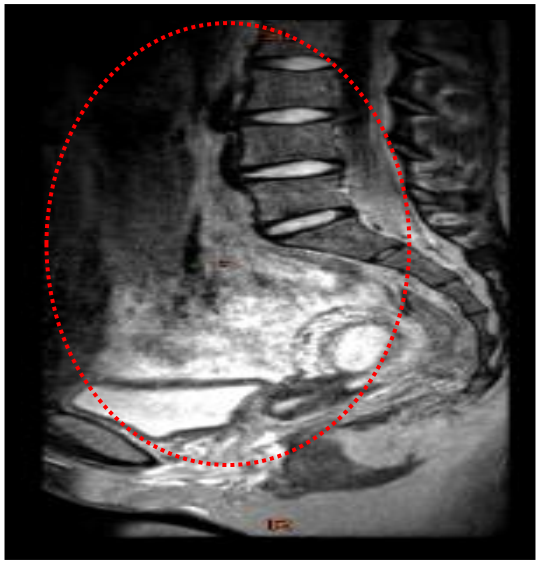
- **Hlavní příčina dlouhodobé mortality**
- **Rizikové faktory**
  - CMV
  - Akutní rejekce
  - Věk dárce
  - Hyperlipidémie, hypertenze
  - Imunitní dysregulace
- **Prevence** (Pravastatin)



MALIGNITY

- Vliv imunosuprese
- Vrchol první rok
  (maximální imunosuprese)
- **P**ost **T**ransplant **L**ympho-
  proliferative **D**isorder (PTLD)
  (infekce EBV)
- Kožní nádory (infekce HPV)





Tx SRDCE V GOSH

- 404 pacientů (od roku 1988)
  - 211 chlapců (52%)
- Diagnózy:
  - Kardiomyopatie 293 (72,5%)
  - VSV 102 (25,3%)
    - jednokomorvé 55
    - dvoukomorové 57
  - Retransplantace 9 (2,2%)

VĚKOVÉ ROZLOŽENÍ

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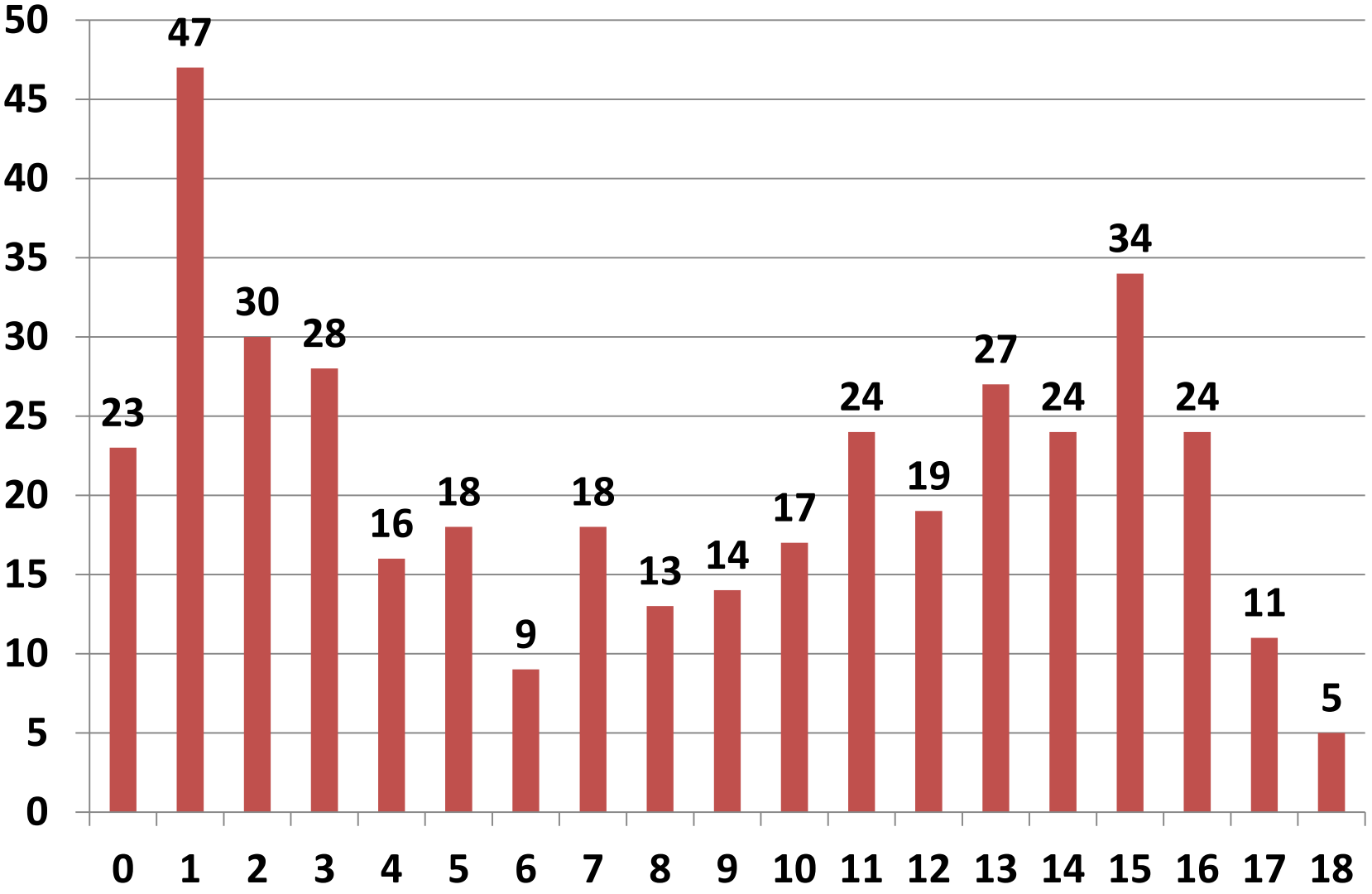
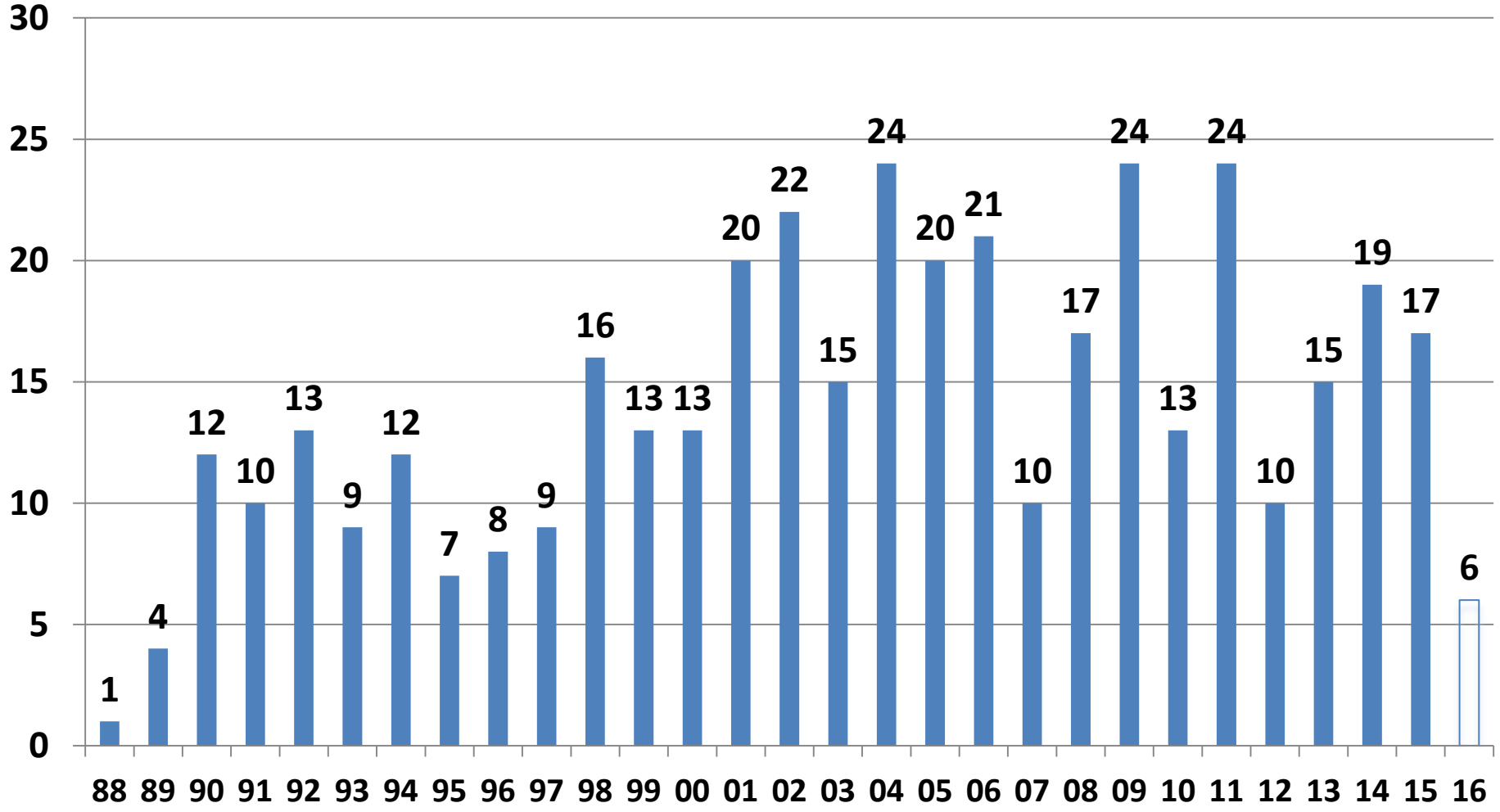


POČET Tx ROČNĚ n = 404



CELKOVÁ DOBA PŘEŽITÍ

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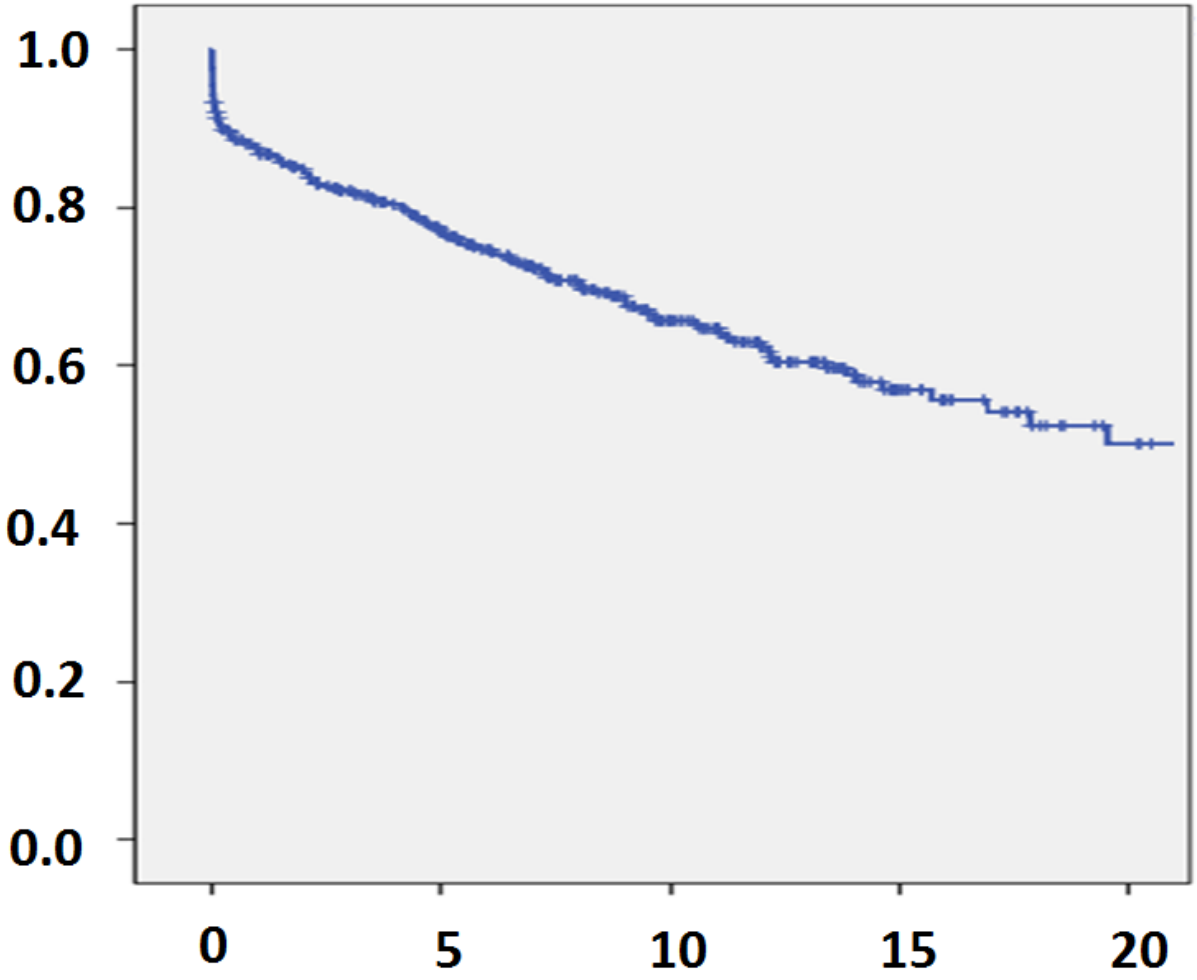
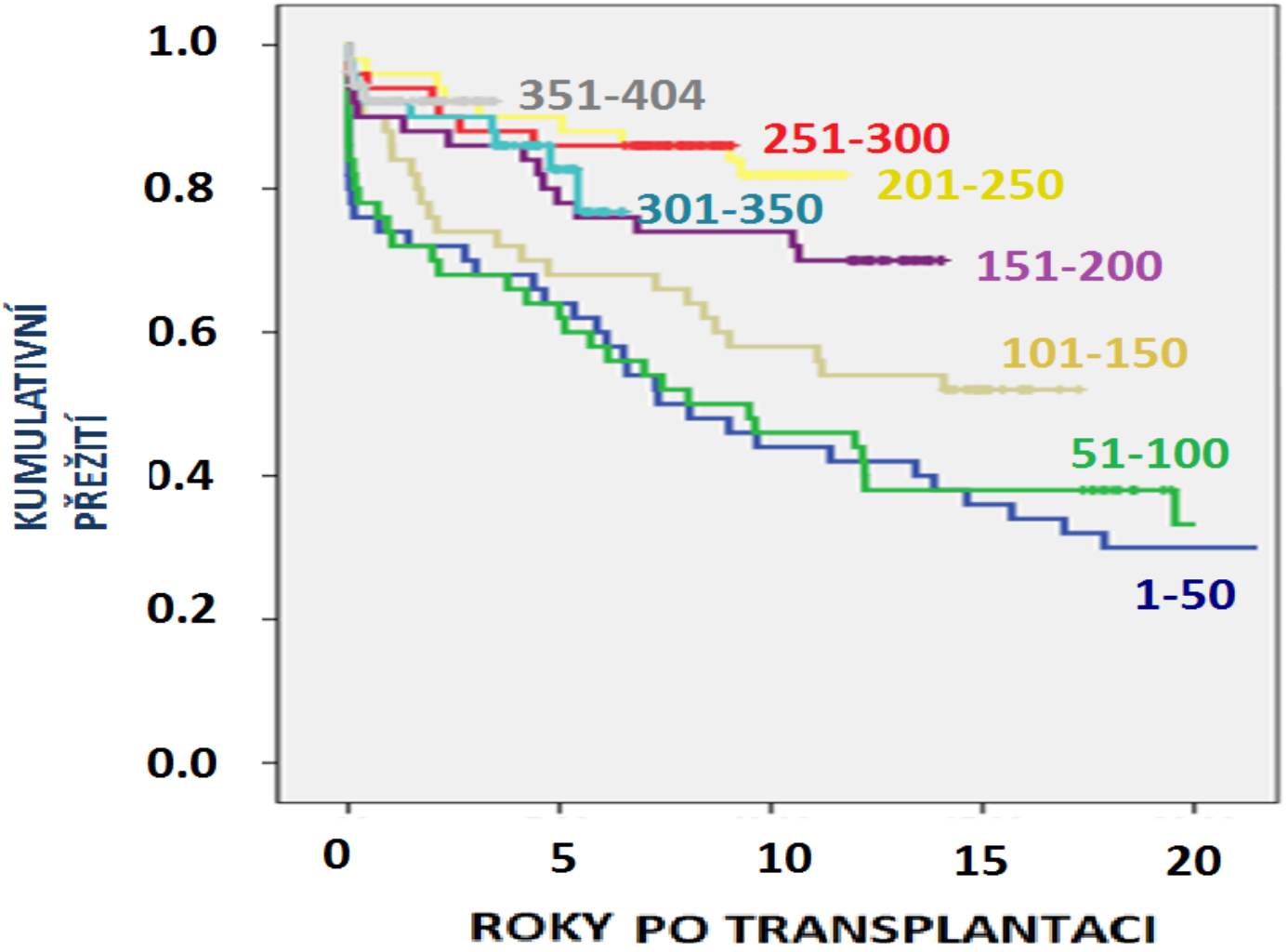


PŘEŽITÍ PODLE POČTU PACIENTŮ



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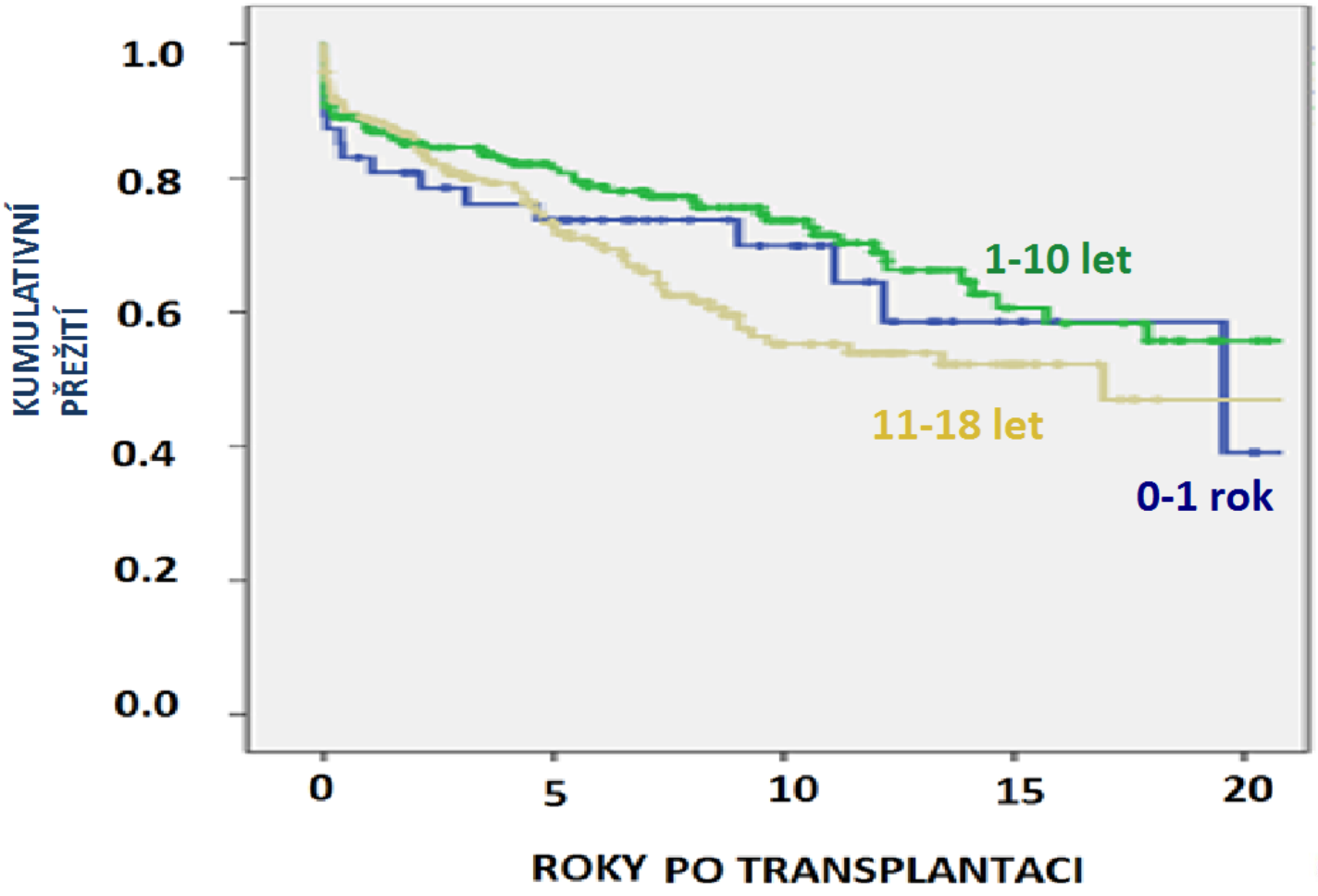
PŘEŽITÍ PODLE VĚKOVÝCH SKUPIN



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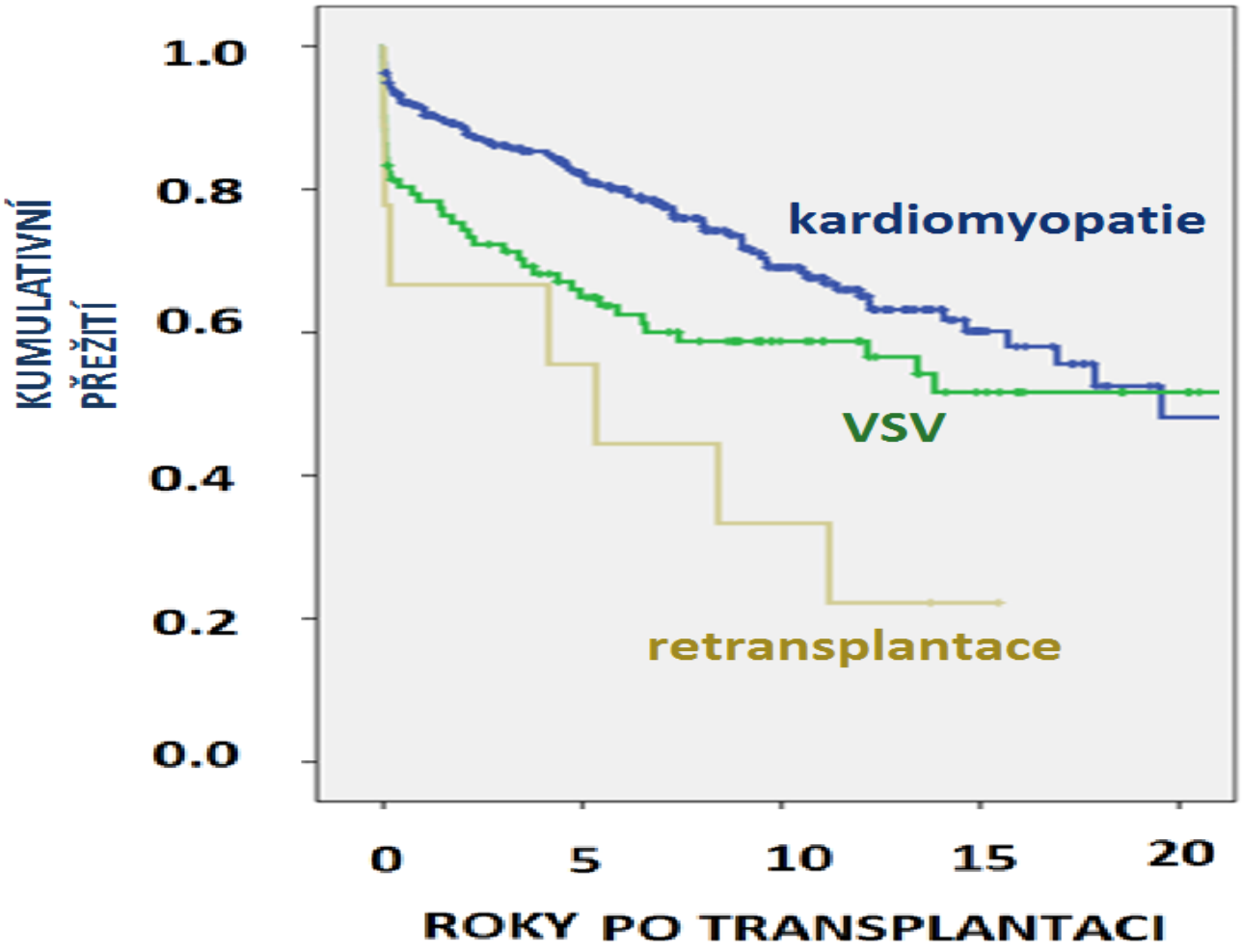
PŘEŽITÍ PODLE DIAGNÓZY



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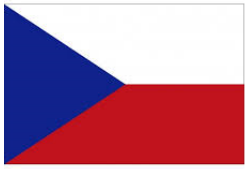
Tx srdce v ČR



- Od r. 1995 **M. Ošmerová, P. Němec, J. Černý** Centrum kardiovaskulární a transplantační chirurgie v Brně
- 26 dětí (časně zemřelo 5 dětí)
- 90% kardiomyopatie
- přežití 1/5/10 let - 81% / 81% / 76,9%

- M. Ošmerová, et al., Pediatric heart transplantation: 17-year Brno experience, Cor et Vasa 55 (2013)

Tx srdce v DKC

- 2000 – 2016 - **8 pacientů** (6 chlapců)
  - VSV n = 4
  - DCM n= 3
  - Maligní arytmie n = 1

- Věk 12,6 roků (2,3 - 17,8)
- Váha 25,5 kg (9,7kg - 45,6kg)
- NYHA III-IV

- Sledování 1,5 roků (1,5 měs. - 15,2 roků)
  - 1 pac. zemřel z jiných příčin (polymorbidita)
  - 3 pacienti léčeni pro rejekci

ZÁVĚR

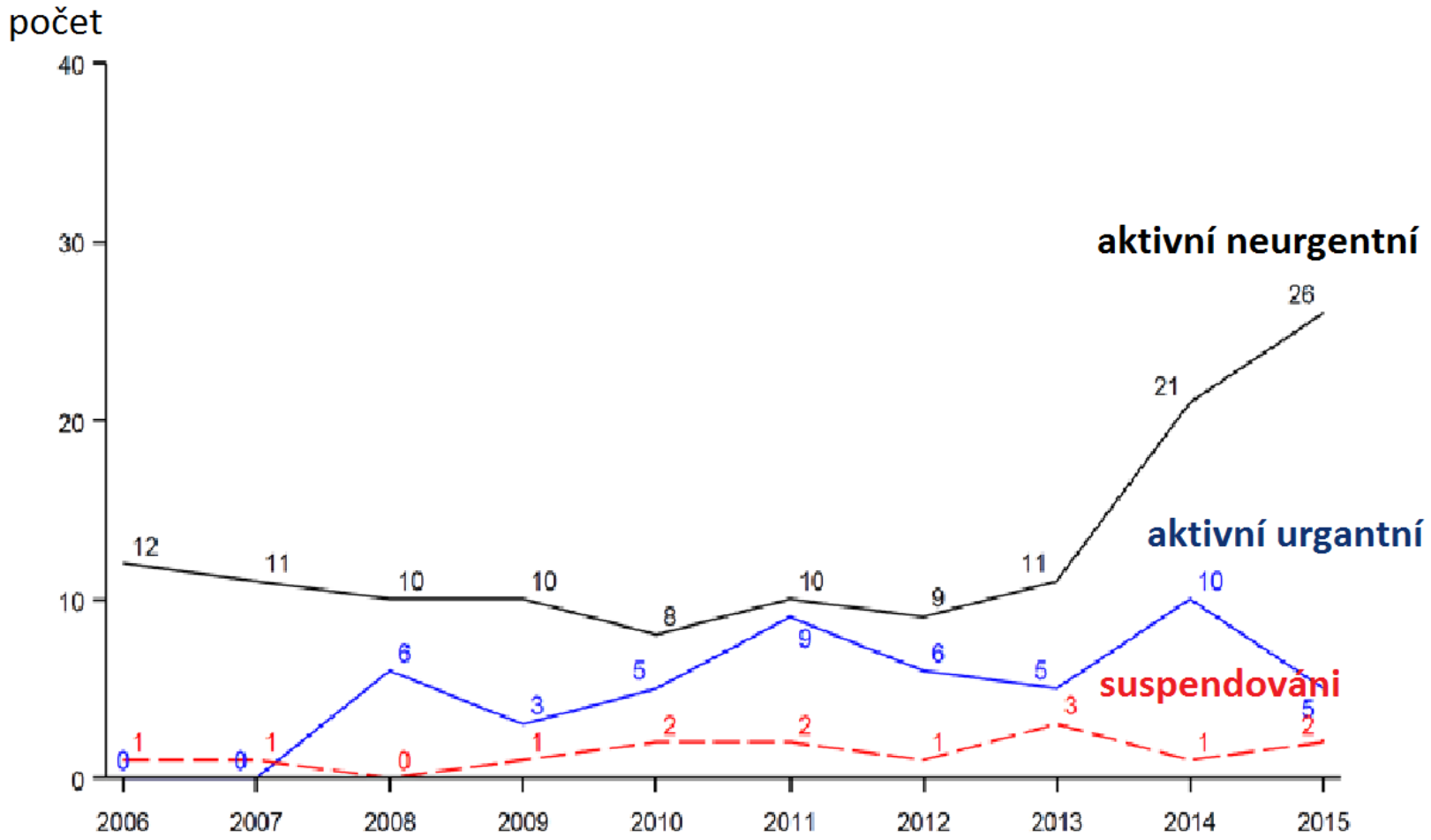
- ECMO = krátkodobá podpora
- Berlin Heart a Heartware = dlouhodobé podpory
- Transplantace srdce u dětí je jedinou terapeutickou možností terminálního srdečního selhání
- Přežití okolo 20 let
- Koronární nemoc štěpu je hlavní příčinou dlouhodobé mortality

PODĚKOVÁNÍ:

Prof M. Burch
Dr M. Fenton
Dr J. Simmonds
Prof J. Marek
Dr Ann Karimová
Prof. J. Janoušek
ECMO, VAD team
TX team
CICU team

DĚKUJI ZA POZORNOST

PEDIATRICKÁ ČEKACÍ LISTINA UK



Charakteristika souboru

ID	Věk (roky)	Váha/výška (percentil)	Dg	OP	NYHA/ status	ČL (dny)
OV	2,3	<3 / 50	HLHS	2	III-IV,CHSS, AR/AET	46
JŠ	12,9	7 / 7	SV/F	3	III, CHSS **ECMO**	163
FD	16,4	<3 / <3	AS, LV PLE	6	IV, CHSS **LVAD** (7 měs.)	64
MV	17,8	<3 / 7	SV/F	5	III, CHSS	288
AM	3,2	3 / 7	DCMP	0	III,CHSS	23
MH	12,4	<3 / <3	DCMP	0	IV, CHSS Inotropie	35
LN	13,4	<3 / 3	DCMP	0	III, CHSS	309
LM	5,9	25 / 50	TU, AR	0	IV Resuscitace	4

Peroperační data

ID	Délka op.(h)	Ischemie štěpu (h)	Bypass (min)	Komplikace	Vent (d)
OV	6:00	1:38	172	LBBB, edém myokardu	13
JŠ	7:00	1:46	175	hypertenze syst.	2
FD	17:50	2:11	360	PH - ECMO, krvácení, OH, CVVHD, hypertenze syst, PRES sy, tromboza SVC	8
MV	16:10	3:46	349	krvácení - revize, OH, CVVHD, AR	6
AM	5:40	3:30	117	Hemophilová bronchopneumonie	3
MH	5:20	1:43	101	hypertenze syst edém mozku	20
LN	4:00	2:06	115	hypertenze syst., AR PRES sy - křeče	4
LM	3:20	1:22	121	0, paréza bránice	2

Criteria to carry out formal testing :

- Completion of **4-weeks support** if histologic diagnosis was cardiomyopathy, and **2 weeks** if the diagnosis was **myocarditis**. Testing was carried out approximately every 2 weeks thereafter in clinically stable patients. Frequency of testing was also dependent on the results of the initial assessment.
- Significant **improvement in ventricular function** with VAD running (fractional shortening > 25%, ejection fraction > 50% or subjective improvement).
- Evidence of sustained cardiac output with stable heart rate and blood pressure when support briefly discontinued (e.g., during ventricle changes).

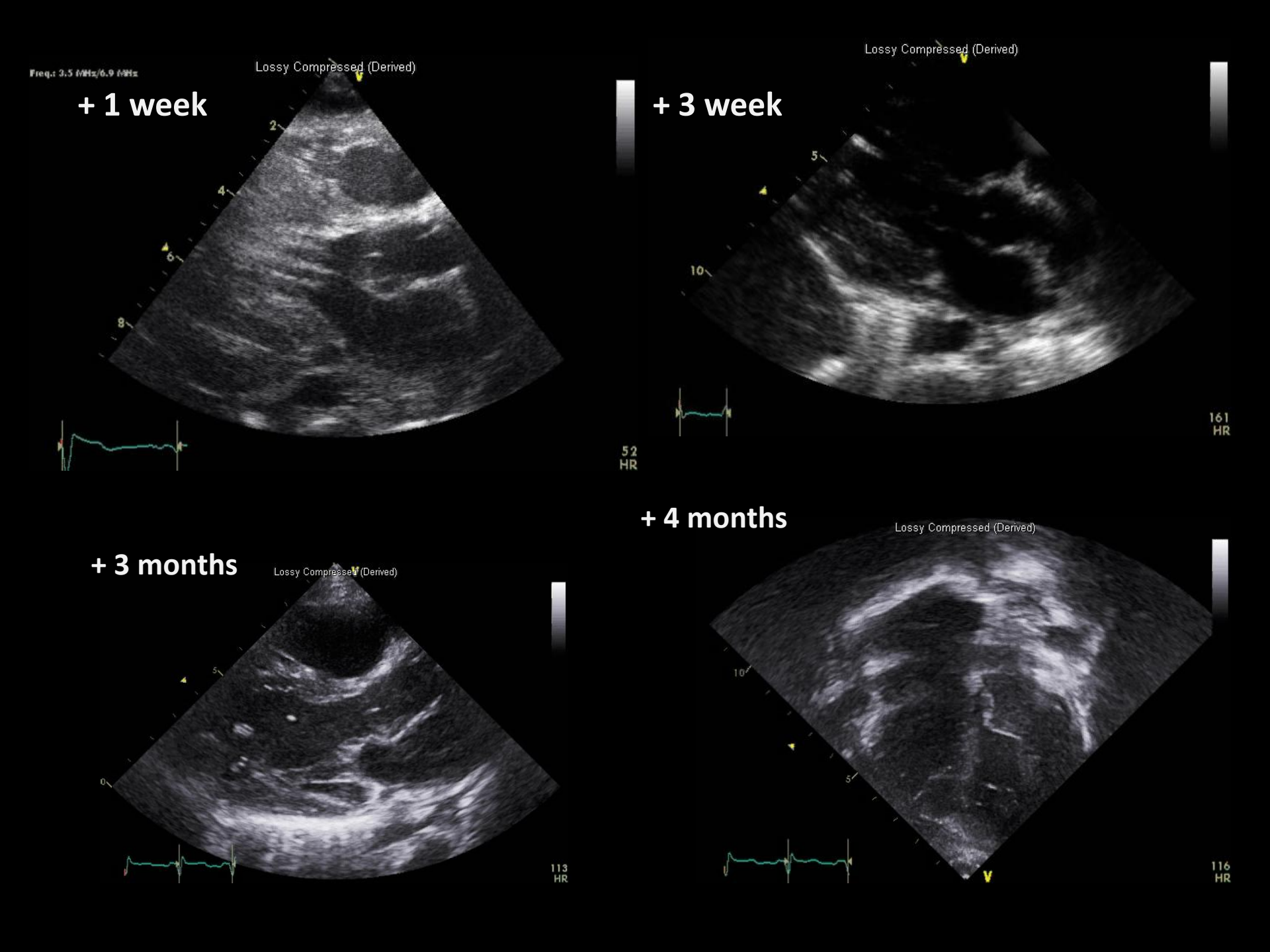
GOS data 2002-2007

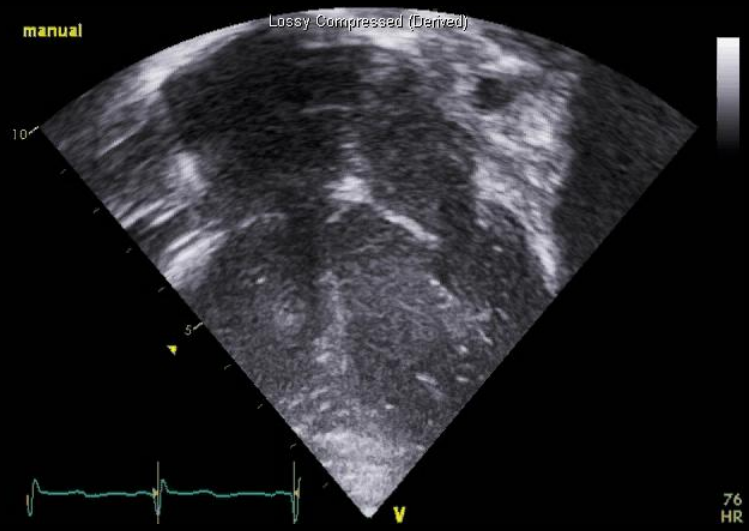
Table 1 **Median waiting time for children registered for first heart only transplant at GOSH, 2002 – 2007 by urgency status and weight at registration**

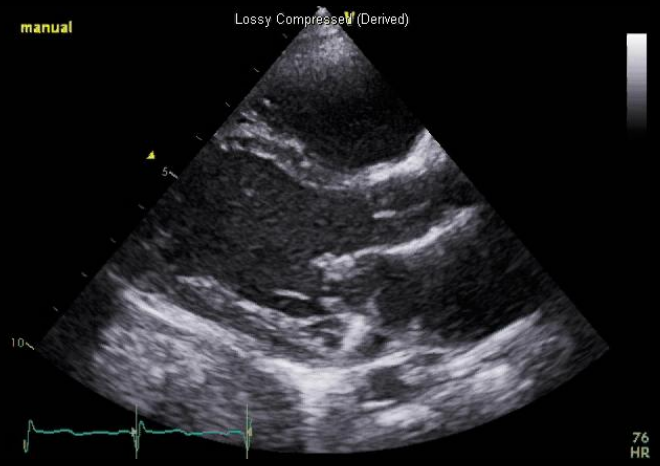
	Patients who were never urgently listed			Patients who were urgently listed at some point			All patients		
Weight at registration	N	Median waiting time	95% CI	N	Median waiting time	95% CI	N	Median waiting time	95% CI
<10 kg	26	338	(39, 637)	24	95	(25, 165)	50	119	(75, 163)
10-19 kg	22	234	(0, 518)	19	23	(10, 36)	41	93	(48, 138)
20-39 kg	15	23	(0, 51)	8	15	(0, 33)	23	21	(12, 30)
40-59 kg	11	31	(12, 50)	9	5	(2, 8)	20	10	(4, 16)
≥60kg	3	45	(0, 103)	7	13	(0, 28)	10	13	(7, 19)
<10 kg	26	338	(39, 637)	24	95	(25, 165)	50	119	(75, 163)
10-19 kg	22	234	(0, 518)	19	23	(10, 36)	41	93	(48, 138)
≥20 kg	29	31	(10, 52)	24	7	(4, 10)	53	17	(7, 27)

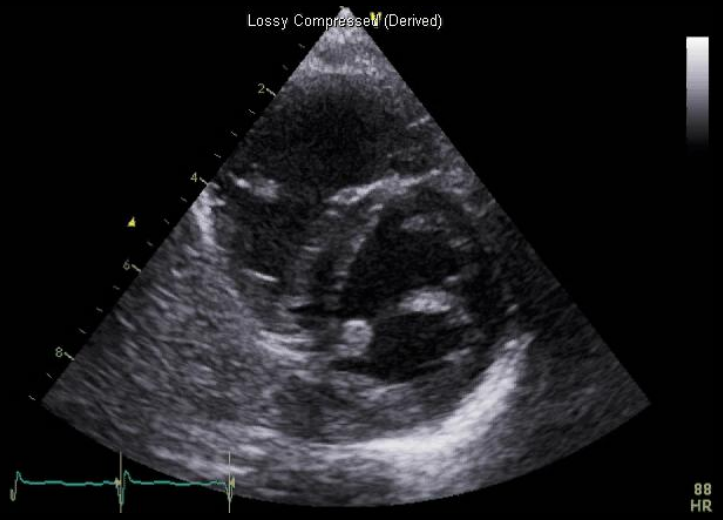
Median waiting times are estimated using the Kaplan-Meier method, and relate to active waiting times only. Any time that the patient was suspended from the list is excluded from the calculation.
Children are aged less than 16 years at the time of registration.

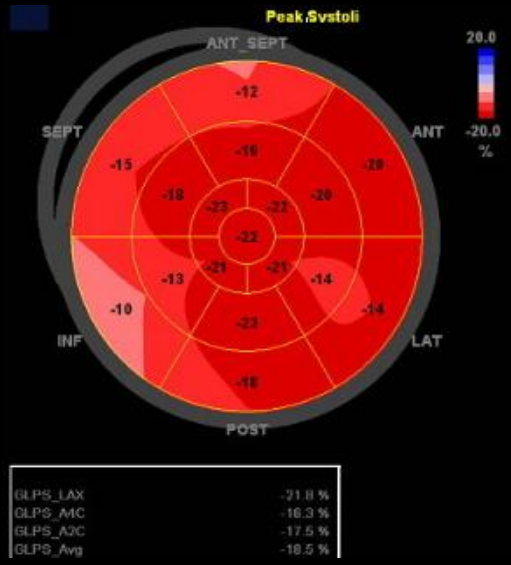
Source: Data as reported on the National Transplant Database


+ 1 week
Lossy Compressed (Derived)
+ 3 week
Lossy Compressed (Derived)
52
HR
161
HR
+ 3 months
Lossy Compressed (Derived)
113
HR
+ 4 months
Lossy Compressed (Derived)
116
HR



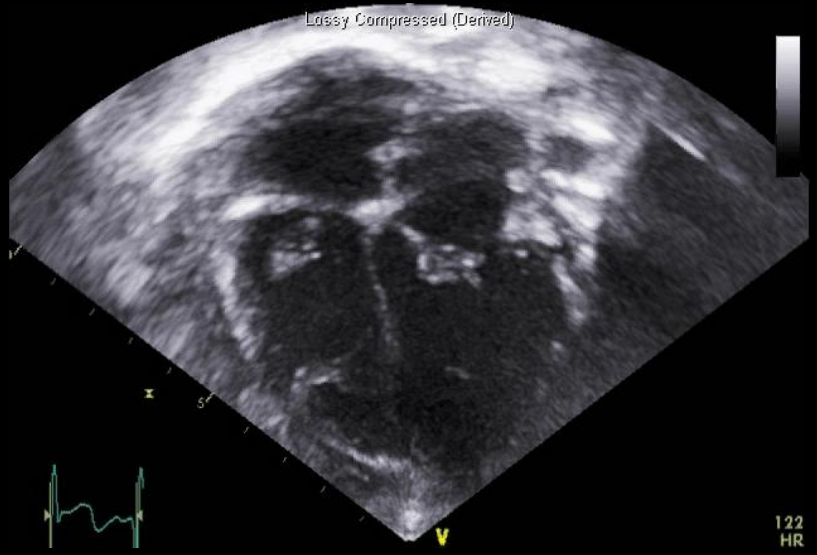




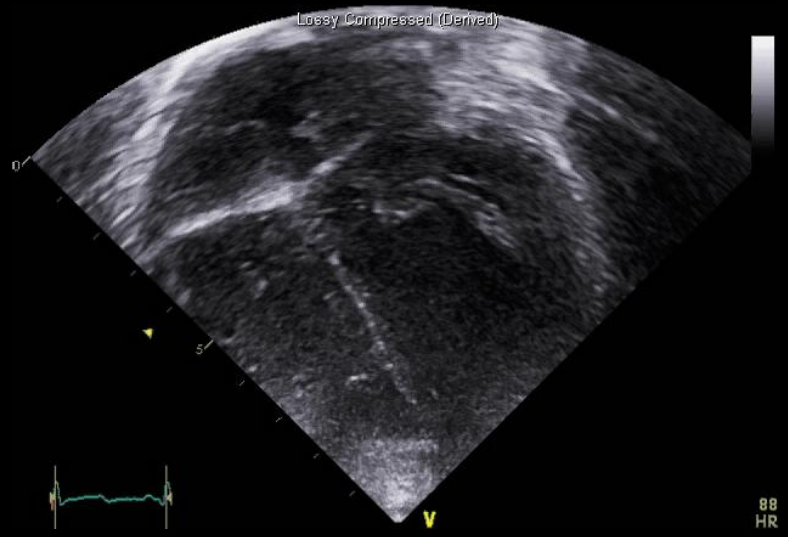


Sinus rhythm, on Milrinone and low dose Adrenaline

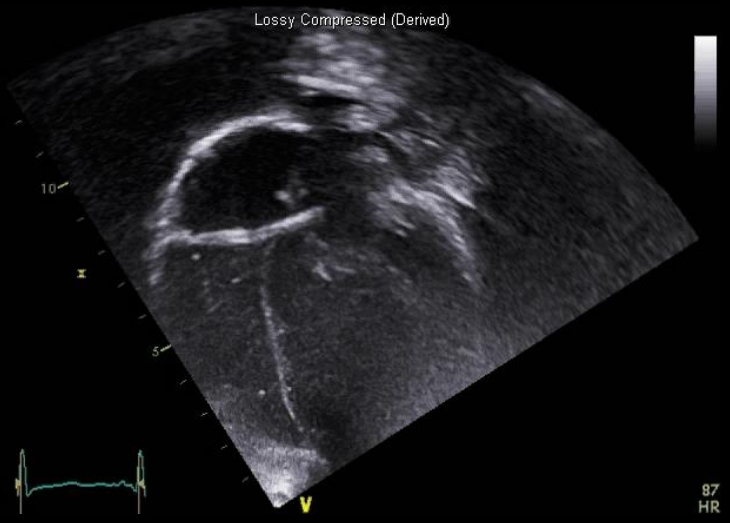
+ 1 week



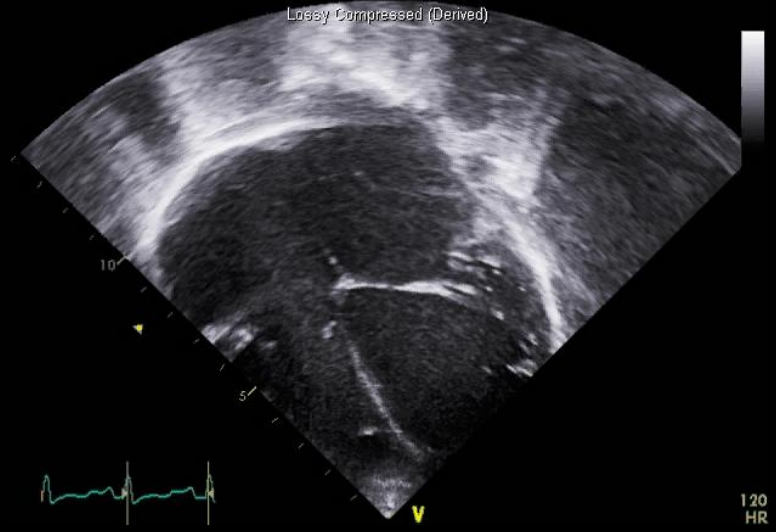
+ 1 months



+ 3 months



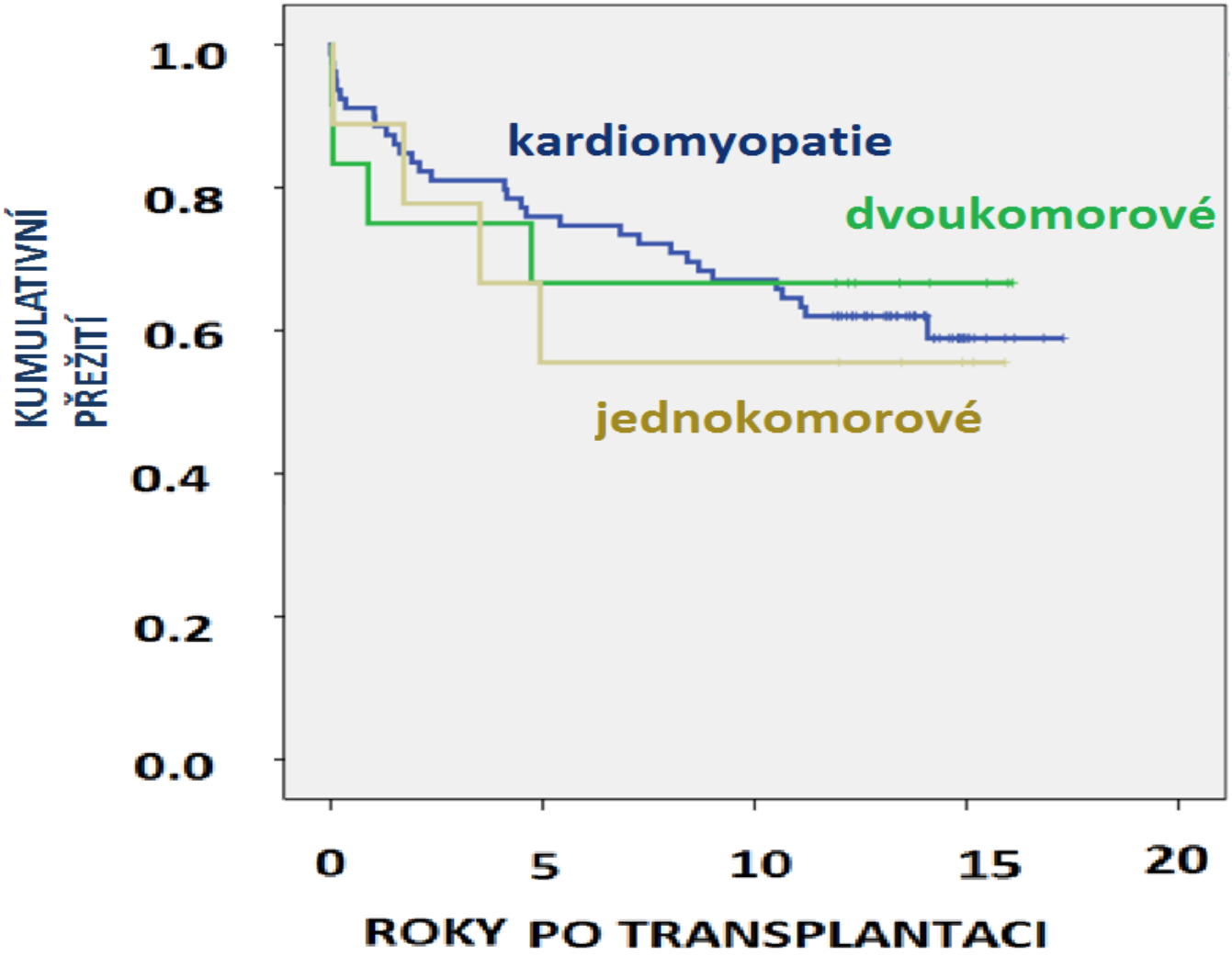
+ 5 months



GOSH	AGE	WEIGHT	DIAGNOSIS	SUPPORT	OUTCOME
1.	9 mo	8kg	DCM	LVAD (4 months)	Stable cardiac function Subdural haemorrhage Neurodevelopmental delay
2.	9 mo	8kg	DCM	LVAD (9 months)	Explantation for sepsis Milrinone as bridge to transplant 1 month later Subdural haemorrhage Neurodevelopmental delay
3.	2 y	12 kg	DCM	Run 1 : LVAD (4 months) Run 2: LVAD (5 months)	Further deterioration 6 months after explantation
4.	1 y	7 kg	DCM	Run 1 : LVAD (41 days) Run 2: LVAD (1 day)	died after 2nd implantation
5.	17 y	52 kg	DCM (propionic acidaemia)	BIVAD (2 months)	died 1.5 year later (metabolic crisis)

NEWCASTLE		WEIGHT	DIAGNOSIS	SUPPORT	OUTCOME
1.	4 y	16 kg	DCM	Run 1 : LVAD (49 days) Run 2: BIVAD (15 days) Run 3: LVAD (7 days)	Transplanted
2.	6 mo	7 kg	DCM	LVAD (20 days)	Well, stable cardiac function
3.	8 mo	7 kg	DCM	Run 1 : LVAD (31 days) Run 2: LVAD (11 days)	Transplanted
4.	11 mo	9 kg	DCM	Run 1 : BIVAD (76 days) Run 2: LVAD (46 days)	Transplanted

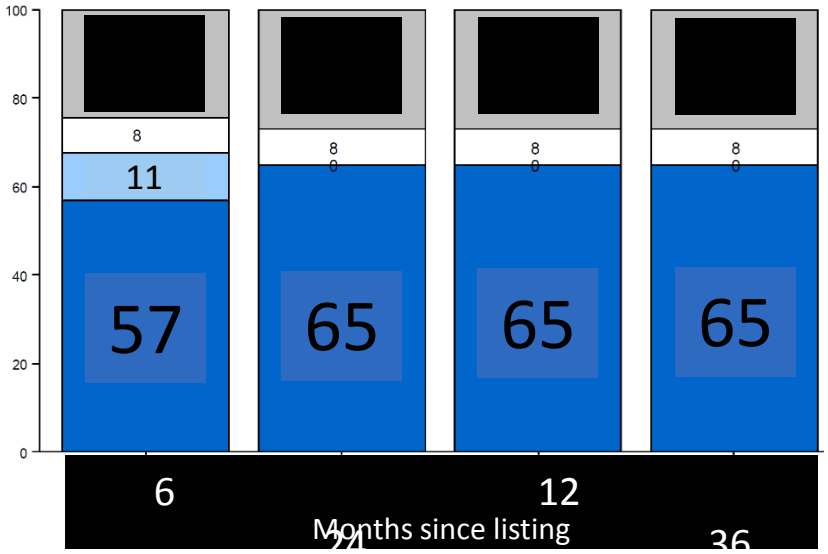
PŘEŽITÍ PODLE DIAGNÓZY



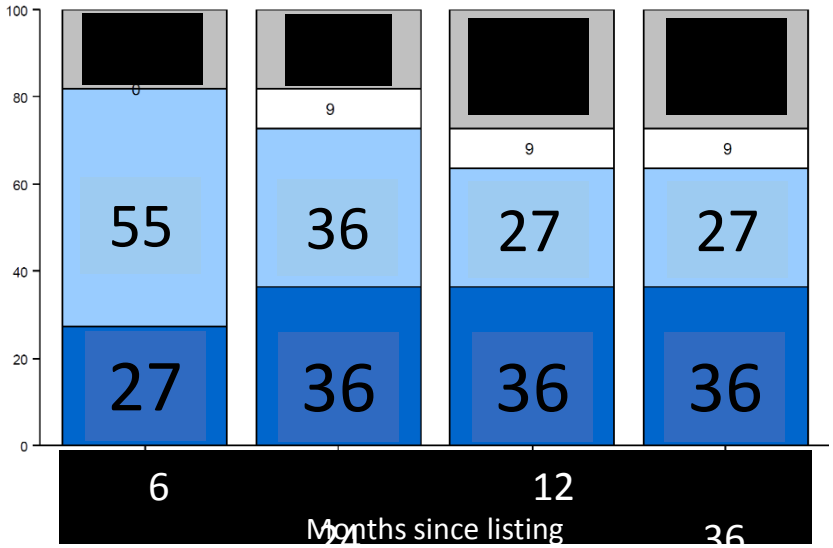
Great Ormond Street Hospital

Outcomes for Children Listed (2011)

Urgent



Non-urgent



Transplanted

Waiting

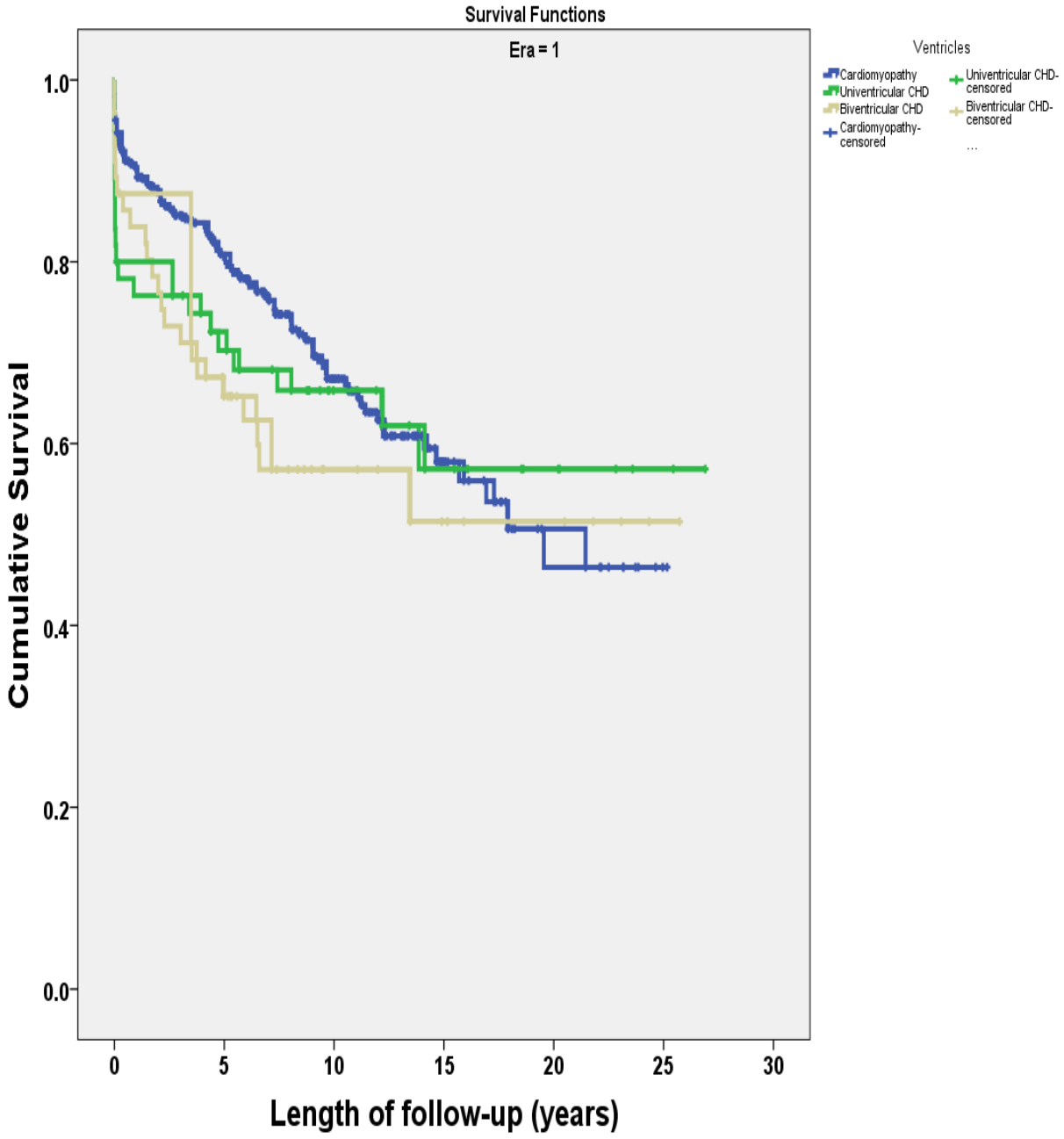
Removed

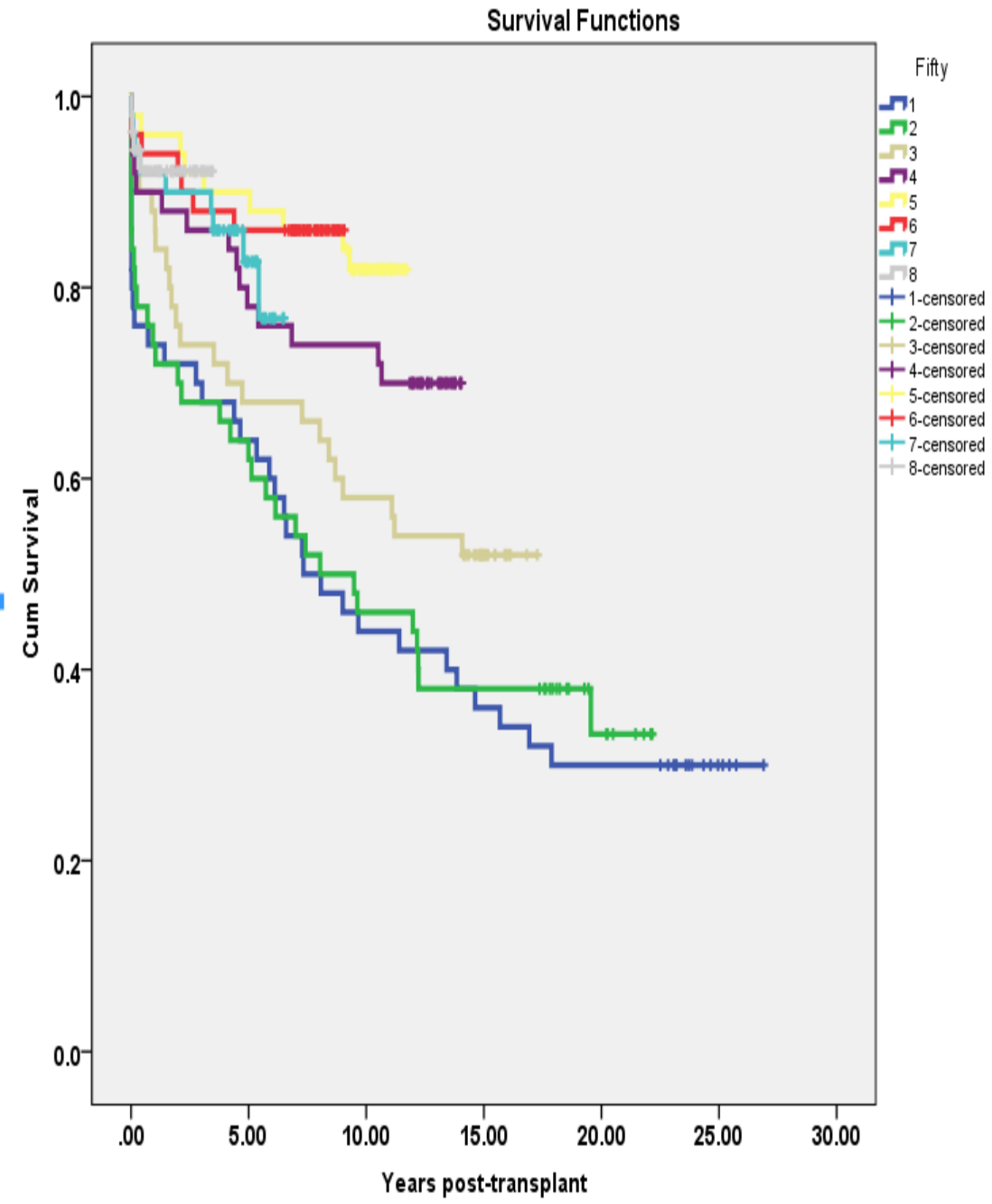
Died

Century	Diagnosis	Total N	N of Events	Censored	
				N	Percent
1	Cardiomyopathy	62	42	20	32.3%
	Congenital Heart Disease	35	22	13	37.1%
	Overall	97	64	33	34.0%
2	Cardiomyopathy	73	27	46	63.0%
	Congenital Heart Disease	21	8	13	61.9%
	Overall	94	35	59	62.8%
3	Cardiomyopathy	74	9	65	87.8%
	Congenital Heart Disease	26	7	19	73.1%
	Overall	100	16	84	84.0%
4	Cardiomyopathy	84	7	77	91.7%
	Congenital Heart Disease	20	6	14	70.0%
	Overall	104	13	91	87.5%
Overall	Overall	395	128	267	67.6%

Ventricles	Total N	N of Events	Censored	
			N	Percent
Cardiomyopathy	293	92	201	68.6%
Univentricular CHD	55	20	35	63.6%
Biventricular CHD	56	23	33	58.9%
Overall	404	135	269	66.6%

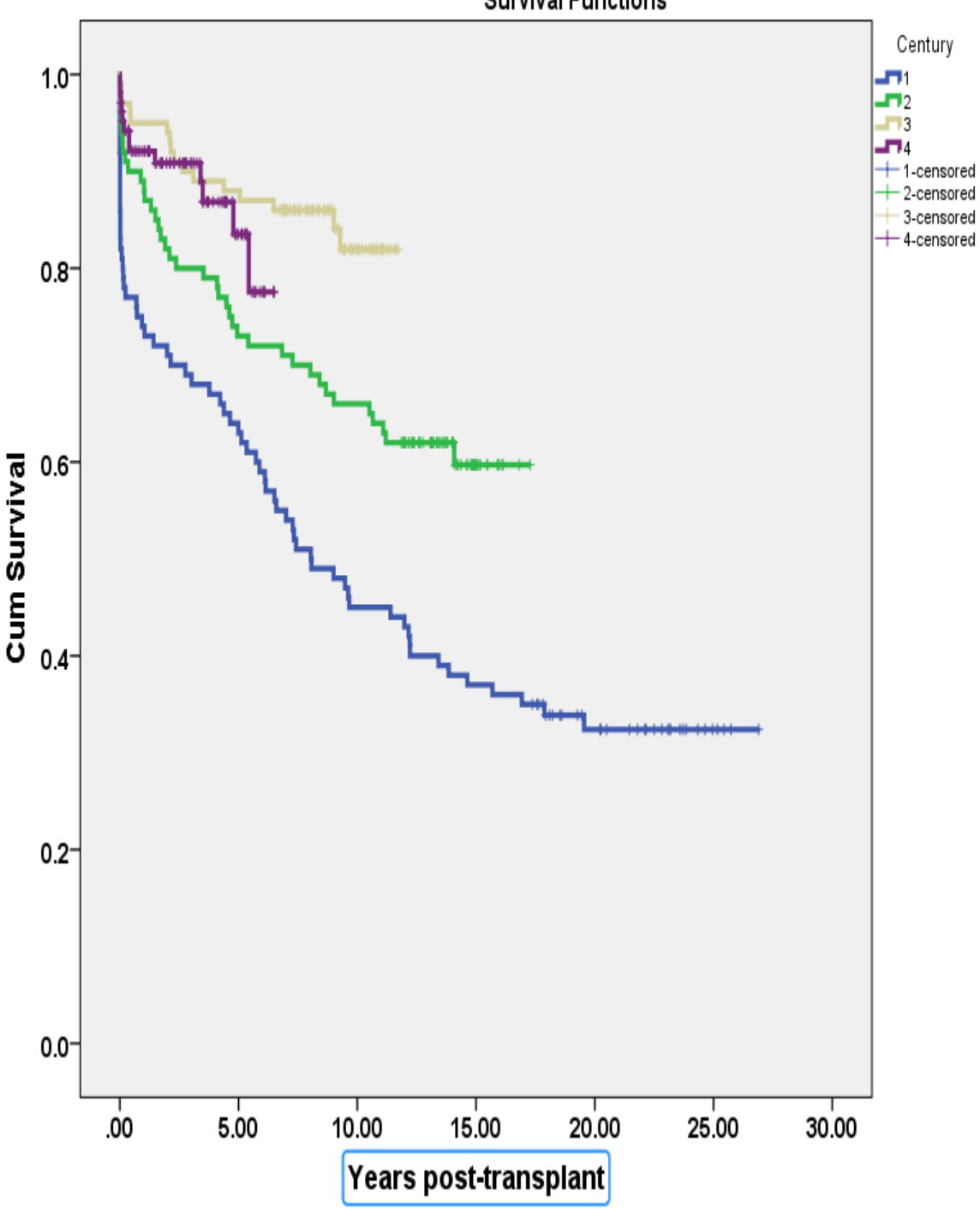
Century	Ventricles	Total N	N of Events	Censored	
				N	Percent
1	Cardiomyopathy	65	45	20	30.8%
	Univentricular CHD	18	10	8	44.4%
	Biventricular CHD	17	12	5	29.4%
	Overall	100	67	33	33.0%
2	Cardiomyopathy	79	31	48	60.8%
	Univentricular CHD	12	4	8	66.7%
	Biventricular CHD	9	4	5	55.6%
	Overall	100	39	61	61.0%
3	Cardiomyopathy	71	9	62	87.3%
	Univentricular CHD	14	2	12	85.7%
	Biventricular CHD	15	5	10	66.7%
	Overall	100	16	84	84.0%
4	Cardiomyopathy	78	7	71	91.0%
	Univentricular CHD	11	4	7	63.6%
	Biventricular CHD	15	2	13	86.7%
	Overall	104	13	91	87.5%
Overall	Overall	404	135	269	66.6%


Survival Functions
Era = 1
Ventricles
Cardiomyopathy
Univentricular CHD
Biventricular CHD
Cardiomyopathy-censored
Univentricular CHD-censored
Biventricular CHD-censored
...
Cumulative Survival
1.0
0.8
0.6
0.4
0.2
0.0
0
5
10
15
20
25
30
Length of follow-up (years)



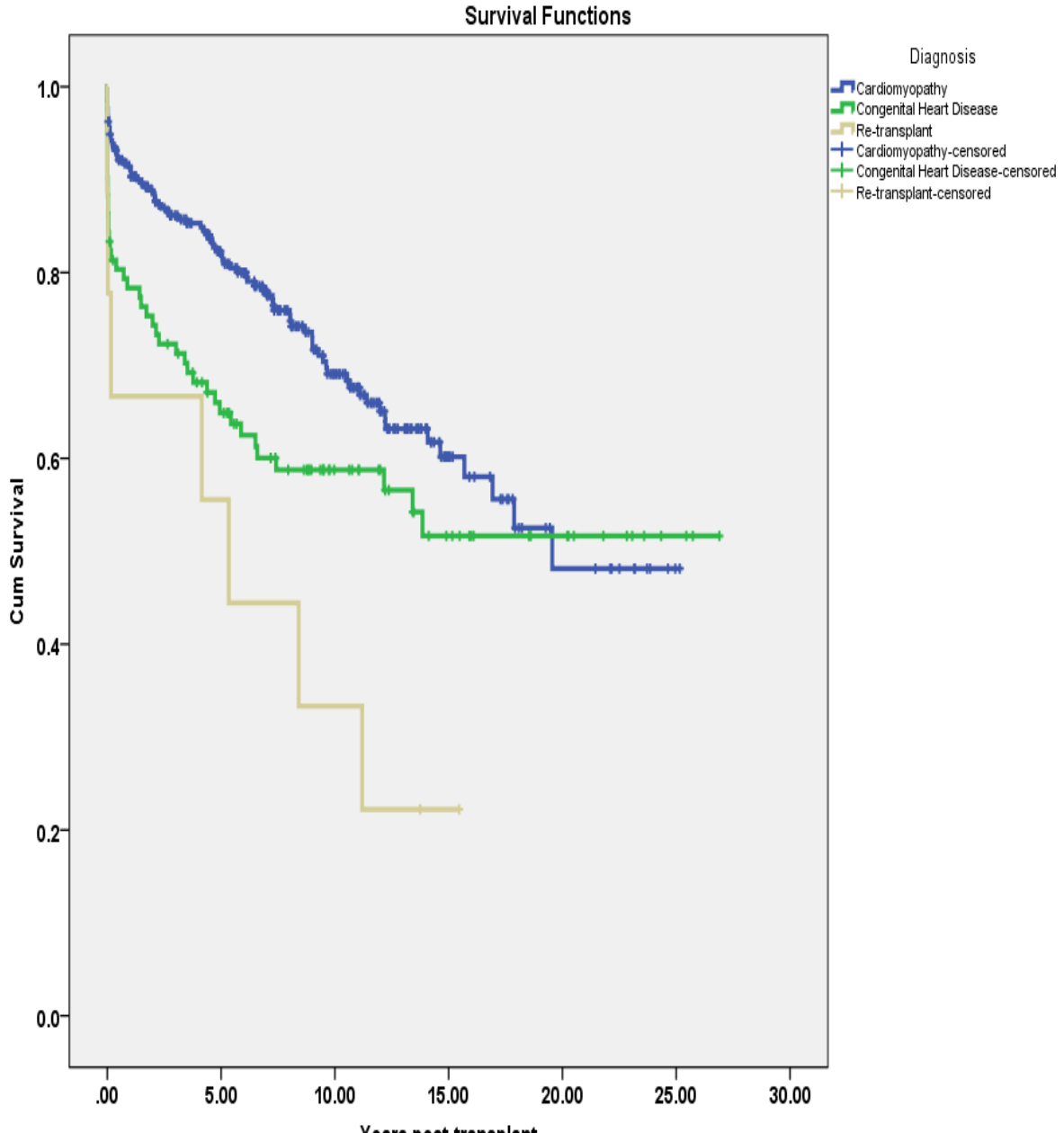
Case Processing Summary

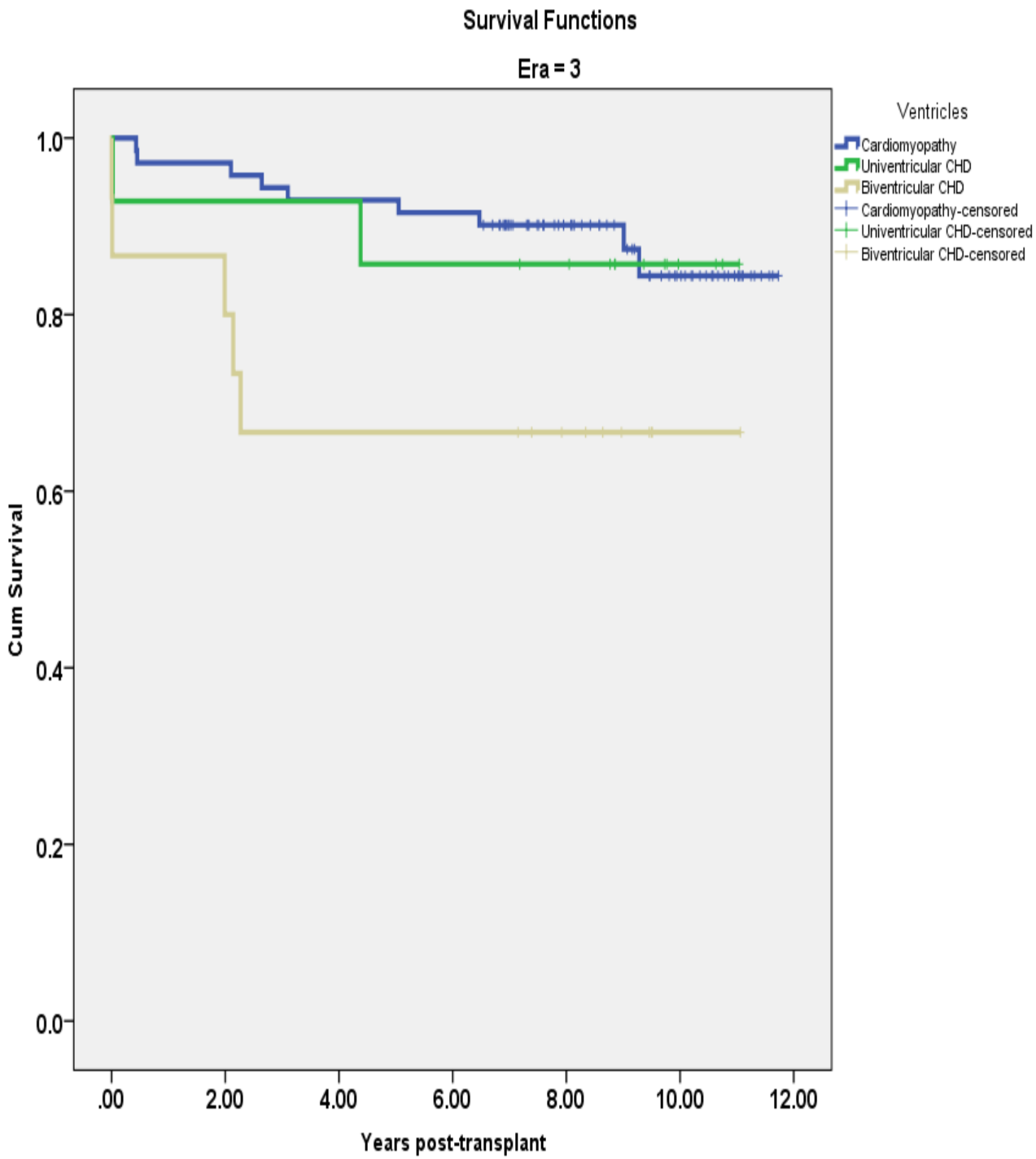
Fifty	Total N	N of Events	Censored	
			N	Percent
1	50	35	15	30.0%
2	50	32	18	36.0%
3	50	24	26	52.0%
4	50	15	35	70.0%
5	50	9	41	82.0%
6	50	7	43	86.0%
7	50	9	41	82.0%
8	54	4	50	92.6%
Overall	404	135	269	66.6%

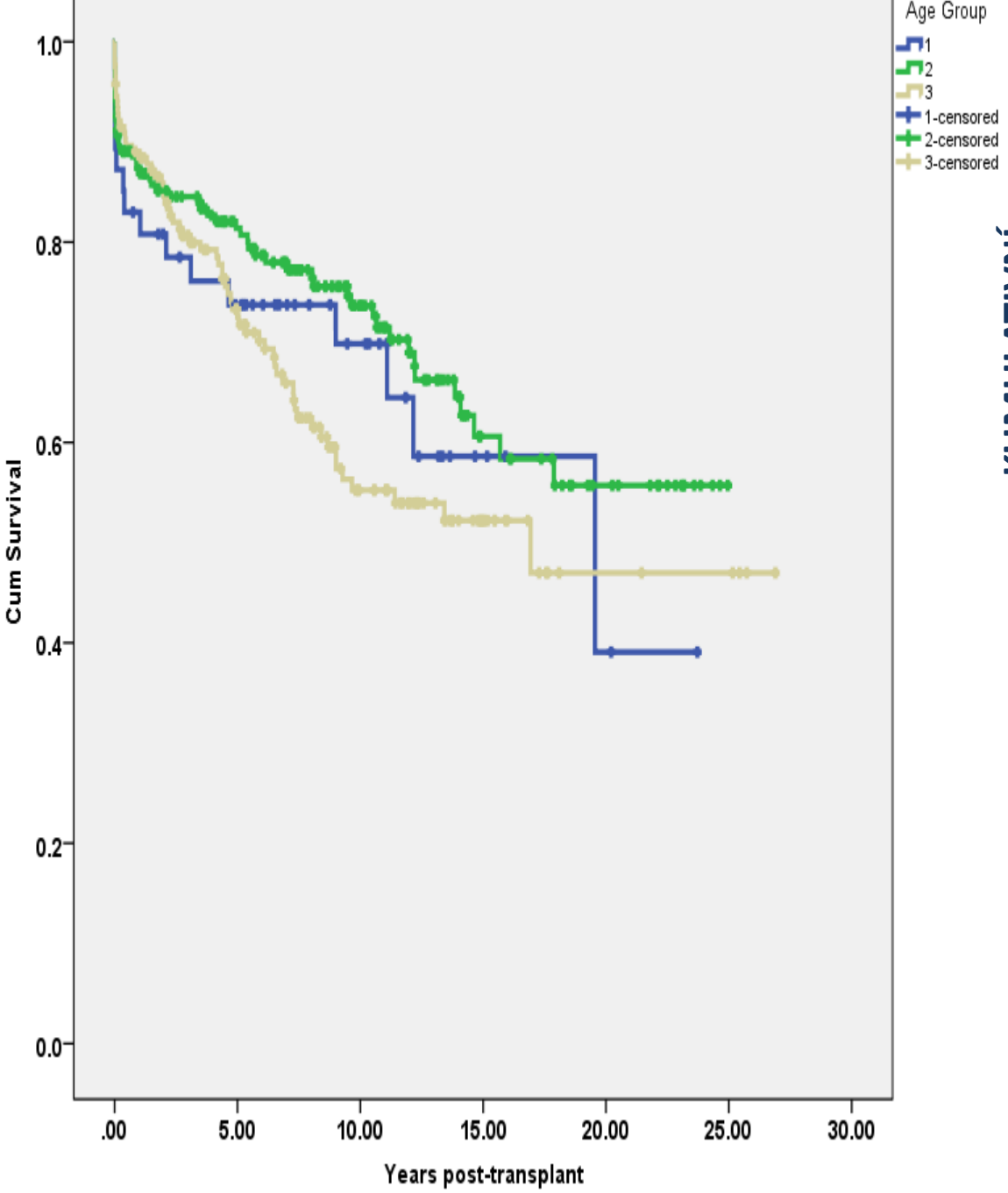


Case Processing Summary

Century	Total N	N of Events	Censored	
			N	Percent
1	100	67	33	33.0%
2	100	39	61	61.0%
3	100	16	84	84.0%
4	104	13	91	87.5%
Overall	404	135	269	66.6%


Survival Functions
Diagnosis
Cardiomyopathy
Congenital Heart Disease
Re-transplant
Cardiomyopathy-censored
Congenital Heart Disease-censored
Re-transplant-censored
Cum Survival
1.0
0.8
0.6
0.4
0.2
0.0
.00
5.00
10.00
15.00
20.00
25.00
30.00

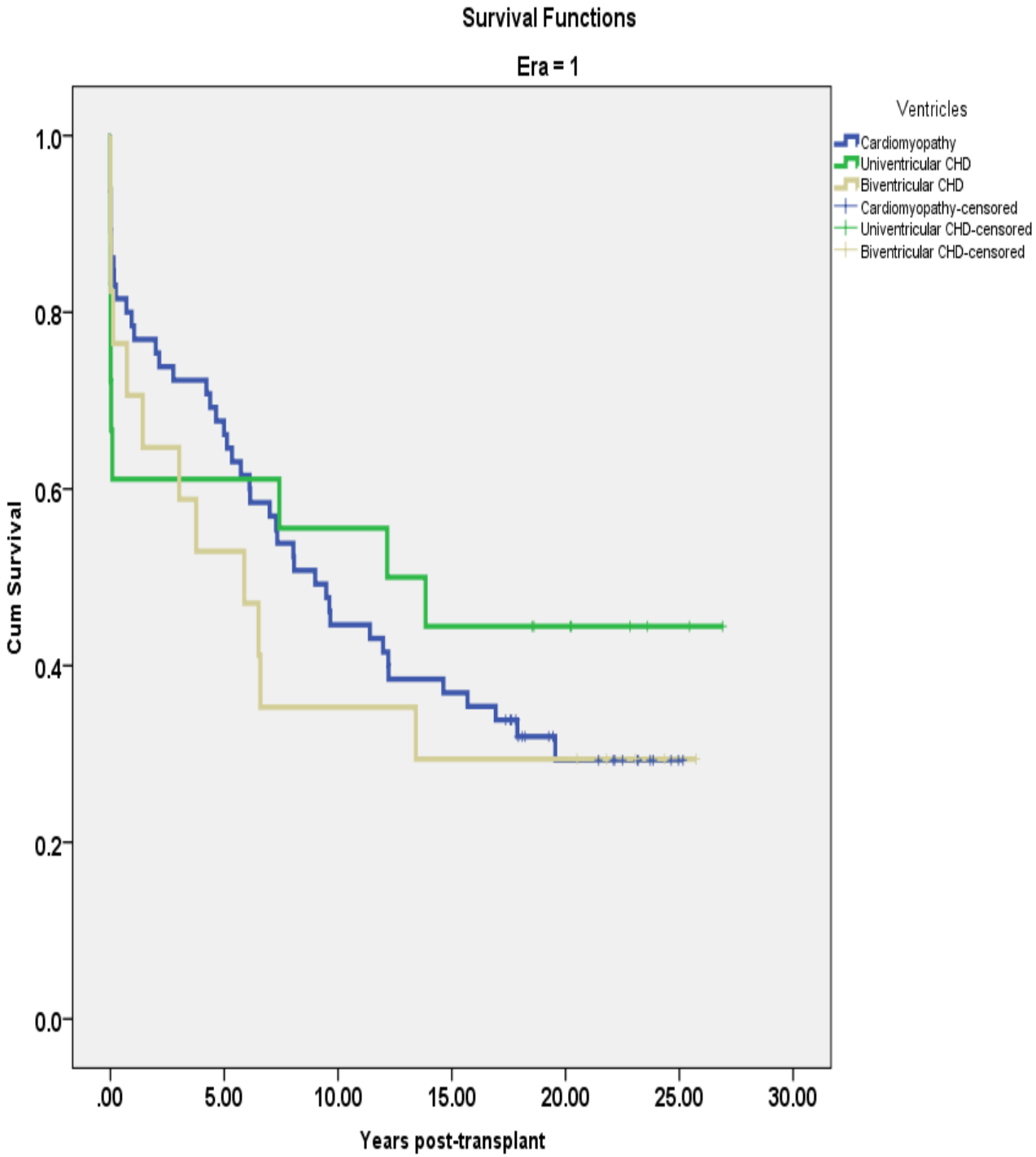

Survival Functions
Era = 3
Ventricles
Cardiomyopathy
Univentricular CHD
Biventricular CHD
Cardiomyopathy-censored
Univentricular CHD-censored
Biventricular CHD-censored
Cum Survival
1.0
0.8
0.6
0.4
0.2
0.0
.00
2.00
4.00
6.00
8.00
10.00
12.00
Years post-transplant

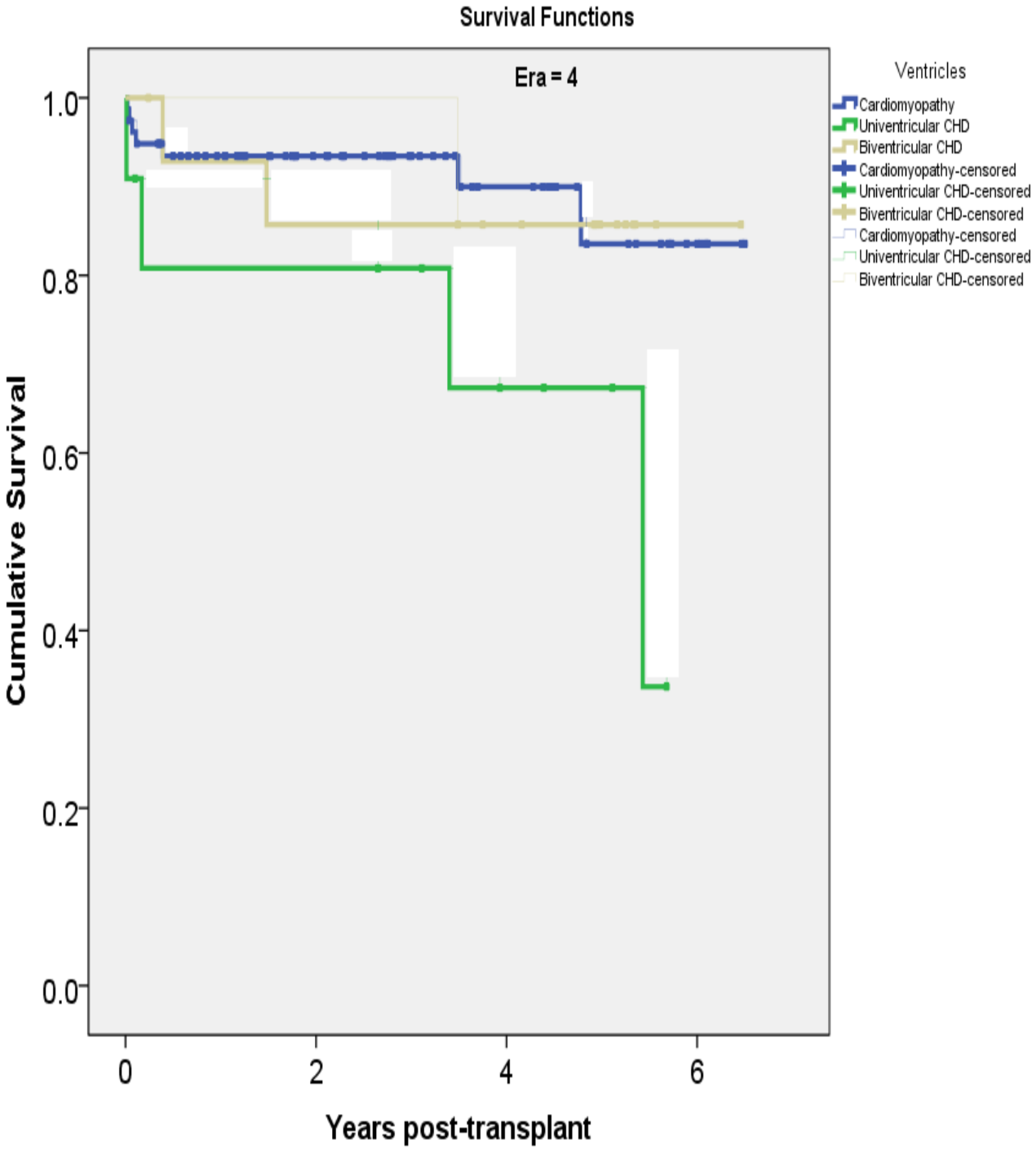


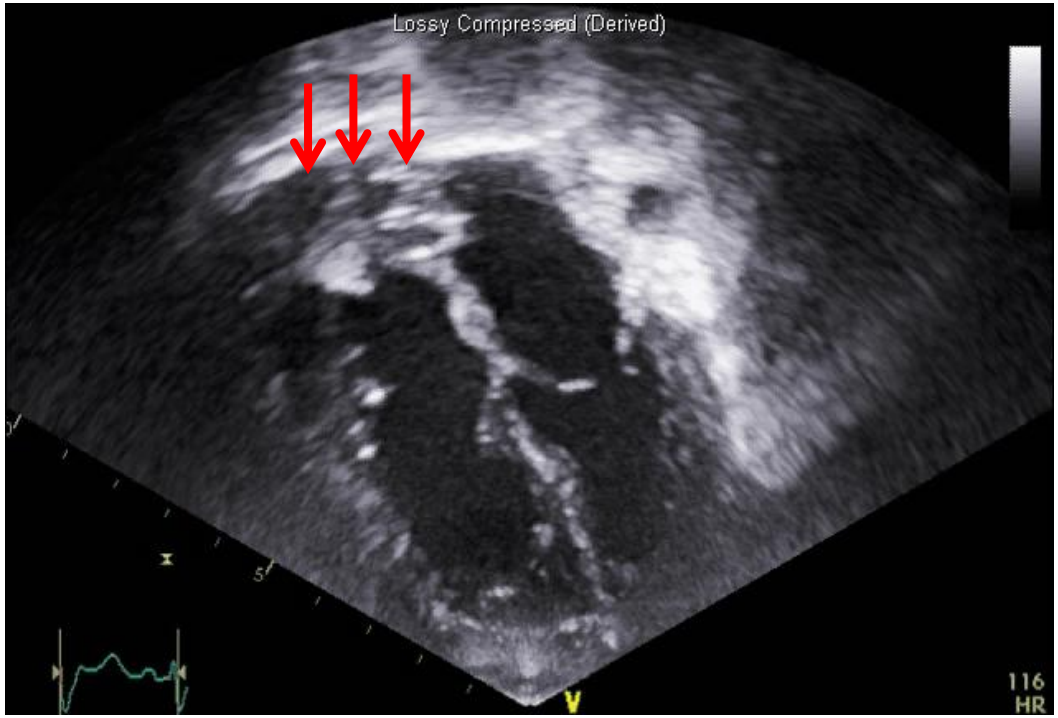
KUMULATIVNÍ PŘEŽITÍ

Case Processing Summary

Age Group	Total N	N of Events	Censored	
			N	Percent
1	47	16	31	66.0%
2	192	55	137	71.4%
3	165	64	101	61.2%
Overall	404	135	269	66.6%

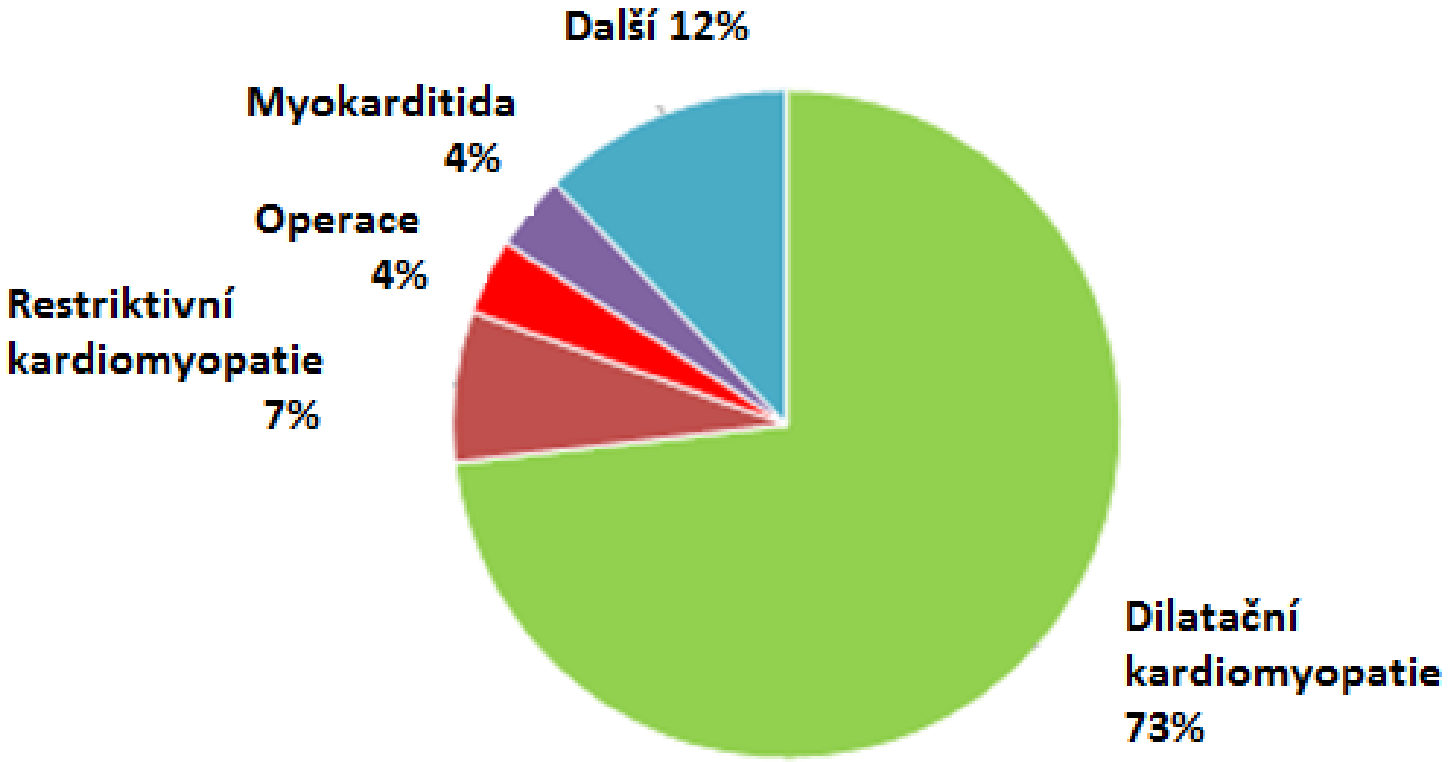

Survival Functions
Era = 1
Ventricles
Cardiomyopathy
Univentricular CHD
Biventricular CHD
Cardiomyopathy-censored
Univentricular CHD-censored
Biventricular CHD-censored
Cum Survival
1.0
0.8
0.6
0.4
0.2
0.0
.00
5.00
10.00
15.00
20.00
25.00
30.00
Years post-transplant


Survival Functions
Era = 4
Ventricles
Cardiomyopathy
Univentricular CHD
Biventricular CHD
Cardiomyopathy-censored
Univentricular CHD-censored
Biventricular CHD-censored
Cardiomyopathy-censored
Univentricular CHD-censored
Biventricular CHD-censored
Cumulative Survival
1.0
0.8
0.6
0.4
0.2
0.0
0
2
4
6
Years post-transplant


Lossy Compressed (Derived)
116
HR

Diagnóza před implantací (2004-2016)

n= 82



S laskavým svolením Dr Karimové

Ventricles	Total N	N of Events	Censored	
			N	Percent
Cardiomyopathy	293	92	201	68.6%
Univentricular CHD	55	20	35	63.6%
Biventricular CHD	56	23	33	58.9%
Overall	404	135	269	66.6%

Diagnosis	Total N	N of Events	Censored	
			N	Percent
Cardiomyopathy	293	85	208	71.0%
Congenital Heart Disease	102	43	59	57.8%
Re-transplant	9	7	2	22.2%
Overall	404	135	269	66.6%

Diagnosis

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Cardiomyopathy	293	72.5	72.5	72.5
	Congenital Heart Disease	102	25.2	25.2	97.8
	Re-transplant	9	2.2	2.2	100.0
	Total	404	100.0	100.0	

Infants

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Infant	47	11.6	11.6	11.6
	Child	357	88.4	88.4	100.0
	Total	404	100.0	100.0	

Sex

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	211	52.2	52.2	52.2
	Female	193	47.8	47.8	100.0
	Total	404	100.0	100.0	