Pulmoner Transplantasyon Kime, Ne Zaman?

Evre IV hastada transplantasyona giden yolda tedavi yaklaşımları, kılavuzlar ne diyor ?

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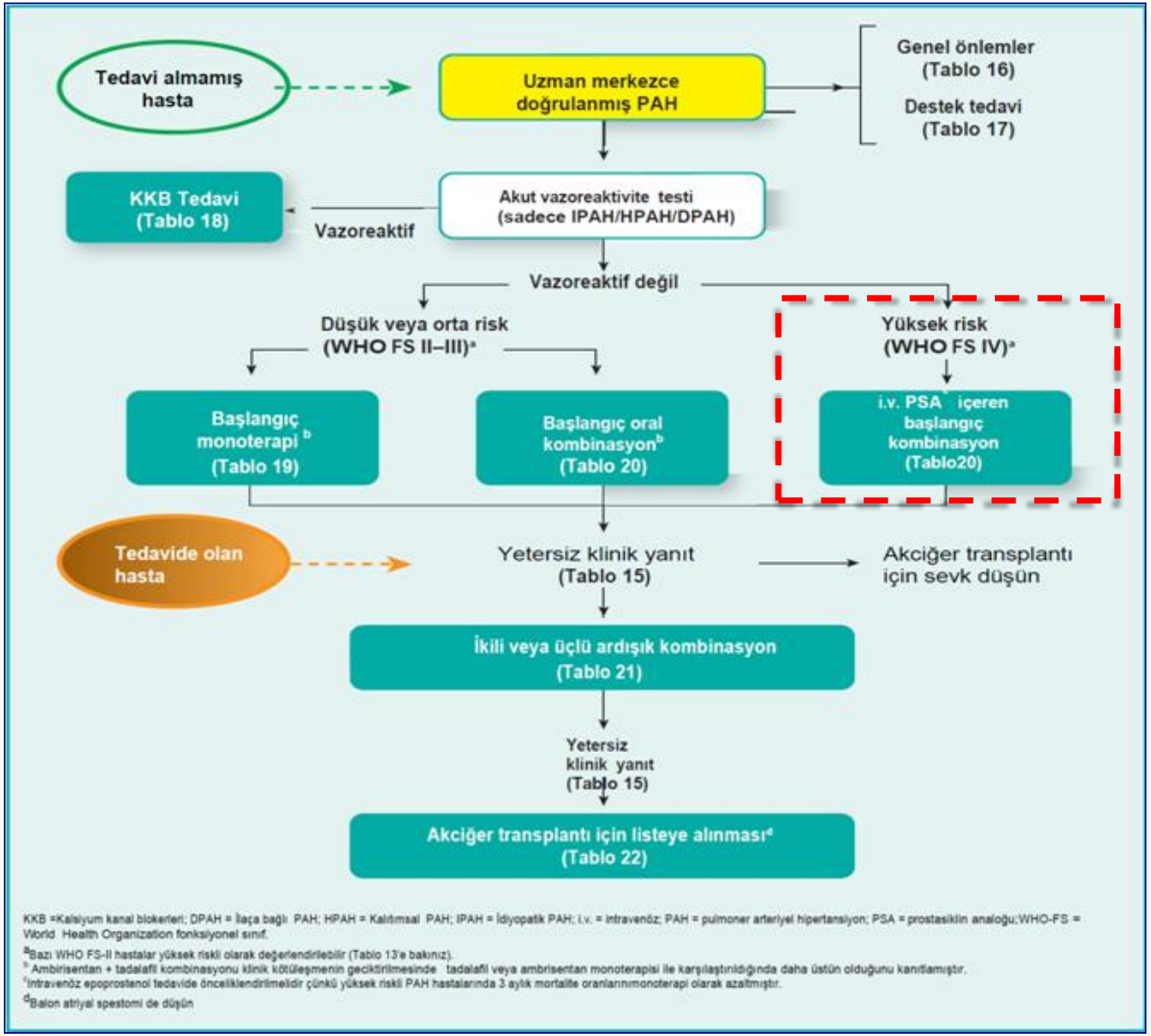
KARDİYOLOJİ AD

2017 ŞUBAT



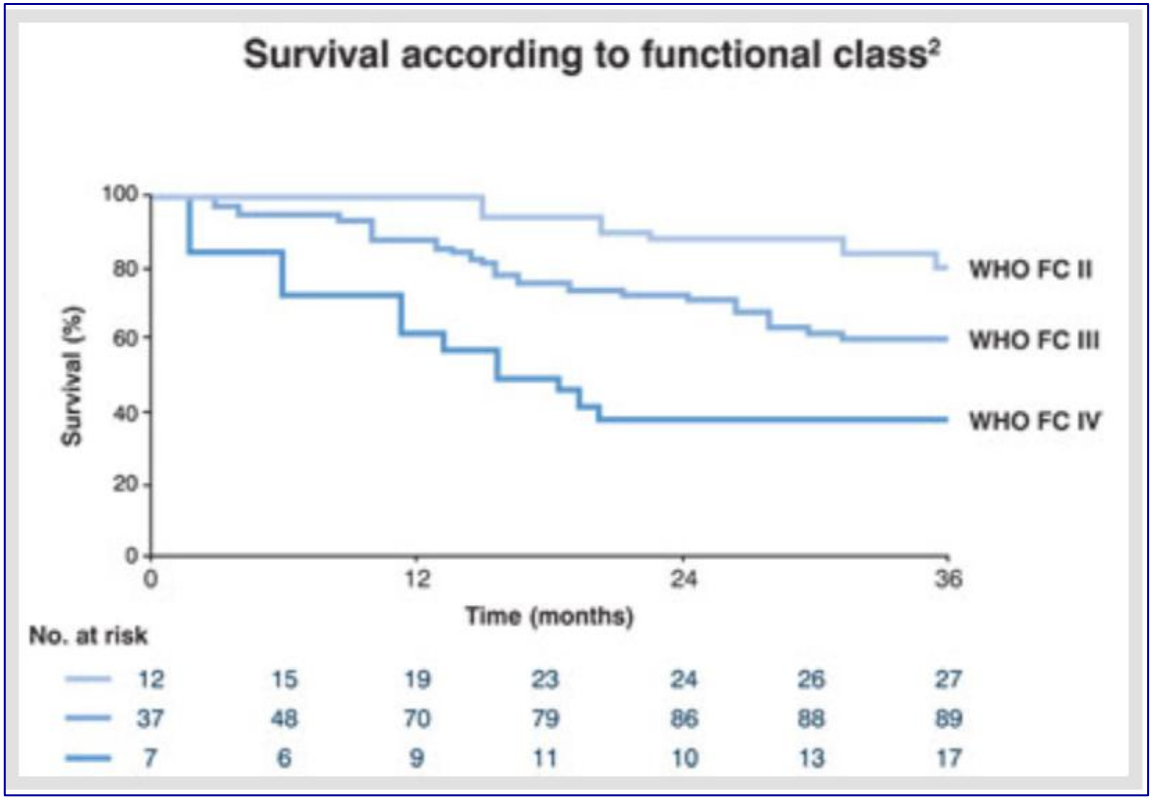
KKB =Kalsiyum kanal blokerleri; DPAH = İlaça bağlı PAH; HPAH = Kalıtımsal PAH; IPAH = İdiyopatik PAH; i.v. = intravenöz; PAH = pulmoner arteriyel hipertansiyon; PSA = prostasiklin analoğu;WHO-FS = World Health Organization fonksiyonel sınıf.

[a]Bazı WHO FS-II hastalar yüksek riskli olarak değerlendirilebilir (Tablo 13'e bakınız).

[b] Ambirisentan + tadalafil kombinasyonu klinik kötüleşmenin geciktirilmesinde tadalafil veya ambrisentan monoterapisi ile karşılaştırıldığında daha üstün olduğunu kanıtlamıştır.

[c]İntravenöz epoprostenol tedavide önceliklendirilmelidir çünkü yüksek riskli PAH hastalarında 3 aylık mortalite oranlarınınmonoterapi olarak azaltmıştır.

[d]Balon atriyal spestomi de düşün



Functional Class	Symptomatic profile
I	Patients with pulmonary hypertension but without resulting limitation of physical activity. Ordinary physical activity does not cause dyspnoea or fatigue, chest pain, or near syncope
II	Patients with pulmonary hypertension resulting in slight limitation of physical activity. They are comfortable at rest. Ordinary physical activity causes undue dyspnoea or fatigue, chest pain, or near syncope
III	Patients with pulmonary hypertension resulting in marked limitation of physical activity. They are comfortable at rest. Less than ordinary activity causes undue dyspnoea or fatigue, chest pain, or near syncope
IV	Patients with pulmonary hypertension with inability to carry out any physical activity without symptoms. These patients manifest signs of right heart failure. Dyspnoea and/or fatigue may even be present at rest. Discomfort is increased by any physical activity

PAH Risk Değerlendirmesi 2015

Prognoz değişkeni (1 yıllık beklenen mortalite)	Düşük risk <%5	Orta risk %5-10	Yüksek risk >%10
Sağ kalp yetmezliğinin klinik bulguları	Yok	Yok	Var
Progresyon semptomları	Yok	Yavaş	Hızlı
Senkop	Yok	Nadiren	İsrarcı
WHO FS	I,II	III	IV
6DYT	>440 m	165-440 m	<165 m
Kardiyopulmoner egzersiz testi	Tepe VO_2 >15 ml/dk/kg (bekln. >%65) VE/VCO_2 eğim <36	Tepe VO_2 11-15 ml/dk/kg (bekln. %35-65) VE/VCO_2 eğim 36-44.9	Tepe VO_2 <11 ml/dk/kg (bekln. <%35) VE/VCO_2 eğim ≥45
NT-proBNP plazma seviyeleri	BNP <50 ng/l NT-proBNP <300 ng/ml	BNP 50-300 ng/l NT-proBNP 300-1400 ng/ml	BNP <300 ng/l NT-proBNP >1400 ng/ml
Görüntüleme (Eko, KMR)	SA alanı <18 cm^2 Perikard effüzyonu yok	SA alanı 18-26 cm^2 Perikard effüzyonu yok veya az	SA alanı >26 cm^2 Perikard effüzyonu var
Hemodinami	SAB <8 mmHg Kİ ≥2.5 l/dk/m^2 SvO_2 >%65	SAB 8-14 mmHg Kİ 2.0-2.4 l/dk/m^2 SvO_2 %60-65	SAB >14 mmHg Kİ <2.0 l/dk/m^2 SvO_2 <%60

ESC kılavuzu 2015: monoterapi

			Sınıf[a]-Düzey[b]					
			DSÖ-FS II		DSÖ-FS III		DSÖ-FS IV	
Kalsiyum kanal blokerleri			I	C[d]	I	C[d]	-	-
Endotelin reseptör antagonistleri	Ambrisentan		I	A	I	A	IIb	C
	Bosentan		I	A	I	A	IIb	C
	Masitentan[d]		I	B	I	B	IIb	C
Fosfodiesteraz tip-5 inhibitörleri	Sildenafil		I	A	I	A	IIb	C
	Tadalafil		I	B	I	B	IIb	C
	Vardenafil*		IIb	B	IIb	B	IIb	C
Guanilat siklaz uyarıcıları	Riosiguat		I	B	I	B	IIb	C
Prostanoidler	Epoprostenol	İntravenöz[d]	-	-	I	A	I	A
	İloprost	İnhale	-	-	I	B	IIb	C
		İntravenöz*	-	-	IIa	C	IIb	C
	Treprostinil	Subkütan	-	-	I	B	IIb	C
		İnhale*	-	-	I	B	IIb	C
		İntravenöz[e]	-	-	IIa	C	IIb	C
		Oral*	-	-	IIb	B	-	-
	Beraprost*		-	-	IIb	B	-	-
IP reseptör agonistleri	Seleksipag (oral)*		I	B	I	B	-	-

ESC kılavuzu 2015: kombinasyon tedavisi:' başlangıçta komb.'

Ölçüm/ tedavi	Sınıf[a]-Düzey[b]					
	DSÖ-FS I		DSÖ-FS III		DSÖ-FS IV	
Ambrisentan+tadalafil[c]	I	B	I	B	IIb	C
Diğer ERA+PDE-5i	IIa	C	IIa	C	IIb	C
Bosentan+sildenafil+iv epoprostenol	-	-	IIa	C	IIa	C
Bosentan+iv epoprostenol	-	-	IIa	C	IIa	C
Diğer ERA ya da PDE-5i+sc treprostinil	-	-	IIb	C	IIb	C
Diğer ERA ya da PDE-5i+diğer iv prostasiklin analogları	-	-	IIb	C	IIb	C

ESC kılavuzu 2015: Kombinasyon tedavisi 'ardışık'

Ölçüm / tedavi	Sınıf[a]-Düzey[b]					
	DSÖ-FS I		DSÖ-FS III		DSÖ-FS IV	
Sildenafile eklenen masitentan[c]	I	B	I	B	IIa	C
Bosentana eklenen riosiguat	I	B	I	B	IIa	C
ERA ve/veya PDE-5i'ye[c] eklenen seleksipag[d]	I	B	I	B	IIa	C
Epoprostenole eklenen sildenafil	-	-	I	B	IIa	B
Sildenafil veya bosentana eklenen inhale treprostinil	IIa	B	IIa	B	IIa	C
Bosentana eklenen inhale iloprost	IIb	B	IIb	B	IIb	C
Bosentana eklenen tadalafil	IIa	C	IIa	C	IIa	C
Sildenafile eklenen ambrisentan	IIb	C	IIb	C	IIb	C

Treatment of patients with pulmonary arterial hypertension at the time of death or deterioration to functional class IV: Insights from the REVEAL Registry

Harrison W. Farber, MD,[a] Dave P. Miller, MS,[b] Leslie A. Meltzer, PhD,[c] and Michael D. McGoon, MD[d]

JHLT 2013;32:1114

REVEAL : 3515 hasta

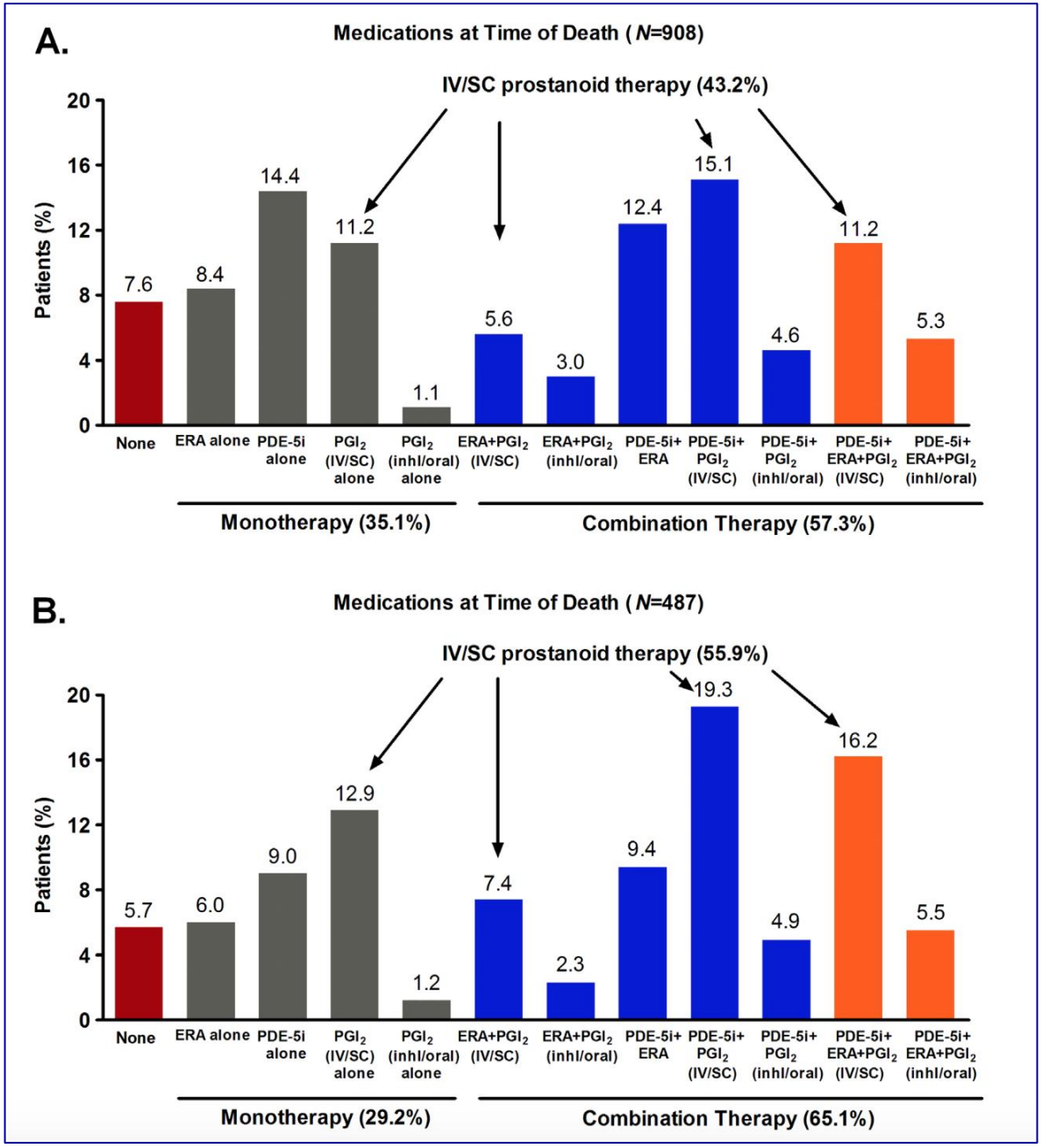
487 hasta: PAH ilişkili ölüm

908 hasta:tüm nedenlere bağlı ölüm

294 hasta: FS I / II / III → FS IV

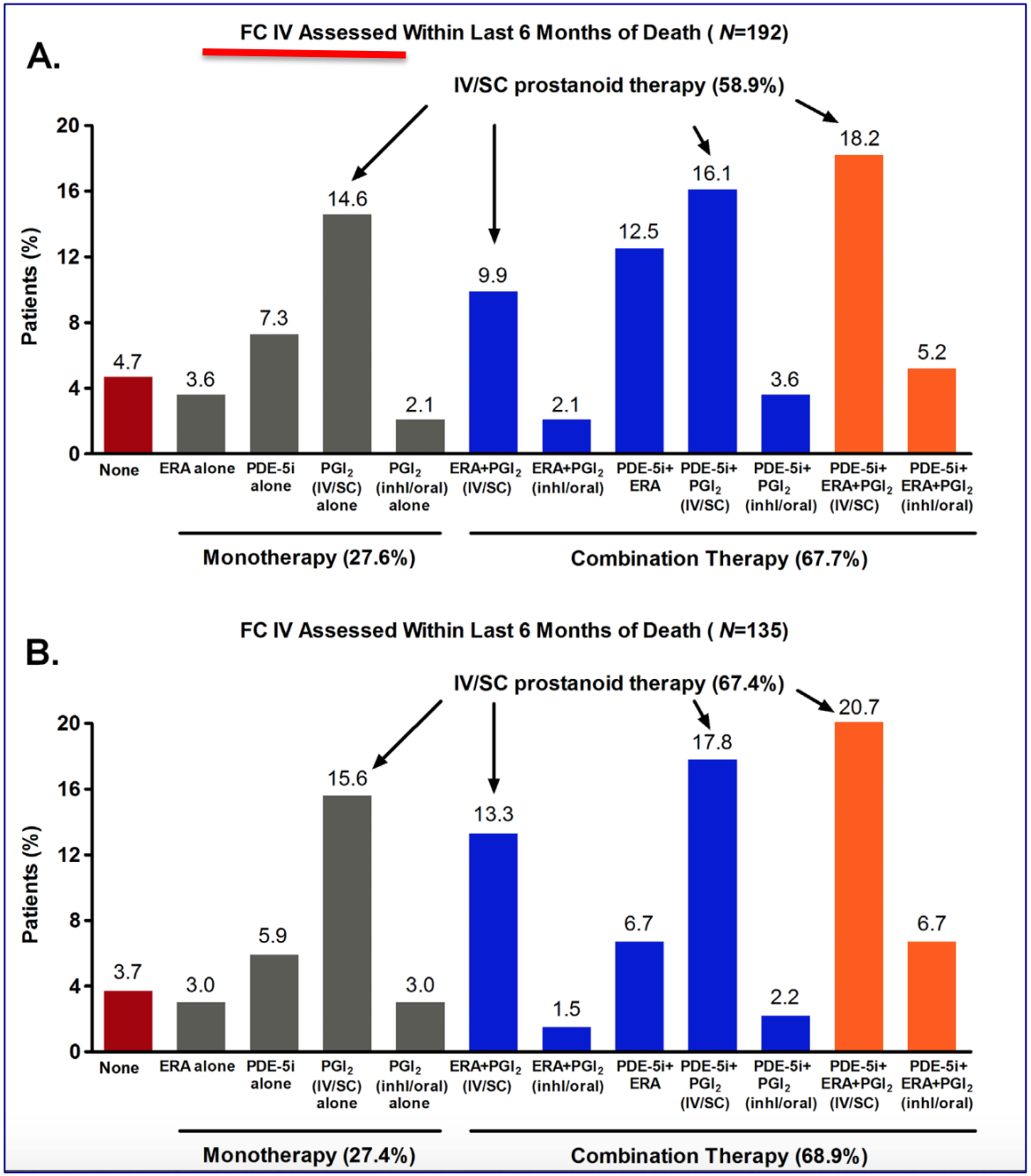
A:
Tüm nedenlere bağlı ölüm
NYHA III > IV

B:
PAH ilişkili ölüm
NYHA III = IV



A:
Tüm nedenlere bağlı ölüm

B:
PAH ilişkili ölüm



Prognostic factors in severe pulmonary hypertension patients who need parenteral prostanoid therapy: The impact of late referral

	Roma grubu	refere grup
Hemodynamic		
Right atrial pressure, mm Hg	8.1 ± 5.1	7.5 ± 3.5
Pulmonary artery pressure, mm Hg	54 ± 15	52 ± 10
Cardiac index, liters/min/m^2	2.2 ± 1.0	2.2 ± 0.4
Pulmonary vascular resistance, WU	15.2 ± 8.2	12.3 ± 3.5
Heart failure < 1 year prostanoid	6 (21)	6 (50) [b]
Pre-prostanoid		
Days on oral therapy	734 ± 620	850 ± 600
NYHA III/IV	24:4 (14)	7:5 (41)[b]
6MWT, meters	344 ± 114	254 ± 120[b]
Hemodynamic		
Right atrial pressure, mm Hg	7.6 ± 4.7	8.5 ± 6.3
Pulmonary artery pressure, mm Hg	54 ± 13	52 ± 12
Cardiac index, liters/min/m^2	2.1 ± 1.0	1.8 ± 0.3
Pulmonary vascular resistance, WU	15.3 ± 8.1	15.2 ± 5.9
Echocardiography		
Left ventricular eccentricity index		
Diastolic	2.33 ± 0.30	2.42 ± 0.31
Systolic	2.21 ± 0.30	2.27 ± 0.34
Right atrial area, cm^2	32.1 ± 4.2	35.4 ± 4.6[c]
TAPSE, mm	19.0 ± 3.5	18.5 ± 2.5
Pericardial effusion	3 (10)	3 (25)[c]
Urgent Prostanoid	6 (21)[d]	9 (75)
Deaths	10 (35)[d]	10 (83)

JHLT 2012;31:364

A. Urgent therapy, if the patient had the following conditions:
   - Hospital admission for refractory congestive heart failure, NYHA functional class IV with rapid progression of symptoms, need of inotropic drugs, severe hemodynamic impairment (right atrial pressure $>$ 15 mm Hg, CI $<$ 2.0 liter/min/m^2), regardless of previous oral therapy.

B. Elective first line therapy:
   - NYHA class III with clinical stability and low cardiac output (ie, CI $<$ 2.2 liters/min/m^2).

C. Elective add-on therapy in NYHA class III patients:
   - Lack of any improvement during dual-oral specific treatment (ie, NYHA functional class and 6MWT distance) after 3 to 4 months of therapy;
   - Worsening of NYHA functional class or reduction from baseline in the 6MWT distance by 15%, confirmed by 2 tests done within 2 weeks.

Table 6 Comparison of Characteristics of Survivors From the Evaluation Before Starting Prostanoid to Last Follow-up

Variable	Pre-prostanoid Mean ± SD	Last evaluation Mean ± SD	*p*-value
Follow-up, days	0	1424 ± 1385	
NYHA	2.8 ± 0.4	2.3 ± 0.5	0.002
6MWT, meters	354 ± 91	426 ± 82	0.0001
Hemodynamic			
RAP, mm Hg	9.1 ± 5.1	8.6 ± 3.1	0.2
PAP, mm Hg	56 ± 13	44 ± 18	0.05
CI, liters/min/m^2	2.0 ± 1.2	3.1 ± 1.2	0.002
PVR, WU	17 ± 10	8 ± 6	0.001
Echocardiography			
Diastolic LVEI	2.27 ± 0.30	1.97 ± 0.50	0.0001
Systolic LVEI	2.13 ± 0.30	1.83 ± 0.50	0.0003
RA area, cm^2	31.4 ± 5.4	29.2 ± 6.3	0.004
TAPSE, mm	18.8 ± 3.7	20.6 ± 2.6	0.003
Pericardial effusion	0	0	1

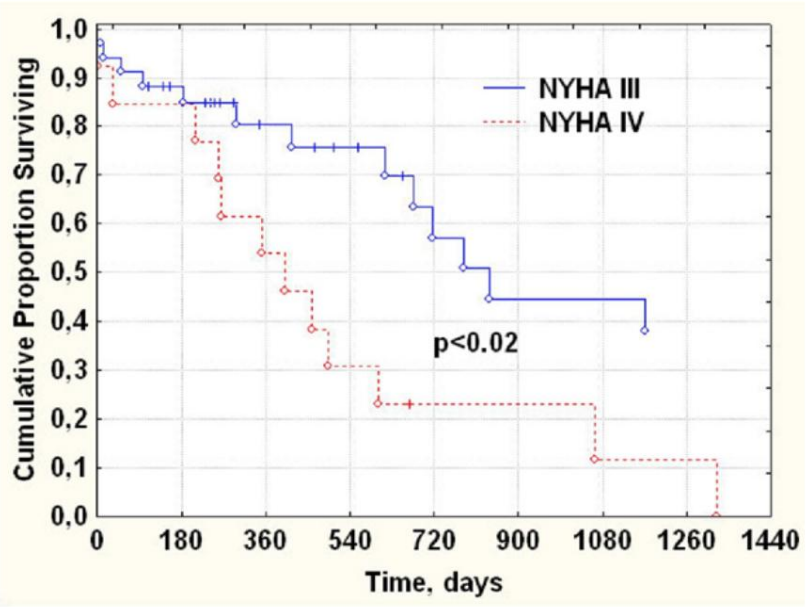


Figure 4 Kaplan-Meier survival curves for patients based on New York Heart Association (NYHA) functional class.

Table 4 Univariate Analysis of Variables Associated With Death

Variable	Unit	HR	95% CI	*p*-value
New York Heart Association class	1.0	3.11	1.69–5.72	0.0002
6-minute walk test	50	0.72	0.59–0.87	<0.001
HF < 1 year before prostanoid	1.0	2.44	1.15–5.18	0.01
Pericardial effusion	1.0	2.97	1.25–7.06	0.01
Right atrial pressure	2.0	1.07	1.00–1.14	0.03
Urgent prostanoids	1.0	4.54	2.05–10.05	0.0001
Rome-First-Line prostanoid-Referred	1.0	1.84	1.20–2.82	<0.01

CI, confidence interval; HF, heart failure; HR, hazard ratio.

Table 5 Multivariate Analysis of Variables Associated With Death[a]

	Unit	HR	95% CI	*p*-value
Urgent prostanoids	1.0	3.55	1.53–8.24	0.003
NYHA class	1.0	2.09	1.11–3.94	0.02

CI, confidence interval; HR, hazard ratio; NYHA, New York Heart Association.

[a]Chi-square = 25.8; df = 3; p = 0.00001.

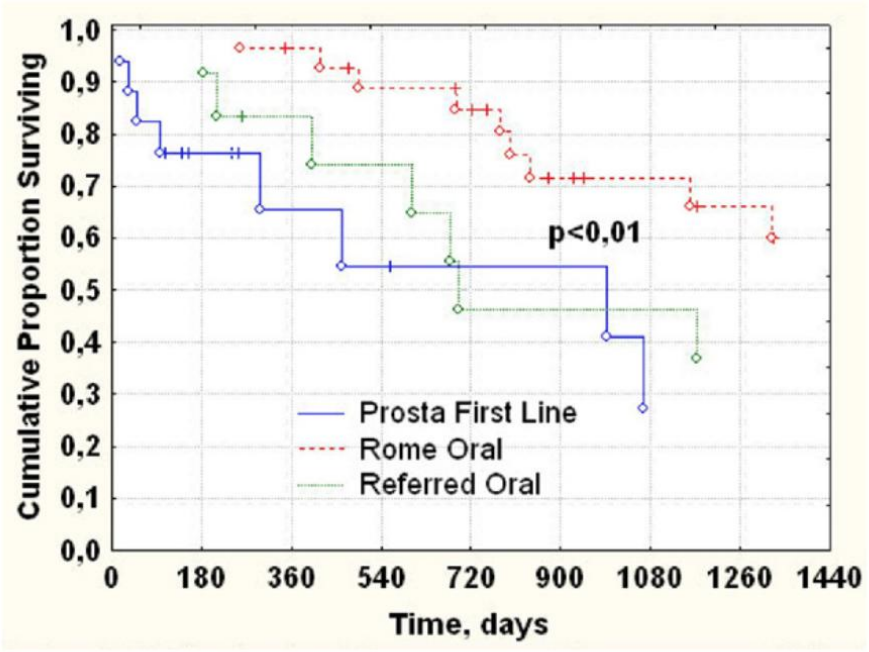


Figure 2 Kaplan-Meier survival curves for patients according to the modality access to prostanoid therapy: Rome group, Referred group, and First-line prostanoid.

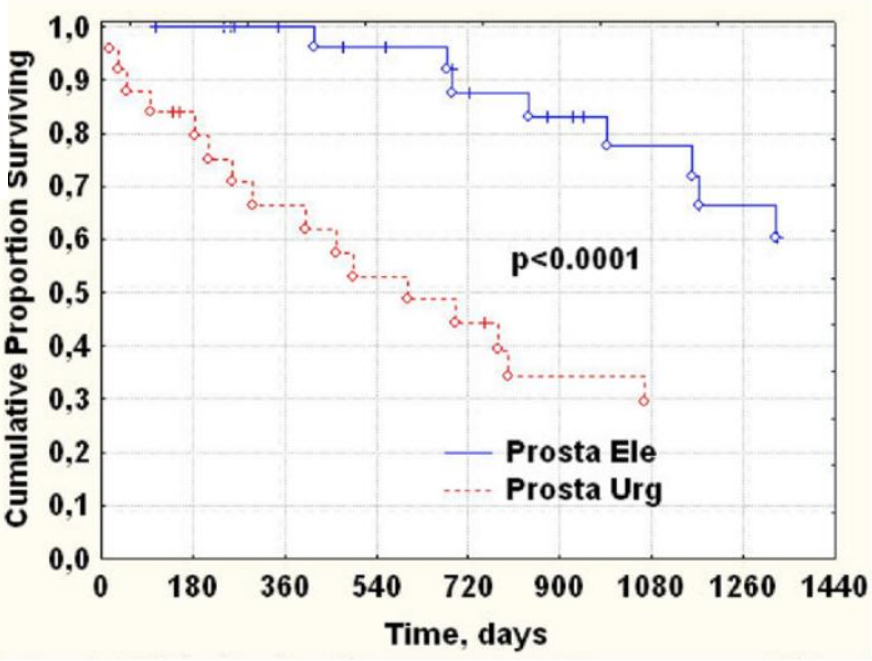


Figure 3 Kaplan-Meier survival curves for patients according to urgent (Urg) and elective (Ele) prostanoid initiation.

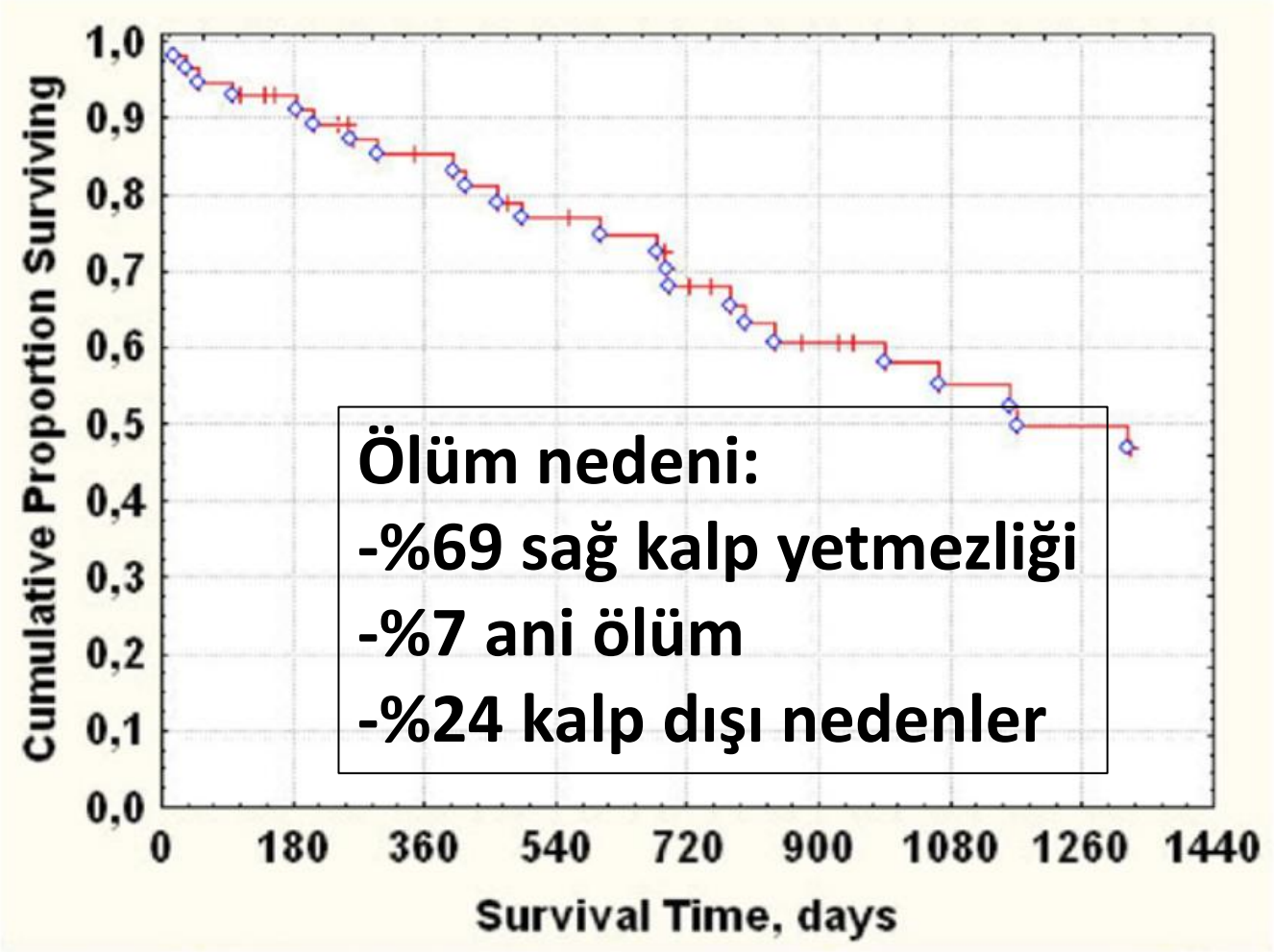
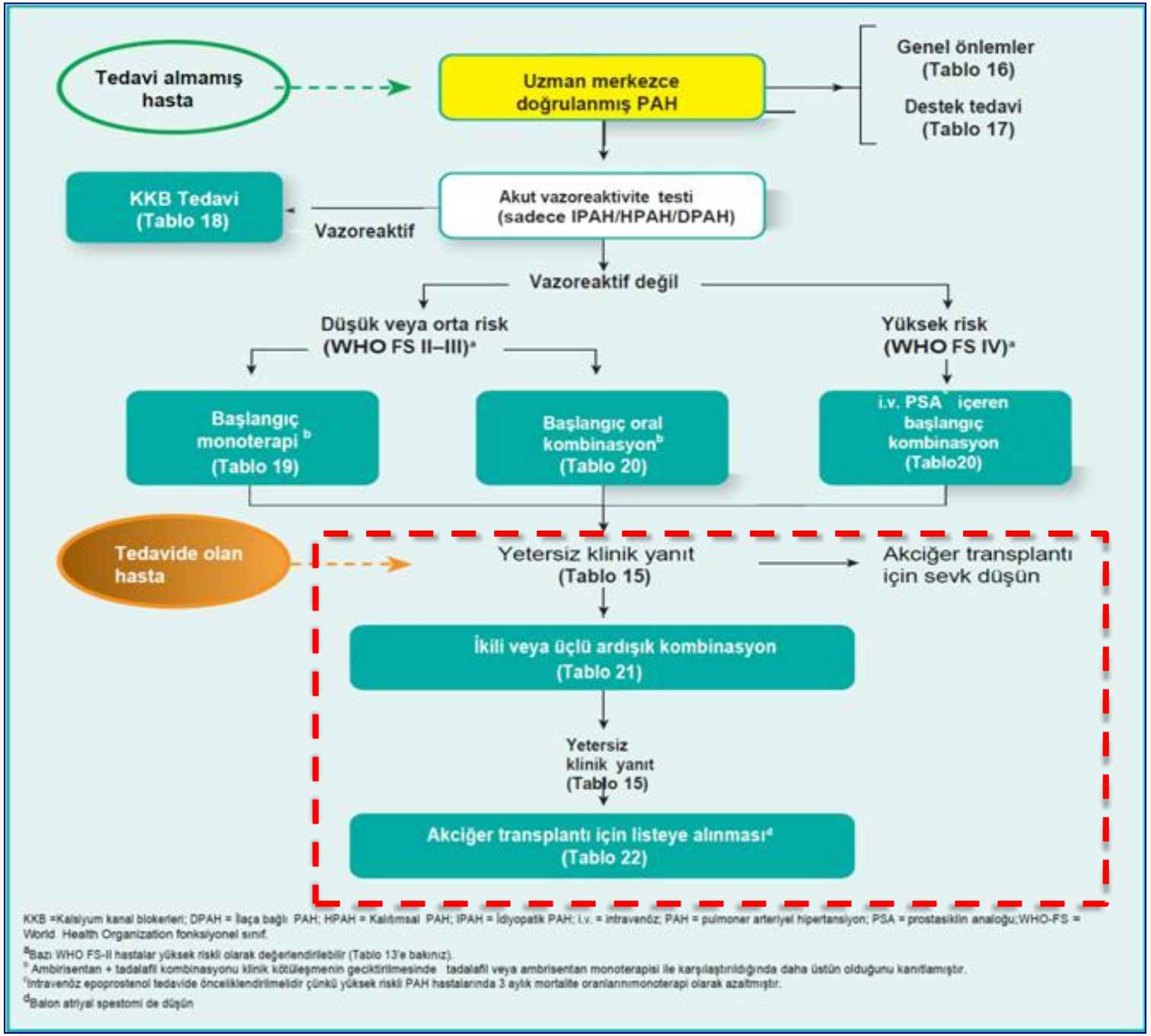


Figure 1 Kaplan-Meier survival estimates in 57 patients with precapillary pulmonary hypertension (PH) after prostanoid initiation. The overall survival rates at 1, 2, 3, and 4 years were, respectively, 77%, 53%, 40%, and 32%.



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[a]Bazı WHO FS-II hastalar yüksek riskli olarak değerlendirilebilir (Tablo 13'e bakınız).

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[c]İntravenöz epoprostenol tedavide önceliklendirilmelidir çünkü yüksek riskli PAH hastalarında 3 aylık mortalite oranlarınımonoterapi olarak azaltmıştır.

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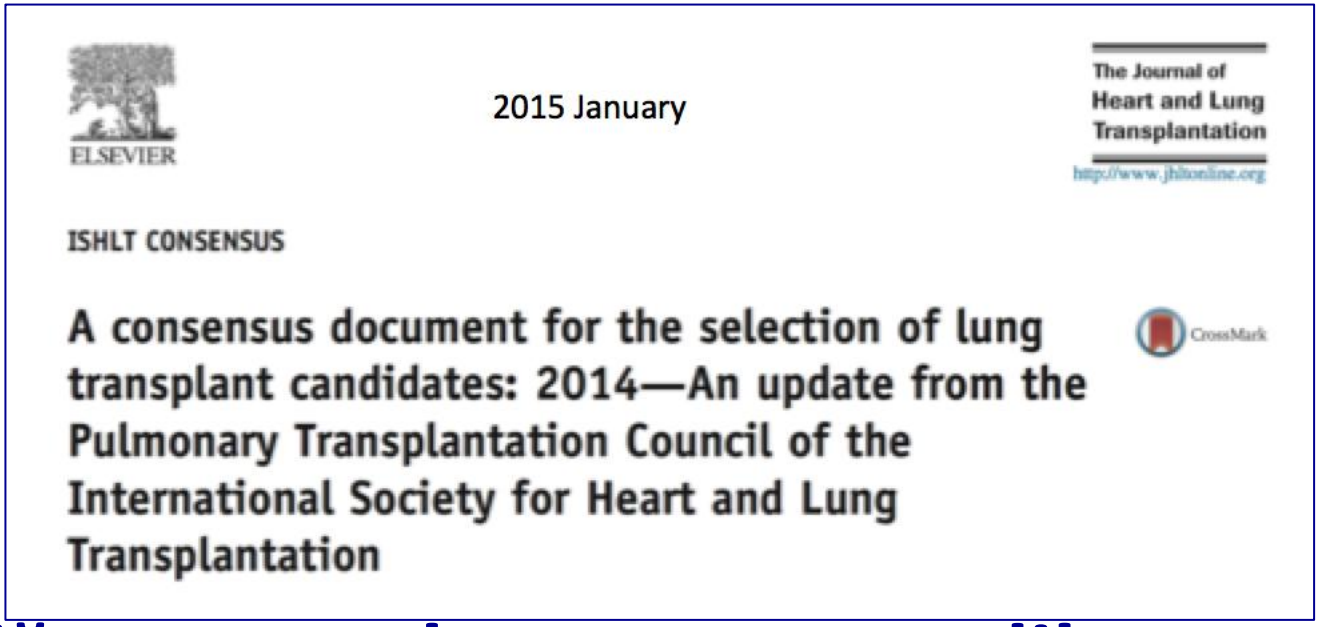


Akciğer Transplantasyonu Endikasyonu

1. Akciğer hastalığına bağlı ölüm riskinin yüksek olması:
   2 yıl içinde beklenen risk >%50
2. Akc tx sonrası yaşam beklentisinin yüksek olması:
   90 gün için yaşam beklentisi > %80
3. Akc tx sonrası 5 yıllık yaşam beklentisinin yüksek olması:
   5 yıllık yaşam beklentisi > %80

Pulmonary vascular diseases

Timing of referral:

- NYHA Functional Class III or IV symptoms during escalating therapy.
- Rapidly progressive disease (assuming weight and rehabilitation concerns not present).
- Use of parenteral targeted pulmonary arterial hypertension (PAH) therapy regardless of symptoms or NYHA Functional Class.
- Known or suspected pulmonary veno-occlusive disease (PVOD) or pulmonary capillary hemangiomatosis.

Timing of transplant listing:

- NYHA Functional Class III or IV despite a trial of at least 3 months of combination therapy including prostanoids.
- Cardiac index of <2 liters/min/m^2.
- Mean right atrial pressure of >15 mm Hg.
- 6-minute walk test of <350 m.
- Development of significant hemoptysis, pericardial effusion, or signs of progressive right heart failure (renal insufficiency, increasing bilirubin, brain natriuretic peptide, or recurrent ascites).[1,61,62]

İleri tedavi stratejileri

Ölçüm/ tedavi	Sınıf[a]-Düzey[b]					
	DSÖ-FS II		DSÖ-FS III		DSÖ-FS IV	
Kalp atış hızı >110/dk ise kan basıncı (sistolik kan basıncı, <90 mmHg düşükse, idrar çıkışı azalmışsa ve eşlik eden hastalığa bağlı olsun ya da olmasın laktat düzeyleri artmışsa PH hastalarının YBÜ'de tedavisi önerilir.	-	-	-	-	I	C
Hipotansif hastalarda inotropik destek önerilir.			I	C	I	C

Ölçüm/tedavi	Sınıf[a]-Düzey[b]					
	DSÖ-FS II		DSÖ-FS III		DSÖ-FS IV	
Maksimum ilaç tedavisine rağmen klinik yanıt hemen akciğer nakli önerilir.	-	-	I	C	I	C
Maksimum ilaç tedavisinin başarısız olmasının ardından, yapılabiliyorsa balonlu atriyal septostomi düşünülebilir.	-	-	IIb	C	IIb	C

NYHA III / IV hasta → **Akc tx**

Eur Respir J 2011; 38: 359–367
DOI: 10.1183/09031936.00148310

Outcomes of hospitalisation for right heart failure in pulmonary arterial hypertension

A. Campo*, S.C. Mathai*, J. Le Pavec*, A.L. Zaiman*, L.K. Hummers#, D. Boyce*, T. Housten*, N. Lechtzin*, H. Chami*, R.E. Girgis* and P.M. Hassoun*

- **90 hasta / 205 hospitalizasyon**
- **RV yetm: %56.1**

  enfeksiyon:%15.6

  kanama: %8.3

  aritmi: %6.3

  senkop: %5.8
- **ICU: %16.1**

- **Mortalite:**
  - **Genel: %14**
  - **ICU: %48**
  - **İnotrop:%46**
  - **Mekanik ventilasyon: %100**
- **Hastane sonrası mortalite:**
  - **3 ay: %13**
  - **6 ay: %26**
  - **12 ay.%35**

TABLE 3 Risk factors for in-hospital mortality in right heart failure (RHF) hospitalisations

	Unadjusted OR (95% CI)	p-value	Adjusted for underlying diagnosis and age OR (95% CI)	p-value
Age per year	1.0 (0.98–1.03)	0.67	NA	
Male *versus* female	1.88 (0.46–7.7)	0.38	1.17 (0.32–4.25)	0.81
CTD-PAH *versus* IPAH/AiPAH	3.1 (1.0–9.35)	0.05	4.92 (1.18–20.6)#	0.03
WHO FC pre-admission	1.91 (0.75–4.85)	0.17	1.61 (0.63–4.09)	0.32
Charlson index ⩾2	2.69 (0.97–7.46)	0.06	1.96 (0.68–5.61)	0.21
Data on admission				
Systolic BP per mmHg decrease	1.05 (1.02–1.09)	<0.01	1.06 (1.02–1.10)	<0.01
Systolic BP ⩽100 mmHg	3.62 (1.18–11.1)	0.02	4.32 (1.37–13.6)	0.01
Heart rate per beat	1.02 (0.98–1.05)	0.32	1.02 (0.99–1.06)	0.19
Haematocrit %	0.92 (0.83–1.02)	0.10	0.93 (0.84–1.02)	0.14
eGFR <60 mL·min^{-1}/1.73 m^2	2.75 (0.92–8.23)	0.07	2.27 (0.53–9.77)	0.27
Na ⩽136 mEq·mL^{-1}	4.42 (1.36–14.4)	0.01	4.29 (1.29–14.7)	0.02
ProBNP pg·mL^{-1} (log transformed)¶	65.4 (4.5–946)	<0.01	NA	
Previous RHF hospitalisation	1.54 (0.55–4.34)	0.41	2.66 (0.67–10.5)	0.16
Need for inotropes	136.2 (7.83–2370)	<0.01	NA	
Need for mechanical ventilation	252.1 (13.34–4764)	<0.01	NA	

Sağ kalp yetmezliği

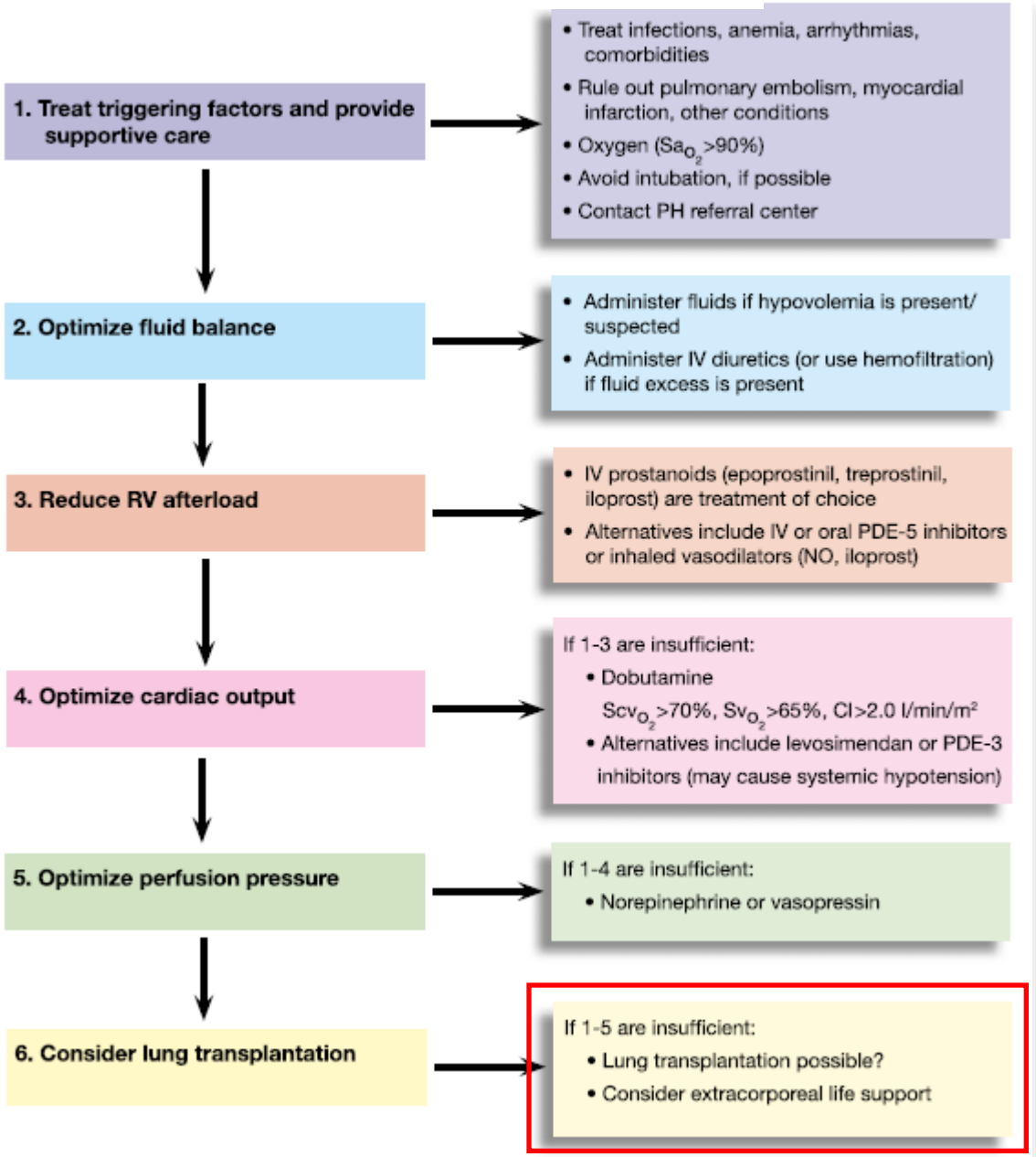
- **Akut sağ kalp yetmezliği**

- **Kronik sağ kalp yetmezliği**

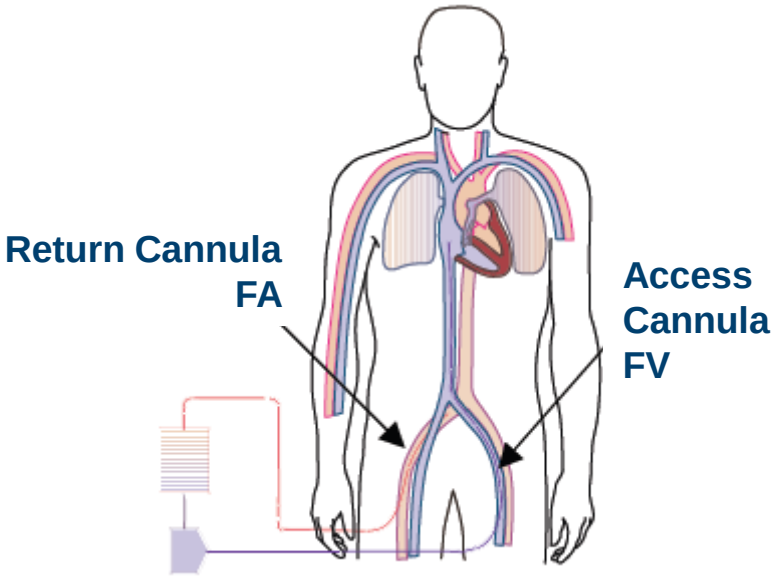
Intensive Care Unit Management of Patients with Severe Pulmonary Hypertension and Right Heart Failure

Hoeper MM
Am J Respir Crit Care Med 2011

İPAH
Eisenmenger
Akut PE
KPTE

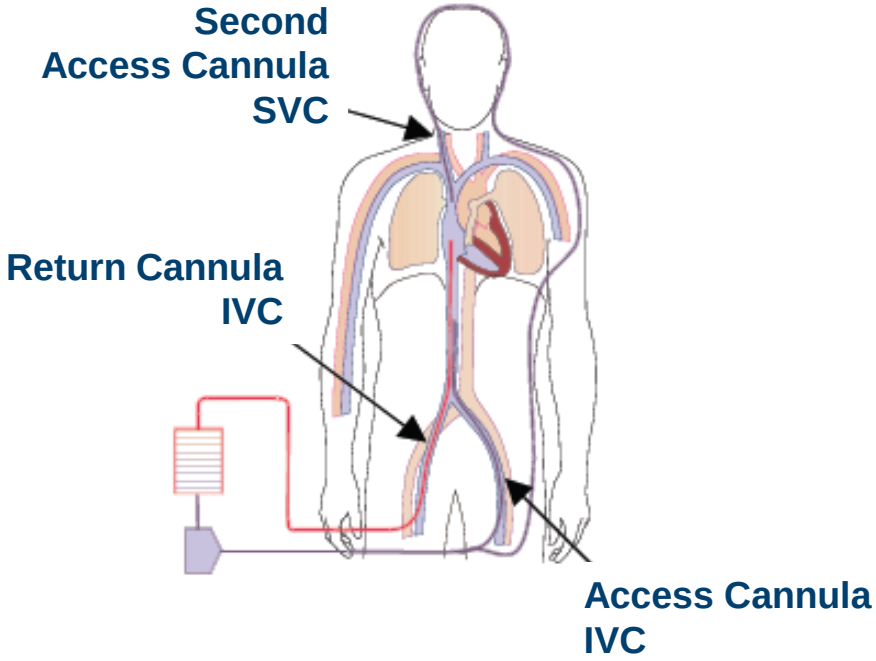


Veno-Arterial (V-A) ECMO



Sağ ventrikül yetmezliği

Veno-Venous (V-V) ECMO



American Journal of Transplantation 2010; 10: 2173–2178
Wiley Periodicals Inc.

doi: 10.1111/j.1600-6143.2010.03192.x

Case Report

Extracorporeal Membrane Oxygenation in Nonintubated Patients as Bridge to Lung Transplantation

Table 1: Demographic data and outcomes

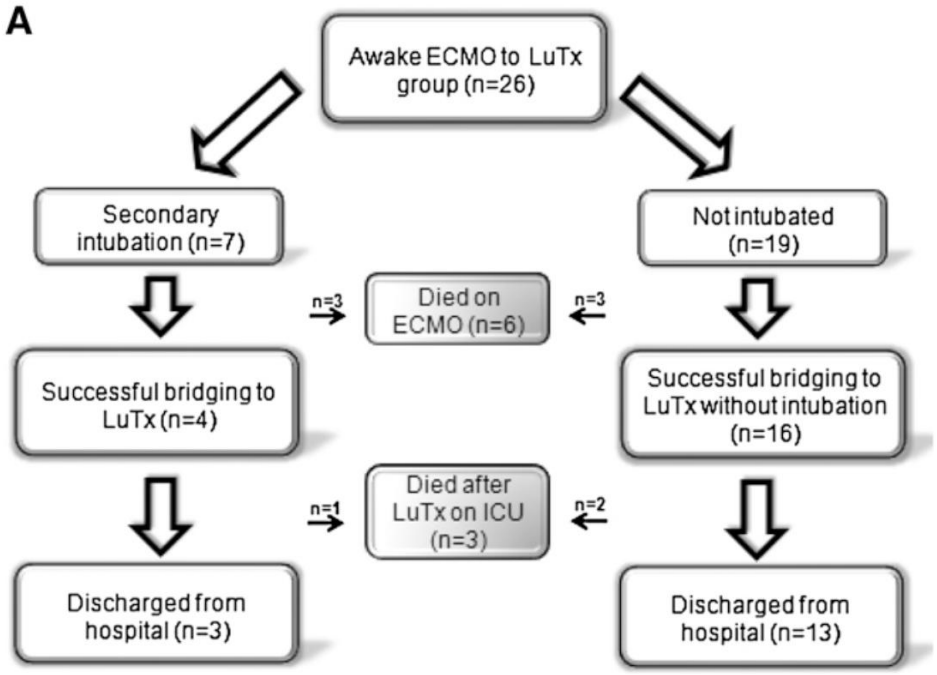
Pat	Age	Gender	Diagnosis	Days on ECMO	Type of Tx	Outcome
1	29	Female	CTEPH	35	BLTx	Discharged, alive, follow-up 14 months after Tx
2	53	Male	PAH, LF, SSc	11	BLTx	Deceased after Tx
3	41	Male	PH, LF due to sarcoidosis	18	BLTx	Discharged, alive, follow-up 6 months after Tx
4	54	Female	IPF	35	BLTx	Discharged, alive, follow-up 4 months after Tx
5	55	Female	IPAH	8	-	Deceased prior to Tx

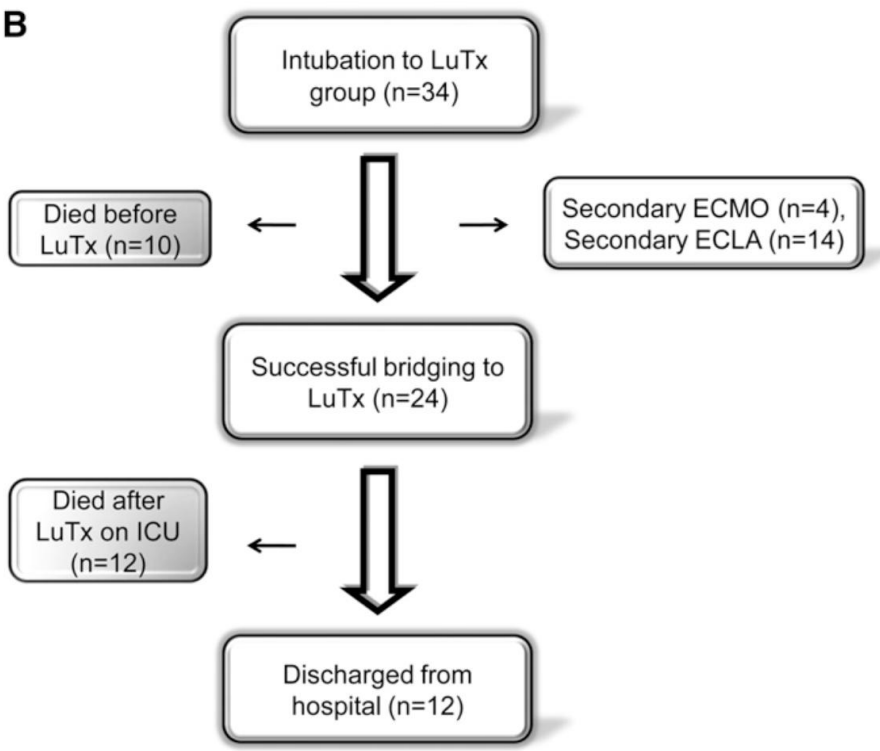
CTEPH = chronic thromboembolic pulmonary hypertension; PAH = pulmonary arterial hypertension; LF = lung fibrosis; SSc = systemic sclerosis; PH = pulmonary hypertension; IPF = idiopathic pulmonary fibrosis; IPAH = idiopathic pulmonary arterial hypertension; BLTx = bilateral lung transplantation.

In conclusion, these preliminary data support the concept that the use of ECMO in awake patients may be a viable bridging strategy for selected patients with cardiopulmonary failure that can be applied successfully over prolonged periods of time.

Extracorporeal Membrane Oxygenation in Awake Patients as Bridge to Lung Transplantation

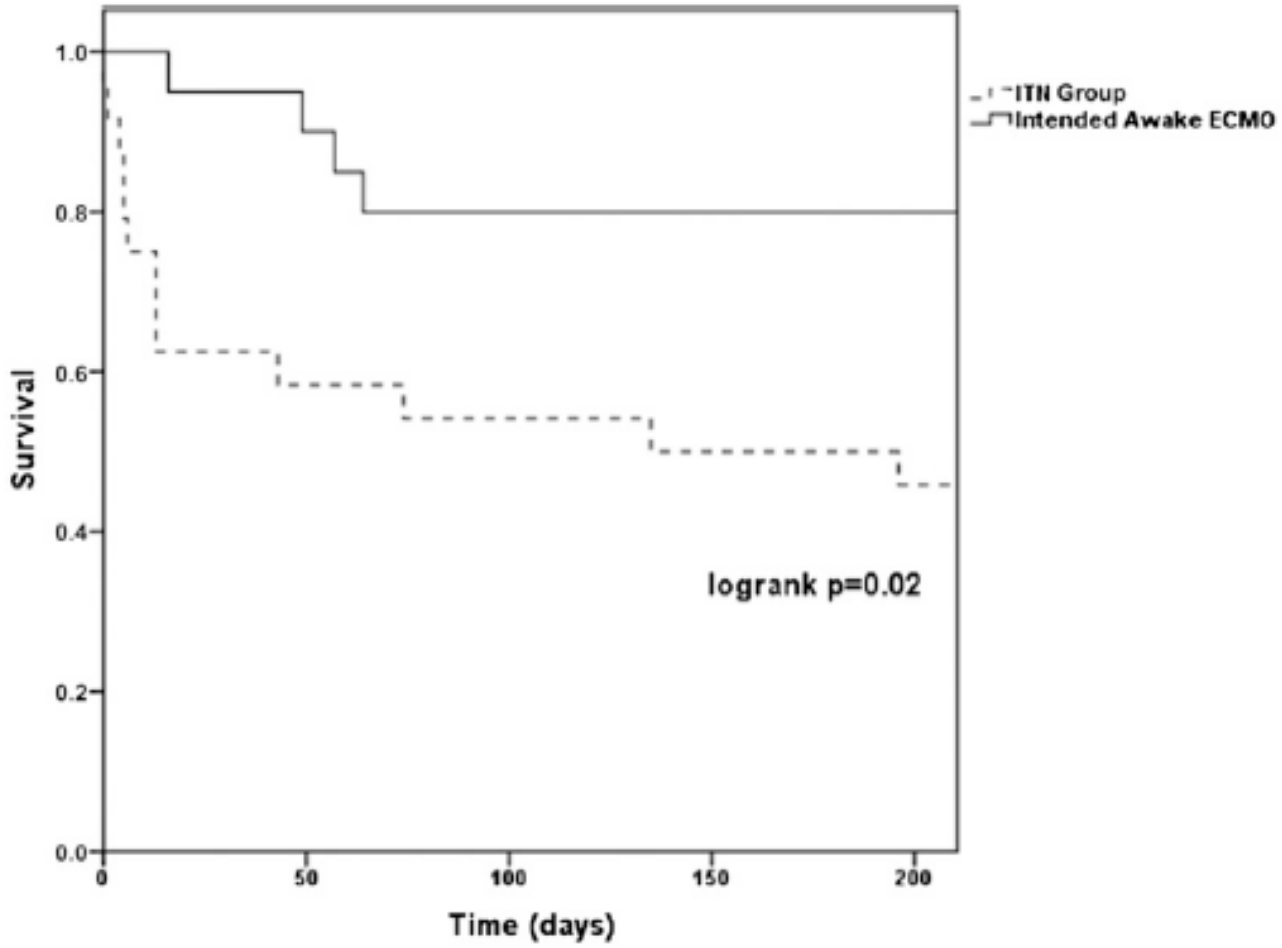
Thomas Fuehner[1], Christian Kuehn[2], Johannes Hadem[3], Olaf Wiesner[1], Jens Gottlieb[1], Igor Tudorache[2], Karen M. Olsson[1], Mark Greer[1], Wiebke Sommer[2], Tobias Welte[1], Axel Haverich[2], Marius M. Hoeper[1], and Gregor Warnecke[2]





Underlying Disease	Patients Receiving Venovenous ECMO	Patients Receiving Venoarterial ECMO
Pulmonary fibrosis, n (%)	5 (56)*	4 (44)
Cystic fibrosis, n (%)	5 (100)†	0 (0)
PAH/CTEPH, n (%)	0 (0)	7 (100)
BOS/ReTx, n (%)	3 (100)	0 (0)
Sarcoidosis, n (%)	0 (0)	1 (100)‡

Am J Respir Crit Care Med 2012



Olguların % 80' i akciğer transplantasyonu (+)
Tx sonrası 6 aylık sağ kalım % 65
Sağ yetmezlik ile başvuran olgularda akla getirilmeli !

American Journal of Transplantation 2009; 9: 853–857
Wiley Periodicals Inc.

doi: 10.1111/j.1600-6143.2009.02549.x

Brief Communication

Bridge to Thoracic Organ Transplantation in Patients with Pulmonary Arterial Hypertension Using a Pumpless Lung Assist Device

4 OLGU:

3 PVOD, 1 PAH

RV yetmezliği (+)

2 OLGU: ECMO (+)

4 OLGU: akc tx (+)

LAD: düşük rezistanslı membran ventilatör

Pulmoner arter – sol atrium

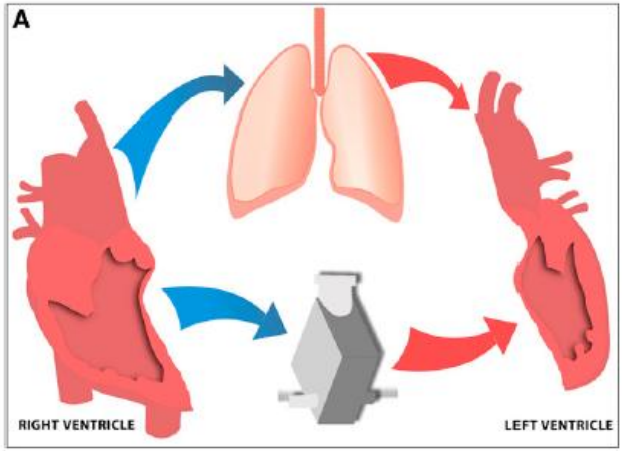


Figure 1: Two lung assist devices connected in parallel creating a shunt between the pulmonary artery and the left atrium

Impact of extracorporeal life support on outcome in patients with idiopathic pulmonary arterial hypertension awaiting lung transplantation

Table 2 Pre-transplant Management

Variable	1998–2005 (n = 23) No. (%)	2006–2010 (n = 21) No. (%)	p-value
In-hospital pre-transplant	1 (4)	10 (48)	0.0009
Atrial septostomy	2 (9)	0	0.2
Extracorporeal life support	0	6 (29)	0.006
PA-LA Novalung	0	4	
VA ECMO	0	2	
Inotropic support	0	5 (25)	0.01
Intubated	0	4 (20)	0.02
Waiting list mortality	5 (22)	0	0.03
Type of transplant			0.05
Bilateral lung	18	17	
Heart-lung	0	4	

ECMO, extracorporal membrane oxygenation; LA, left atrium; PA, pulmonary artery; VA, venoarterial.

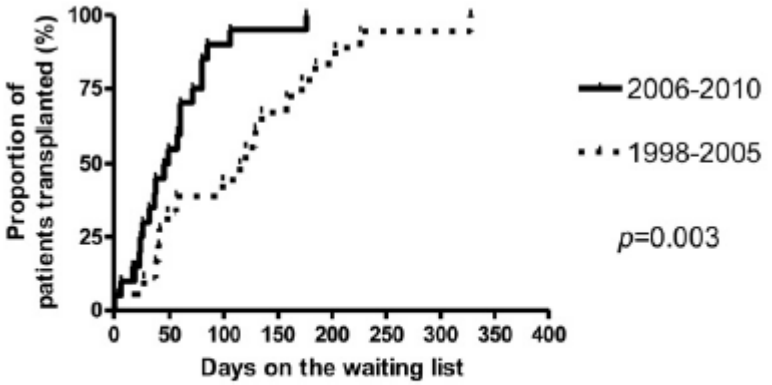


Figure 2 Life-table analysis shows the time between listing and transplant in both eras. The waiting time decreased significantly in the second era.

deParrot M et al, JHLT 2011;30:997

Table 3 Patients Bridged to Lung Transplant With Extracorporeal Life Support

Patient	ECLS mode	ECLS duration (days)	Extubation & rehab	Inotropic support	Type of transplant	Outcome	Follow-up (mon)
1	VA-ECMO	1	No	Yes	Heart-lung	Died, BO	18
2	PA-LA Novalung	21	No	Yes	Bilateral lung	Alive & well	28
3	PA-LA Novalung	30	Yes	No	Bilateral lung	Alive & well	26
4	VA-ECMO	3	No	Yes	Heart-lung	Died, PRES	2
5	PA-LA Novalung	9	Yes	No	Bilateral lung	Alive & well	5
6	PA-LA Novalung	69	Yes	No	Bilateral lobar lung	Died, PGD	0.2

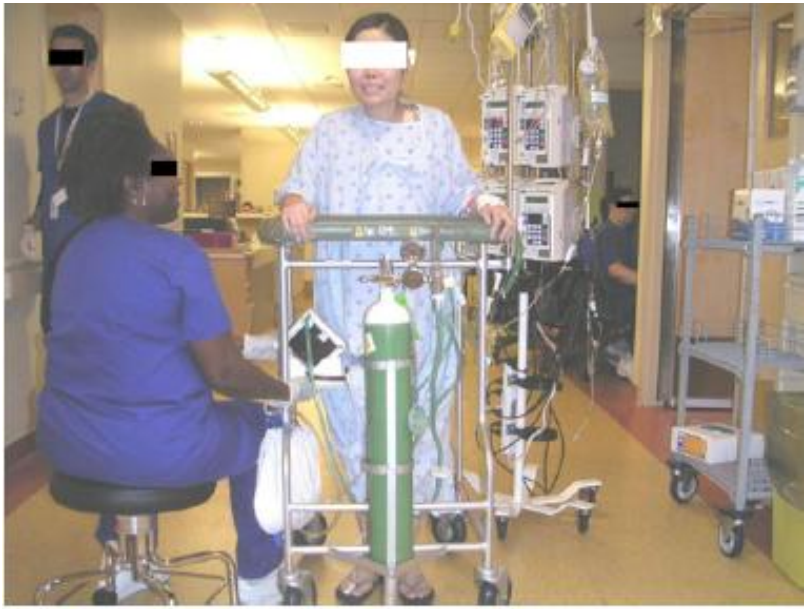
BO, bronchiolitis obliterans; ECLS, extracorporeal life support; ECMO, extracorporeal membrane oxygenation; LA, left atrium; PA, pulmonary artery; PRES, posterior reversible encephalopathy syndrome, PGD, primary graft dysfunction; VA, venoarterial.

Table 4 Early Post-transplant Outcome

Variable	1998–2005 (n = 18)	2006–2010 (n = 21)	p-value
30-day mortality, No.	3	2	0.5
Severe PGD[a], No.	4	5	0.9
LOS (mean ± SD)			
Intensive care unit	17 ± 13	36 ± 30	0.02
Hospital	35 ± 27	66 ± 68	0.08

LOS, length of stay; PGD, primary graft dysfunction; SD, standard deviation.

[a]Defined by PGD III persistent during the initial 72 hours after transplant.



deParrot M et al, JHLT 2011;30:997

ISHLT 2015 January

Transplantasyona köprü: mekanik destek

ECMO önerildiği durumlar

*genç yaş
*multiorgan yetmezliği YOK
*rehabilitasyona uygun olma

ECMO önerilmediği durumlar

*septik şok
*multiorgan yetmezlik VAR
*ciddi arterial tıkanıklık
*HIT
*uzun süreli mekanik ventilatör desteği
*ileri yaş
*obesite

Ultrafiltrasyon

Ann Hepatol. 2015 Nov-Dec;14(6):929-32. doi: 10.5604/16652681.1171786.

Peritoneal ultrafiltration for refractory fluid overload and ascites due to pulmonary arterial hypertension.

Husain-Syed F[1], Muciño-Bermejo MJ[2], Ronco C[2], Seeger W[3], Birk HW[1].

Author information

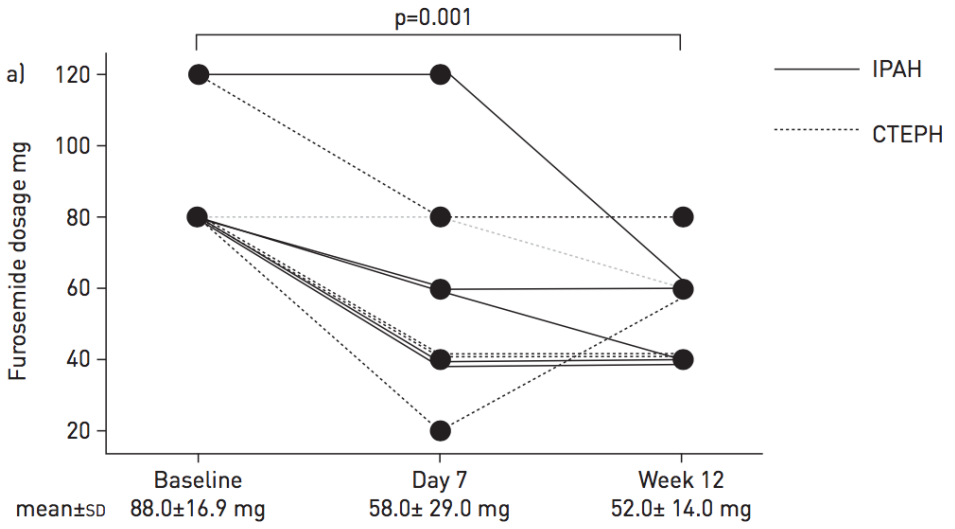
Abstract

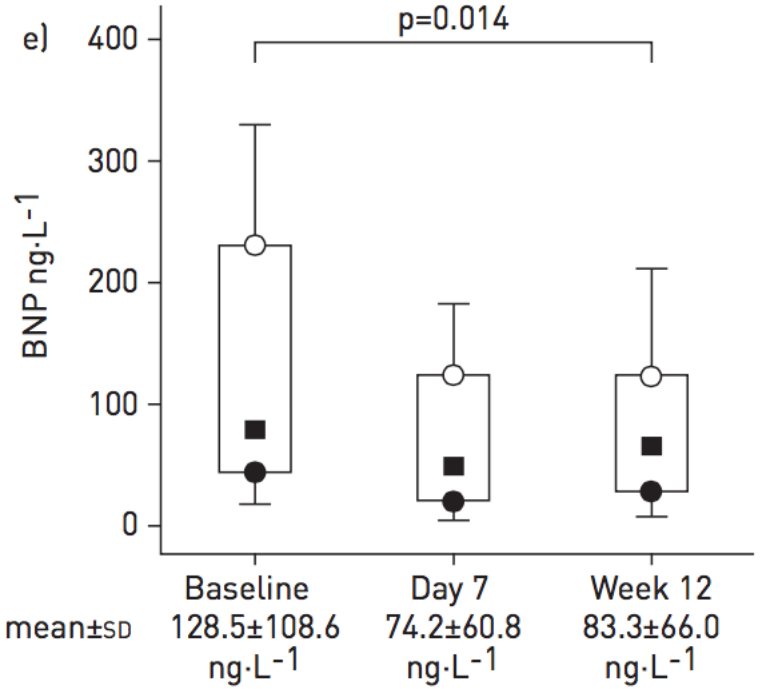
Pulmonary hypertension is a common finding in patients with advanced liver disease. Similarly, among patients with advanced pulmonary arterial hypertension, right heart failure leads to congestive hepatopathy. Diuretic resistant fluid overload in both advanced pulmonary hypertension and chronic liver disease is a demanding challenge for physicians. Venous congestion and ascites-induced increased intra-abdominal pressure are essential regarding recurrent hospitalization, morbidity and mortality. Due to impaired right-ventricular function, many patients cannot tolerate extracorporeal ultrafiltration. Peritoneal dialysis, a well-established, hemodynamically tolerated treatment for outpatients may be a good alternative to control fluid status. We present a patient with pulmonary arterial hypertension and congestive hepatopathy hospitalized for over 3 months due to ascites induced refractory volume overload treated with peritoneal ultrafiltration. We report the treatment benefits on fluid balance, cardiorenal and pulmonary function, as well as its safety. In conclusion, we report a case in which peritoneal ultrafiltration was an efficient treatment option for refractory ascites in patients with congestive hepatopathy.

Oral vasopressin receptor antagonist tolvaptan in right heart failure due to pulmonary hypertension

Tamura Y et al. Eur Respir J 2015;46:283

TOLVAPTAN: 3.75 mg / 7.5 mg / 15 mg / gün – 10 hasta





Balon atriyal septostomi

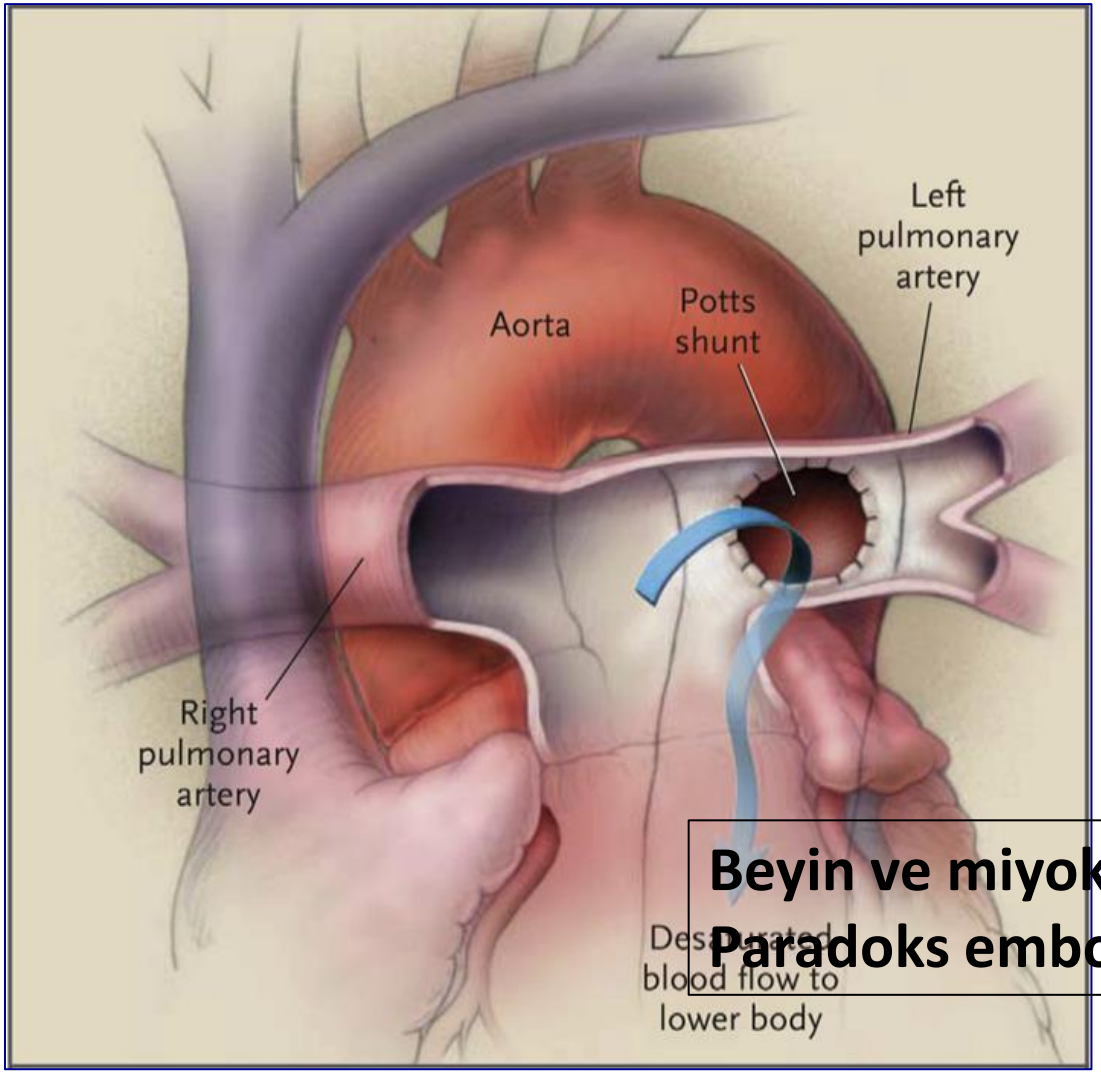
- Medikal tedaviye refrakter sağ kalp yetmezliği
- Tekrarlayan senkop

Kontrendike !!!
- Sağ atriyum basıncı > 20 mmHg
- İstirahat O2 saturasyonu < %85 / %90

Koegh AM et al. JACC 2009;54:S67-77:
24. saatte mortalite %7
1. Ayda mortalite %15

Kılavuz: IIb / C

Pott şantı

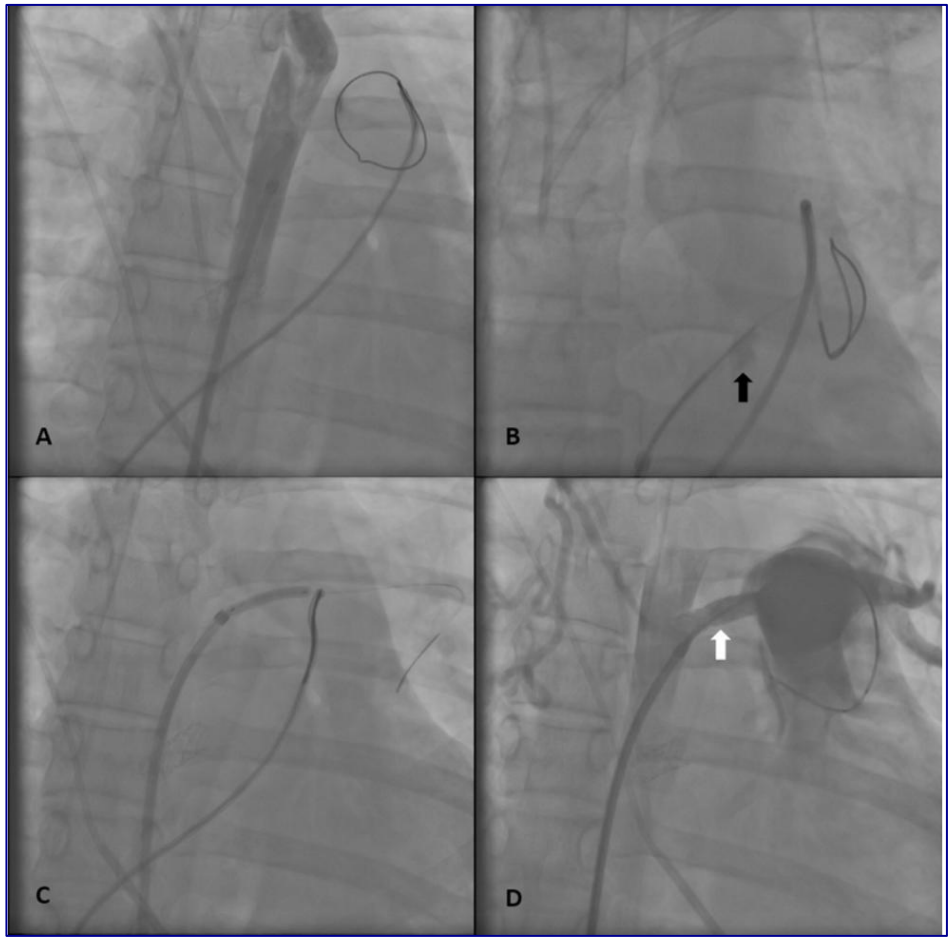


Beyin ve miyokard korunuyor
Paradoks emboli riski yok

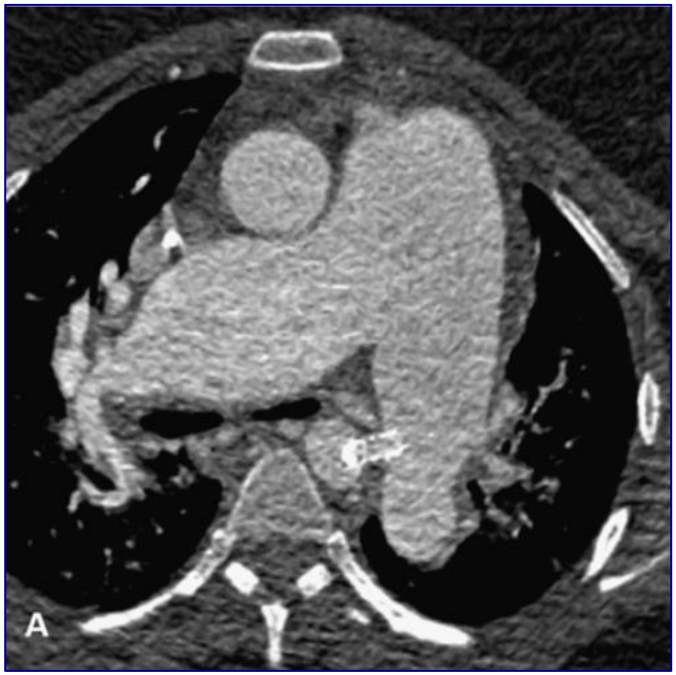
Canadian J of Cardiology 2015

Transcatheter Potts shunt creation in patients with severe pulmonary arterial hypertension: Initial clinical experience

JHLT 2013;32:381



4 erişkin hasta
1 hasta hemotoraks nedeni ile ex



Right ventricular assist device use in ventricular failure due to pulmonary arterial hypertension: Lessons learned

Erika B. Rosenzweig, MD,[a]
Scott Chicotka, MD,[b] and
Matthew Bacchetta, MD[c]

JHLT 2016

*42 yaş kadın hasta, Grup I PAH, medikal tedaviye refrakter sağ kalp yetmezliği

*pRVAD (CentriMag)

10 gün destek tedavi boyunca vazopresör desteği azalmış, klinik sağ yetmezlik bulguları azalmış, pumoner arter hemodinamisi olumlu değişmiş

*HVAD (HeartWare)

10 günde implante edilmiş
SAĞ ATRİUM – PULMONER ARTER
PEROP: masif kanama – transfüzyon
POSTOP: pnomoni ve sepsis

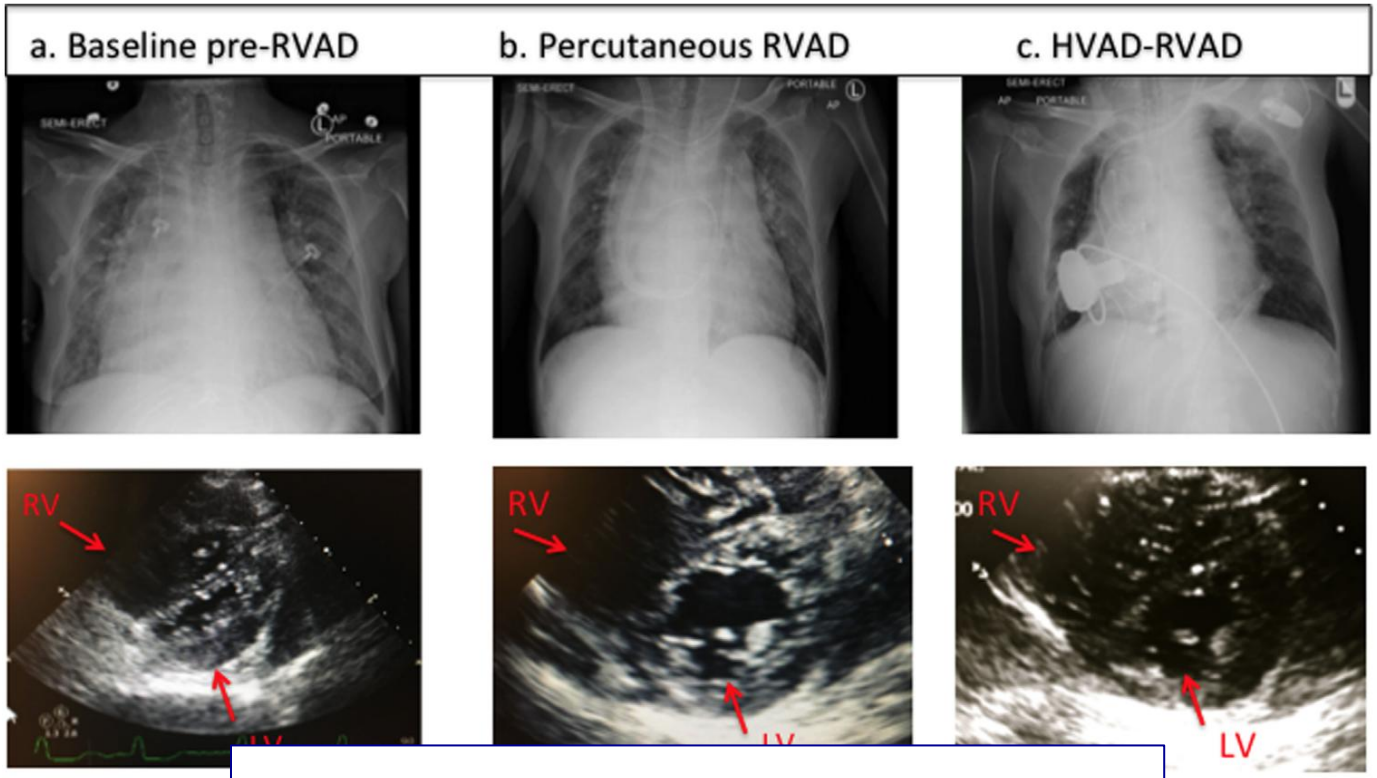
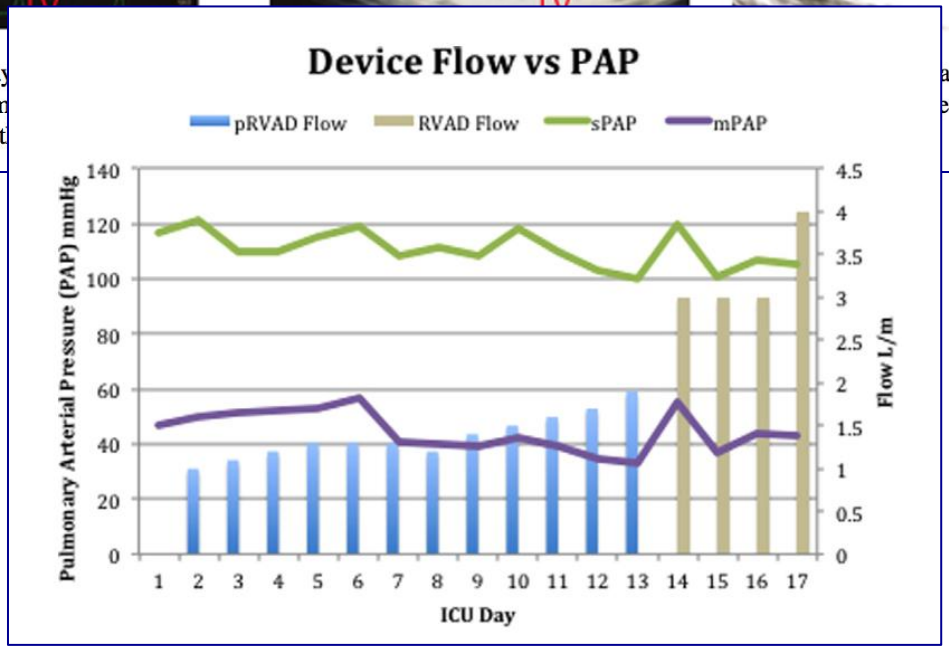


Figure 1 Chest X-ray … aneous right ventricular assist device (RVAD) im… entricular Assist Device -RVAD implantation wit…



Teşekkür ederim..... ☺