İnfektif Endokarditin Komplikasyonları
İnfektif Endokarditte Konjestif Kalp Yetersiz~~mez~~liği ve Yönetimi

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DOKUZ EYLÜL ÜNİVERSİTESİ

The « Endocarditis team »

- **Characteristics of the reference centre**

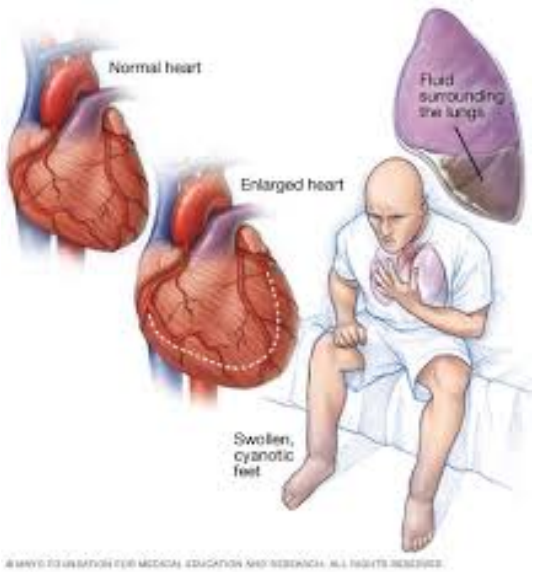
1. Immediate access to diagnostic procedures should be possible, including TTE, TOE, multislice CT, MRI, and nuclear imaging.
2. Immediate access to cardiac surgery should be possible during the early stage of the disease, particularly in case of complicated IE
3. Several specialists should be present on site (the "Endocarditis Team"), including at least cardiac surgeons, cardiologists, anaesthesiologists, ID specialists, microbiologists and, when available, specialists in valve diseases, CHD, pacemaker extraction, echocardiography and other cardiac imaging techniques, neurologists, and facilities for neurosurgery and interventional neuroradiology.

European Heart Journal (2015);36:3075-3123 - doi:10.1093/eurheartj/ehv319

The « Endocarditis team »

Recommendations	Class	Level
Patients with complicated IE should be evaluated and managed at an early stage in a reference centre, with immediate surgical facilities and the presence of a multidisciplinary "Endocarditis Team", including an ID specialist, a microbiologist, a cardiologist, imaging specialists, a cardiac surgeon, and, if needed a specialist in CHD.	IIa	B
For patients with non-complicated IE managed in a non-reference centre, early and regular communication with the reference centre and, when needed, with visit to the reference centre, should be made.	IIa	B

European Heart Journal (2015);36:3075-3123 - doi:10.1093/eurheartj/ehv319



- **KY**, İE’nin en sık görülen komplikasyonudur ve

bu hastalarında cerrahi gereksiniminin en sık nedenidir.

- Prognozun major belirleyicisi olan bu komplikasyon, hem doğal, hem de yapay kapak endokarditinde erken ve geç dönem mortalitenin bağımsız öngördürücüsüdür.
- KY ile komplike olmuş İE vakalarında mortalite için risk faktörleriyse inatçı infeksiyon, aort kapak endokarditi, apse varlığı veya diabetes mellitus olarak tanımlanmıştır .

- Mitral kapak endokarditli hastaların yarısında, aort kapak endokarditli hastaların %80'inde KY bulguları görülür. Akut AY hemodinamik olarak tolere edilemez.
- Çalışmalar, KY gelişmiş İE olgularında, cerrahi tedavinin medikal tedaviye üstün olduğunu göstermiştir. KY gelişmiş İE hastalarında medikal tedavi uygulananlarda gözlenen %55-80'lik mortalite oranları, cerrahi tedavi uygulanmasıyla %15-35'e gerilemektedir .
- ICE Kohortu'nda da cerrahi yapılan hastalarda 1 yıllık mortalite %21 iken medikal tedavi grubunda %45'dir ($p<0,001$) .
- KY gelişen İE hastasında doğal veya yapay kapak endokarditi olması cerrahi kararında önem taşımamakta, her iki durumda da kapak cerrahisi yapılması önerilmektedir.

- Ancak her ne kadar cerrahi tedavinin üstünlüğü gösterilmiş olsa da, cerrahinin zamanlamasına karar verilirken hastanın klinik bulguları ve eşlik eden morbiditeleri de göz önünde bulundurulmalıdır. Bu hastalarda cerrahi kararı ve zamanlaması endokardit ekibi tarafından verilmelidir .
- Bazı İE hastalarında ise ciddi kapak yetmezliğine rağmen (var olan kapak patolojisi) klinik KY gelişmemiştir (öncül bulgulara dikkat!!!). Bu hastalarda kapak yetmezliği açısından ameliyat indikasyonları mevcut değilse medikal takiple izlem düşünülebilir.

- Eğer hastada kardiyojenik şok veya refrakter akciğer ödemi varsa acil cerrahi düşünülmelidir.
- Bu hastalarda antibiyotik tedavisine yanıt beklenmesi uygun değildir.
- Mümkünse ilk 24 saat içinde uygulanacak kapak cerrahisi, bu hasta grubunda prognozu medikal tedaviye kıyasla anlamlı olarak iyileştirmektedir.

- Akciğer ödemi veya kardiyojenik şok gelişmemiş semptomatik KY hastalarında yine cerrahi tedavi düşünülmelidir.
- Ancak bu hastalarda cerrahi tedavi acil olarak değil, erken bir şekilde, antibiyotik tedavisi başlandıktan sonra, günler içinde, geciktirilmeden yapılmalıdır.

Günlük Oskültasyon,
Kan basıncı
Gece yastık sayısı,
Dispne derecesi (VAS skoru ya da Leikert skalası),
Laktat, BFT, KCFT, BNP, troponin

- Medikal izlem asemptomatik veya hafif semptomatik olan hastalarda (NYHA sınıf 1-2) önerilebilir.
- Bu hastaların medikal tedavi alırken yakın şekilde ekokardiyografi ve klinik bulgularla takibi önemlidir. Takiplerde kapak hastalığının ve kliniğin seyrine göre erken cerrahi düşünülebilir.
- Stabil seyirli hastalarda ise kapak hastalıklarındaki kılavuz önerileri temel alınarak kapak lezyonlarının ve kardiyak fonksiyonların derecesine göre elektif cerrahi planlanabilir.

- Doğal kapak endokarditli ve ciddi kapak yetersizliği olan bir hastada, KY kliniği gelişmeden de cerrahi yapılmasının operatif ve postoperatif morbidite ve mortaliteyi azaltacağı düşünülmektedir.
- Özellikle aort kapak endokarditinde KY daha ciddi seyrettiği ve kapak yetmezliği ciddiyetinin dolayısıyla KY tablosunun hızla ilerleme olasılığı yüksek olduğu için erken cerrahi gereklidir.

- İE seyrinde KY gelişmesinin en sık nedenleri ciddi mitral veya aort kapak yetersizliğidir.
- Kapak yetersizliği, akut olarak korda veya kapakcık rüptürü nedeniyle oluşabileceği gibi; İE seyrinde koaptasyonun (kavuşumun) bozulması sonucu da ortaya çıkabilmektedir.
- Diğer nadir KY nedenleri ise intrakardiyak fistüller, yapay kapak dehisensi (ayrışması) ve büyük vejatasyonların neden olduğu kapak obstrüksiyonlarıdır.

Günlük kardiyak oskültasyon ve herhangi bir şüpheli oskültasyon bulgusu (yeni veya var olanın değişimi) KY öncül bulgusu olabilir

TABLE II. Comparison of Findings in Severe Acute and Chronic Aortic Regurgitation

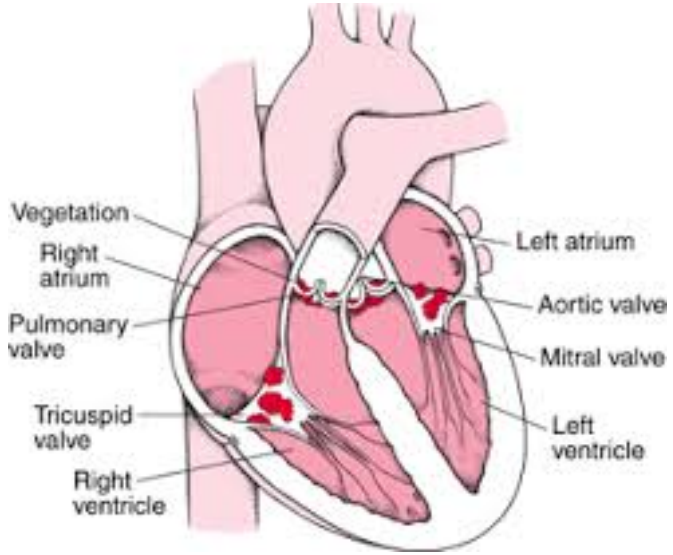
Variable	Aortic Regurgitation	
	Acute	Chronic
Auscultatory		
Diastolic murmur	Soft, early	Holodiastolic, decrescendo
S_1	Soft	Normal or diminished
S_2	Loud P_2	Normal
S_3	Present	Absent
Hemodynamic		
Cardiac output	Decreased	Normal
Pulse pressure	Normal or decreased	Increased
Systolic pressure	Decreased	Increased
LVEDP	Severely increased	Normal
Left ventricular size	Normal	Increased

LVEDP = left ventricular end-diastolic pressure

TABLE III. Comparison of Findings in Severe Acute and Chronic Mitral Regurgitation

Variable	Mitral Regurgitation	
	Acute	Chronic
Auscultatory		
Murmur	Soft, decrescendo	Holosystolic
S_3	Rarely present	May be present
V waves in CVP	May be present	Absent
Hemodynamic		
Cardiac output	Decreased	Normal
Ejection fraction	Normal or decreased	Increased
LVEDP	Severely increased	Normal
Left atrial compliance	Normal	Increased
Left ventricular size	Normal	Increased

CVP = central venous pressure; LVEDP = left ventricular end-diastolic pressure



- Tanı, klinik semptomlar, laboratuvar bulguları ve ekokardiyografiyle konulmaktadır.
- TTE hem tanı hem de klinik seyrin takibinde önemlidir. Kapak ve ventrikül fonksiyonlarının, pulmoner basınç, sağ-sol ventrikül doluş basınçları ve perikardiyal efüzyonun değerlendirilmesinde yardımcıdır.
- TTE’nin yetersiz kalabildiği anevrizma, kapak perforasyonu, fistül gibi durumlarda TÖE faydalı bilgiler sağlamaktadır .

KY semptomları

- Nefes darlığı: Yeni gelişen ya da var olanın kötüleştiği, ortopne ve/veya PND’nin eşlik ettiği
- Çarpıntı
- Çabuk yorulma
- Bitkinlik
- Vücutta su toplaması
- Öksürük (AC ödemi öncülü olabilir)
- Baş Dönmesi, Dikkat Kaybı, Bayılma, Sersemlik
- Bozulmuş mental durum
- Göğüs ağrısı

Laboratuar

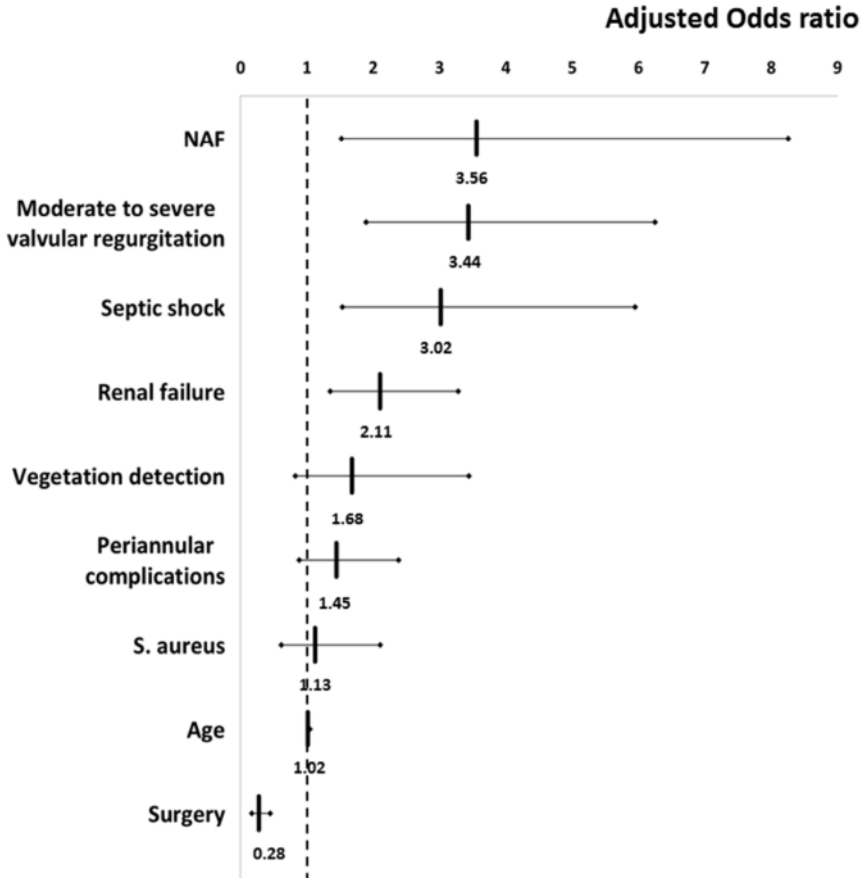
- Kalp yetersizliği tanı ve tedavisinde önemli olan B tipi natriüretik peptid (BNP), kalp yetmezliği ile komplike olmuş İE vakalarında da klinik seyir ve tanıyla ilgili önemli ipuçları vermektedir.
- Yüksek BNP ve troponin değerlerinin istenmeyen olaylarla ilişkili olduğu gösterilmiştir.

Relation of Level of B-Type Natriuretic Peptide With Outcomes in Patients With Infective Endocarditis

Angela B. Shiue, BS[a,†], Amy B. Stancoven, MD[a,†], Jonathan B. Purcell, MD[b], Kristi Pinkston, RN[a], Andrew Wang, MD[c], Amit Khera, MD[a], James A. de Lemos, MD[a], and Gail E. Peterson, MD[a,*]

Elevated B-type natriuretic peptide (BNP) is a marker of poor outcomes in heart failure, acute coronary syndromes, and sepsis. Elevated cardiac troponin I (cTnI) is associated with adverse outcomes in infective endocarditis. It was hypothesized that elevated BNP would be associated with increased rates of morbidity and mortality in patients with infective endocarditis, particularly when combined with elevated cTnI. Consecutively enrolled patients in the International Collaboration on Endocarditis Prospective Cohort Study (ICE-PCS) were evaluated at a single center. The association between elevated BNP and a composite outcome of death, intracardiac abscess, and central nervous system event and the individual components of the composite was determined. Similar analyses were performed in patients who had BNP and cTnI measured. Of 103 patients, 45 had BNP measured for clinical indications. The median BNP level was higher in patients with the composite outcome (1,498 vs 433 pg/ml, $p = 0.03$) and in those who died (2,150 vs 628 pg/ml, $p = 0.04$). Elevated BNP was significantly associated with the composite outcome ($p < 0.01$) and intracardiac abscess ($p = 0.02$). Patients with elevation of BNP and cTnI had a significantly higher probability of the composite outcome (69%) than patients with either BNP or cTnI elevated (29%) or neither BNP nor troponin elevated (0%) (p for trend <0.01). In conclusion, these data demonstrate a significant association between elevated BNP alone and in combination with cTnI for serious outcomes in infective endocarditis and warrant prospective evaluation. © 2010 Elsevier Inc. All rights reserved. (Am J Cardiol 2010;106: 1011–1015)

Yeni gelişen AF



Atrial fibrillation (AF) is the most common cardiac arrhythmia in adults and has been independently related to increased morbidity and mortality. AF is a frequent arrhythmia in **infective endocarditis** (IE). Nevertheless, there are no data on how AF affects the clinical outcome of **patients** with **endocarditis**. Our purpose was to investigate patient characteristics, microbiology, echocardiographic findings, in-hospital course, and prognosis of **patients** with IE who develop **new-onset** AF (NAF) and compare them with those who remained in sinus rhythm (SR) or had previous AF (PAF). From 1997 to 2014, 507 consecutive **patients** with **native left-sided** IE were prospectively recruited at 3 tertiary care centers. We distinguished 3 groups according to the type of baseline **heart** rhythm during hospitalization and previous history of AF: NAF group (n = 52), **patients** with no previous history of AF and who were diagnosed as having NAF during hospitalization; SR group (n = 380), **patients** who remained in SR; and PAF group (n = 75), **patients** with PAF. **Patients** with NAF were older than those who remained in SR (68.3 vs 59.6 years, p <0.001). At admission, **heart failure** was more common in NAF group (53% vs 34.3%, p <0.001), whereas stroke (p = 0.427) was equally frequent in all groups. During hospitalization, embolic events occurred similarly (p = 0.411). In the multivariate analysis, NAF was independently associated with **heart failure** (odds ratio 3.56, p <0.01) and mortality (odds ratio 1.91, p = 0.04). In conclusion, the

Table 5. Multivariable analysis to predict mortality

Variables	OR	95% CI	p
Septic shock	9.04	4.86-17.16	**<0.001**
Heart failure	3.20	1.72-6.11	**<0.001**
Renal failure	3.10	1.79-5.20	**<0.001**
S. aureus	1.99	1.04-3.82	**0.039**
Stroke	1.99	0.94-4.21	0.072
Periannular complications	1.95	1.08-3.53	**0.026**
New-onset AF	1.91	1.01-4.11	**0.040**
Vegetation detection	2.29	0.83-6.32	0.110
Moderate to severe valvular insufficiency	1.57	0.76-3.23	0.222
Age	1.02	0.99-1.04	0.056
Surgery	0.38	0.22-0.67	**<0.001**

Ferrera C et al. Am J Cardiol. 2016 Feb 1;117(3):427-33.

Güncel Yayınlar

Prospective cohort of 3116 adult patients (2470 from Europe, 646 from non-ESC countries), admitted to 156 hospitals in 40 countries between January 2016 and March 2018 with a diagnosis of IE based on ESC 2015 diagnostic criteria. Clinical, biological, microbiological, and imaging [echocardiography, computed tomography (CT) scan, ^{18}F-fluorodeoxyglucose positron emission tomography/computed tomography (^{18}F-FDG PET/CT)] data were collected. Infective endocarditis was native (NVE) in 1764 (56.6%) patients, prosthetic (PVIE) in 939 (30.1%), and device-related (CDRIE) in 308 (9.9%). Infective endocarditis was community-acquired in 2046 (65.66%) patients. Microorganisms involved were staphylococci in 1085 (44.1%) patients, oral streptococci in 304 (12.3%), enterococci in 390 (15.8%), and *Streptococcus gallolyticus* in 162 (6.6%). ^{18}F-fluorodeoxyglucose positron emission tomography/computed tomography was performed in 518 (16.6%) patients and presented with cardiac uptake (major criterion) in 222 (42.9%) patients, with a better sensitivity in PVIE (66.8%) than in NVE (28.0%) and CDRIE (16.3%). Embolic events occurred in 20.6% of patients, and were significantly associated with tricuspid or pulmonary IE, presence of a vegetation and *Staphylococcus aureus* IE. According to ESC guidelines, cardiac surgery was indicated in 2160 (69.3%) patients, but finally performed in only 1596 (73.9%) of them. In-hospital death occurred in 532 (17.1%) patients and was more frequent in PVIE. Independent predictors of mortality were Charlson index, creatinine > 2 mg/dL, congestive heart failure, vegetation length > 10 mm, cerebral complications, abscess, and failure to undertake surgery when indicated.

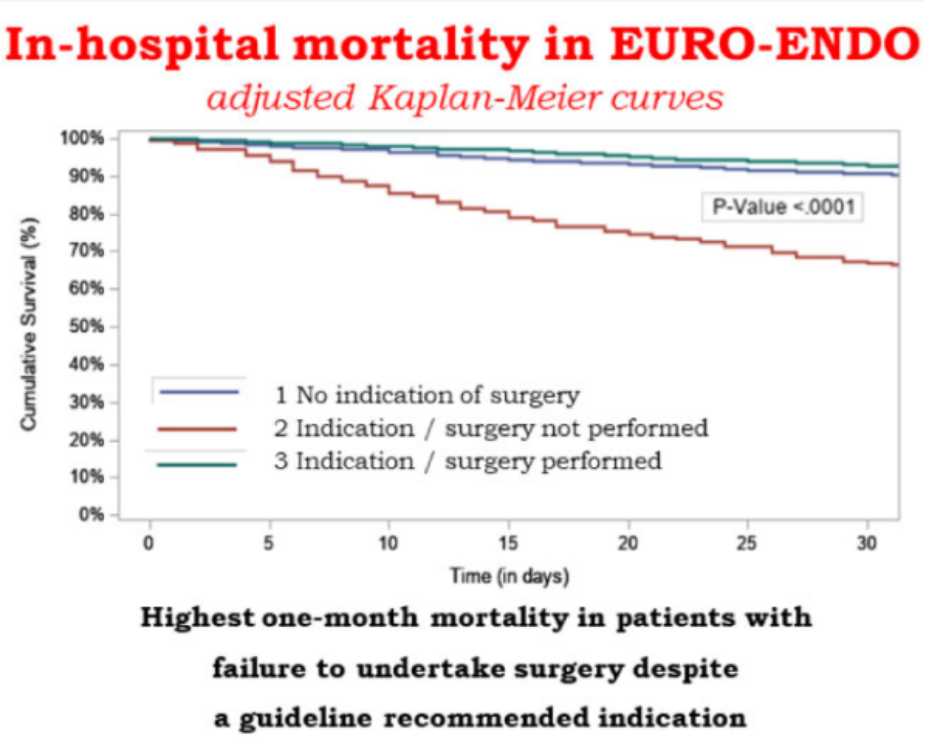
ESC European Society of Cardiology
European Heart Journal (2019) 0, 1–11
doi:10.1093/eurheartj/ehz620
FASTTRACK CLINICAL RESEARCH
Valvular heart disease

Clinical presentation, aetiology and outcome of infective endocarditis. Results of the ESC-EORP EURO-ENDO (European infective endocarditis) registry: a prospective cohort study

Gilbert Habib[1,2]*, Paola Anna Erba[3,4], Bernard Iung[5], Erwan Donal[6], Bernard Cosyns[7], Cécile Laroche[8], Bogdan A. Popescu[9], Bernard Prendergast[10], Pilar Tornos[11], Anita Sadeghpour[12], Leopold Oliver[13], Jolanta-Justina Vaskelyte[14], Rouguiatou Sow[15], Olivier Axler[16], Aldo P. Maggioni[17], and Patrizio Lancellotti[18,19,20]; on behalf of the EURO-ENDO Investigators†

- Embolik olaylar (%20.6), ABY (%17.7) ve KY (%14.1) en sık komplikasyonlardır.
- Hastanede yatmaktayken 1596 hasta (tüm kohortun %51.2'si) cerrahiye gönderilmiş. Oysa cerrahi endikasyon kılavuz önerilerine göre hastaların %69.3'ünde (2160 hasta) bulunmaktaymış.
- Cerrahi, %6.7 hastada acil, %24.8 hastada ivedi (urgency), %32'sinde 1 haftadan sonra ve %36.5'inde elektif olarak uygulanmış.
- Cerrahi endikasyon olguların %46.3'ünde hemodinamik, %32.1'inde embolik ve %64.2'sinde enfeksiyöz sebebiyle oluşmuş.

Habib G et al. European Heart Journal (2019) 0, 1–11



Take home figure Prognosis of infective endocarditis is dismal when cardiac surgery is indicated but not performed (adjusted Kaplan–Meier curve).

Table 3 Univariate Cox regression analysis for all causes of death at discharge (1-month period)

	Effect*	Hazard ratio	95% CI	*P*-value*
Type of endocarditis	PM/ICD	0.80	0.53–1.20	0.08
	Prosthesis+Repair	1.21	0.97–1.52	
Age (per 10 years)		1.10	1.04–1.18	0.002
Gender	Female	1.15	0.92–1.44	0.216
Charlson index		1.14	1.11–1.17	<0.0001
Creatinine >2 mg/dL		2.53	2.01–3.19	<0.0001
Staphylococcus aureus		1.36	1.04–1.74	0.008
Congestive heart failure		2.90	2.31–3.64	<0.0001
Vegetation length > 10 mm		2.44	1.93–3.08	<0.0001
Cerebral complication		2.62	2.02–3.41	<0.0001
Abscess		1.71	1.29–2.27	0.0002
ESC countries		1.12	0.86–1.46	0.42
Source of infection	Non-nosocomial	1.35	0.95–1.93	0.0007
	Nosocomial	1.68	1.27–2.21	
Indication—surgery performed	Indication—not performed	4.02	3.06–5.27	<0.0001
	Indication—performed	0.72	0.54–0.97	
Type of centres	High-volume centres	1.13	0.74–1.71	0.57
Transferred from another hospital		0.75	0.60–0.95	0.02

*P-value corresponds to the results of Wald test. For Region: the reference is North America; For type of endocarditis: Native; For indication—Surgery performed: No indication; For countries: Non-ESC; For type of centres: Low level IE; For source of infection: Community.
ICD, intracardiac defibrillator; PM, pacemaker.

Table 4 Multivariable Cox regression analysis for all causes of death at discharge (1-month period)

	Hazard ratio	95% CI	*P*-value*
Charlson index	1.07	[1.04–1.11]	<0.0001
Creatinine >2 mg/dL	1.58	[1.19–2.11]	<0.0017
Congestive heart failure	2.09	[1.58–2.77]	<0.0001
Vegetation length > 10 mm	2.12	[1.64–2.73]	<0.0001
Cerebral complication	2.21	[1.61–3.04]	<0.0001
Abscess	1.50	[1.07–2.10]	0.0186
Indication—surgery not performed	2.84	[2.00–4.03]	<0.001
Indication—surgery performed	0.63	[0.43–0.92]	0.0169

Goodness of fit test: $P = 0.18$. Concordance = 0.77—Global Schoenfeld residual test $P = 0.12$.
*P-value corresponds to the results of Wald test. For indication—surgery performed or not, the reference is no indication.

Original paper

Perfusion

Predictors of early mortality after surgical treatment of infective endocarditis: a single-center experience

Perfusion
1–7
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Povilas Jakuska,[1] Egle Ereminiene,[2] Egle Muliuolyte,[1] Vidas Kosys,[1] Lukas Pavlavičius,[1] Giedrius Zukovas,[1] Dainius Karciauskas[1] and Rimantas Benetis[1]

Table 5. Independent risk factors for 30-day postoperative mortality.

Characteristics	Prognostic factors	Odds ratio	p value	95% CI
Age (years)	>63	6.4	0.003	1.66-24.66
BMI (kg/m^2)	>30	7.74	0.003	2.20-27.27
Staphylococcus aureus	+	5.04	0.01	1.29-19.64
Ischemic heart disease	+	6.60	0.003	1.62-26.90
XC (minutes)	>84.5	3.79	0.03	1.10-13.08
CPB (minutes)	>107.5	10.0	0.02	1.26-79.58
Paravalvular abscess	+	4.32	0.01	1.31-14.25
Septic or cardiogenic shock	+	18.43	0.001	4.59-73.98

CI: confidence interval; BMI: body mass index; XC: aortic cross-clamp time; CPB: cardiopulmonary bypass time.

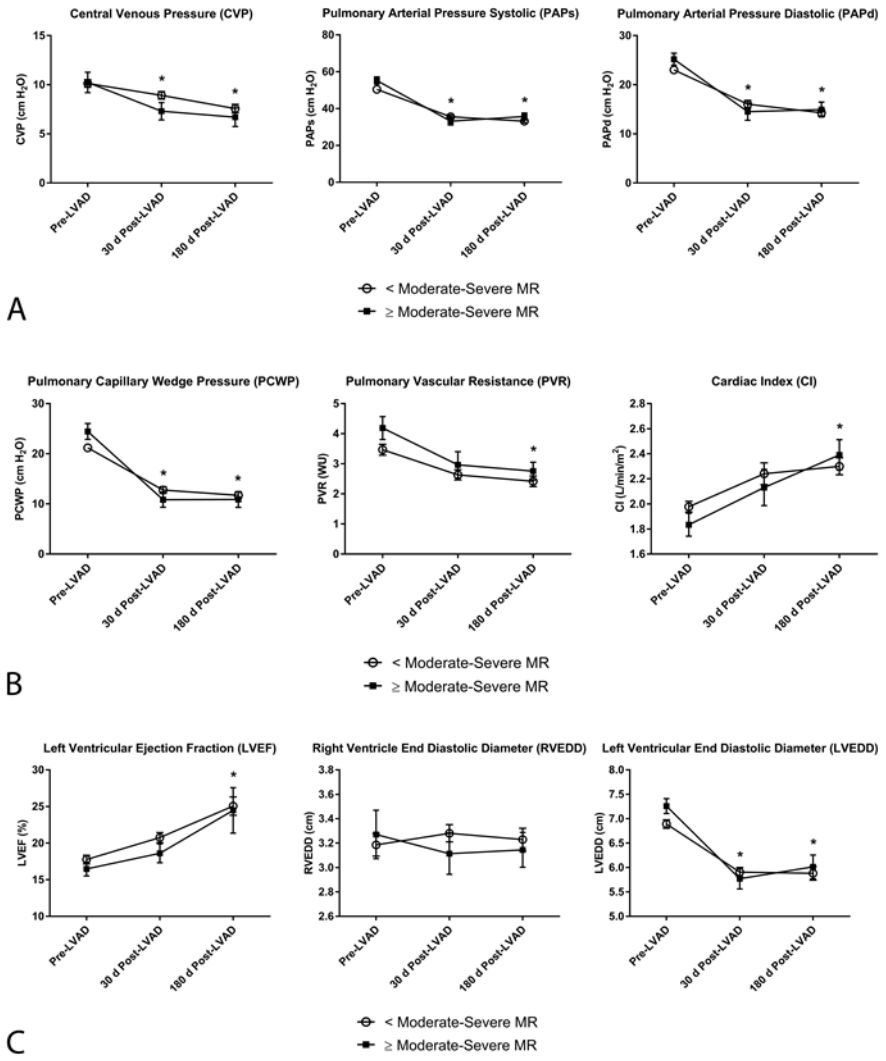
İE’de KY’nin Cerrahi Öncesi Yönetimi

- İE’de KY gelişmesi halinde hasta acil-ivedi operasyona alınana kadar aşağıdaki önlemler alınabilir:
- Hafif KY’de diüretik+nitrat işe yarayabilir.
- Akut ciddi AY’de ileri doğru akımı arttırmak için nitroprussid+dobutamin infüzyonu yapılabilir. İABP kontrendikedir. LVAD işe yaramaz. ECMO’nun sonuçları da iyi değildir.
- Akut ciddi MY’de dobutamin ve nitroprussid kombinasyonu kullanılabilir. İABP kullanılabilir. LVAD kullanımı hemodinamiyi iyileştirebilir.
- Ciddi KY’de ECMO kullanımına dair anekdotal bilgiler bulunmaktadır. Sonuçları belirsizdir. (van den Brink FS et al. Perfusion. 2019 Oct;34(7):613-617, Noyes AM et al. Tex Heart Inst J. 2015 Oct; 42(5): 471–473)

Resolution of Mitral Regurgitation With Left Ventricular Assist Device Support

Matthew Goodwin, MD, Hassan W. Nemeh, MD, Jamil Borgi, MD, Gaetano Paone, MD, Jeffrey A. Morgan, MD

The Annals of Thoracic Surgery
Volume 104, Issue 3, Pages 811-818 (September 2017)
DOI: 10.1016/j.athoracsur.2017.02.016



Kalp Yetmezliği	
Doğal veya yapay, aort veya mitral endokarditinde, akciğer ödemi ya da kardiyojenik şoka sebep olan ciddi akut kapak yetersizliği, obstrüksiyonu ya da fistül varlığı	Acil (I-B)
Doğal veya yapay, aort veya mitral endokarditinde kalp yetmezliği ya da kötü hemodinamik toleransın ekokardiyografik bulgularına neden olan ciddi kapak yetersizliği ya da obstrüksiyonu	Öncelikli (I-B)

Indications and timing of surgery

Indications for surgery	Timing	Class	Level
1. Heart Failure			
Aortic or mitral NVE or PVE with severe acute regurgitation, obstruction or fistula causing refractory pulmonary oedema or cardiogenic shock.	Emergency	I	B
Aortic or mitral NVE or PVE with severe regurgitation or obstruction causing symptoms of HF or echocardiographic signs of poor haemodynamic tolerance.	Urgent	I	B
2. Uncontrolled infection			
Locally uncontrolled infection (abscess, false aneurysm, fistula, enlarging vegetation).	Urgent	I	B
Infection caused by fungi or multiresistant organisms.	Urgent/elective	I	C
Persisting positive blood cultures despite appropriate antibiotic therapy and adequate control of septic metastatic foci.	Urgent	IIa	B
PVE caused by staphylococci or non-HACEK Gram negative bacteria.	Urgent/elective	IIa	C
3. Prevention of embolism			
Aortic or mitral NVE or PVE with persistent vegetations >10 mm after one or more embolic episode despite appropriate antibiotic therapy.	Urgent	I	B
Aortic or mitral NVE with vegetations >10 mm, associated with severe valve stenosis or regurgitation, and low operative risk.	Urgent	IIa	B
Aortic or mitral NVE or PVE with isolated very large vegetations (>30 mm).	Urgent	IIa	B
Aortic or mitral NVE or PVE with isolated large vegetations (>15 mm) and no other indication for surgery.	Urgent	IIb	C

Right-sided infective endocarditis

Recommendations	Class	Level
Surgical treatment should be considered in the following scenarios: • Microorganisms difficult to eradicate (e.g. persistent *fungi*) or bacteraemia for >7 days (e.g. *Staphylococcus aureus, P. aeruginosa*) despite adequate antimicrobial therapy or • Persistent tricuspid valve vegetations >20 mm after recurrent pulmonary emboli with or without concomitant right heart failure or • Right HF secondary to severe tricuspid regurgitation with poor response to diuretic therapy.	IIa	C

European Heart Journal (2015);36:3075-3123 - doi:10.1093/eurheartj/ehv319

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Eve götürülecek mesajlar:

- ✓Özellikle aort kapaktakiler olmak üzere sol taraflı İE olgularının yaklaşık yarısında KY gelişmektedir
- ✓Bu hastaların endokardit takımı bulunan hastanelerde takibi uygun olabilir.
- ✓KY gelişenlerde mortalite riski yüksektir.
- ✓Serviste izlenen İE'li hastalarda, nefes darlığı , akciğer ödemi, hipotansiyon tıbbi bir acil durumdur
- ✓Diğer organ sistemlerinde yetmezlik gelişmesi (laktat yükselmesi, kreatinin yükselmesi, karaciğer işlev bozukluğu dahil), BNP ile troponin yükselmesi, yeni gelişen AF KY gelişiminin habercisi olarak değerlendirilmelidir.
- ✓KY gelişmiş İE hastalarında, acil cerrahi yapılması mortalite oranlarını belirgin olarak azaltmaktadır.