

SOL ATRİYAL APENDİKS OKLÜZYONU İÇİN GÜNCEL ENDİKASYONLAR

Dr Alper Kepez
Marmara Univ. Tıp Fak
Kardiyoloji A.D.

12. Atriyal Fibrilasyon Zirvesi, 2013

Atriyal Fibrilasyon ve İnme

AF hastalarında inme riski 5 kat daha fazla ¹

AF ile ilişkili inme olayları daha şiddetli ve daha ağır morbiditeye neden oluyor ²

AF hastalarında kalp yetersizliği riski 3 kat daha fazla ¹

AF VE MORTALİTE ³

50%

AF ilişkili inme sonrası 1 yıl içerisindeki ölüm riski

27%

Af ilişkili olmayan inmelerde 1 yıl içerisindeki ölüm riski

- 1. Fuster, V., Rydén, L. E., Cannom, D. S., Crijns, H. J., Curtis, A. B., Ellenbogen, K. A., . . . Wann, S. (2006). ACC/AHA/ESC Practice Guidelines. *Circulation*, 114, 700-752.
- 2. Marini, C., De Santis, F., Sacco, S., Russo, T., Olivieri, L., Totaro, R., & Carolei, A. (2005). Contribution of atrial fibrillation to incidence and outcome of ischemic stroke: results from a population-based study. *Stroke*, 36, 1115-1119.
- 3. Bruggenjürgen, B., Rossnagel, K., Roll, S., Andersson, F. L., Selim, D., Müller-Nordhorn, J., . . . Willich, S. N. (2007). The impact of atrial fibrillation on the cost of stroke: the Berlin acute stroke study. *Value Health*, 10(2), 137-143.

PATOGENEZ

- AF ile ilişkili trombüs oluşumu; akım bozukluğu ya da staz, atriyum endotelindeki değişiklikler ve hemostaz bozukluğu (Virchow triadı) kaynaklıdır.
- Altta yatan bir diğer sebep de atriyal miyopatidir. AF'li hastalarda sol atriyum ve sol atriyal apendikte dilatasyon ile sonuçlanan atriyal remodelling gelişir. Sol atriyal dilatasyon staza yol açarak trombotik riskte artışa yol açar. Ekokardiyografide izlenen spontan ekokontrast stazın bir sonucudur.

Sol Atriyal Apendiks



- Blackshear ve ark (*) 1288 nonvalvüler AF tanılı hastanın dahil edildiği çalışmada 222 hastada trombüs oluşumu saptandı. Bu trombüslerin %91'i sol atriyal apendikte izlendi. Mahajan ve ark (**) meta analizde sol atriyumdaki trombüslerin %89'unun sol apendikte yerleştiği belirlendi.
- Sol atriyal apendiks sinüs ritminde dahi intrakardiyak trombüslerin en sık görüldüğü yerdir.

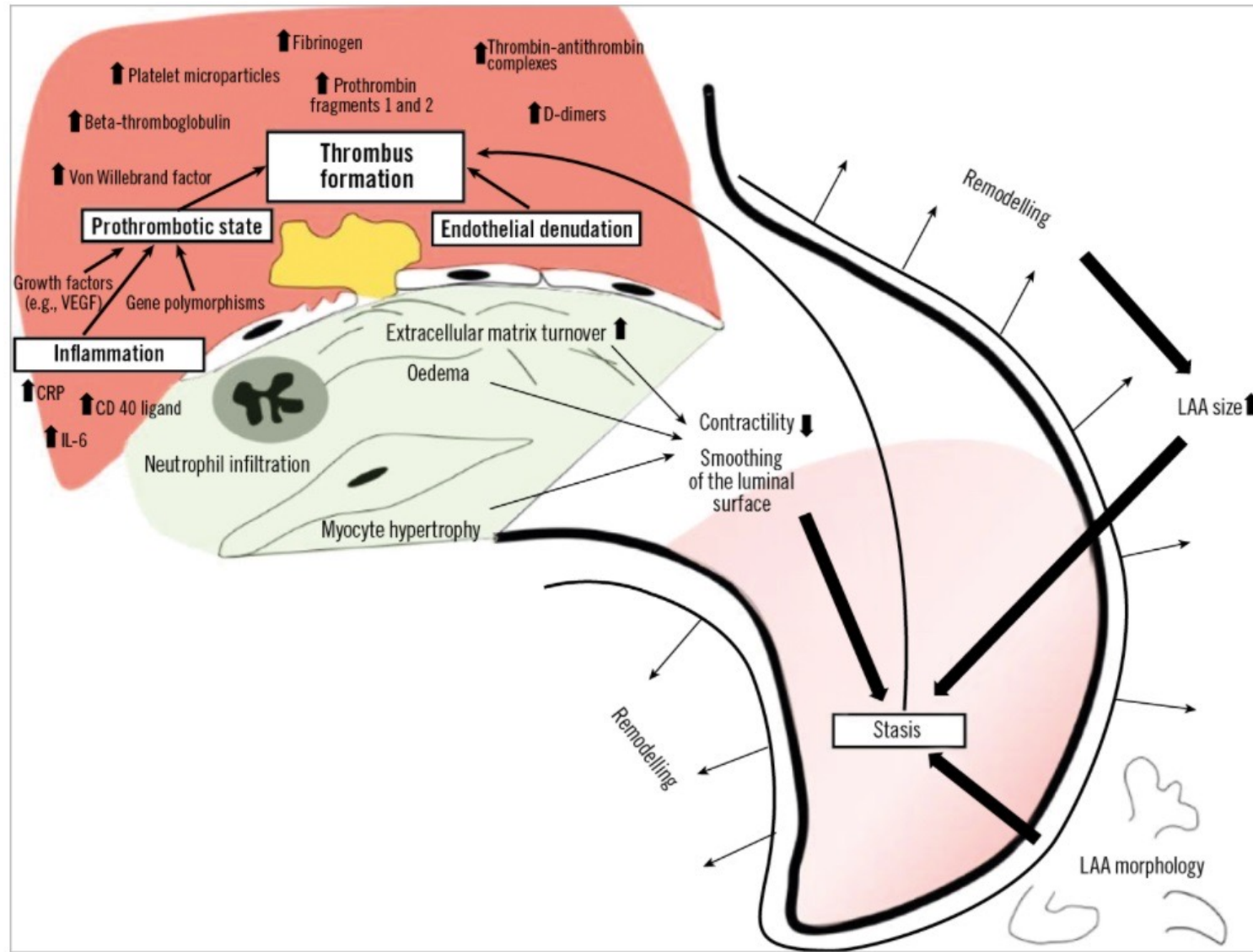
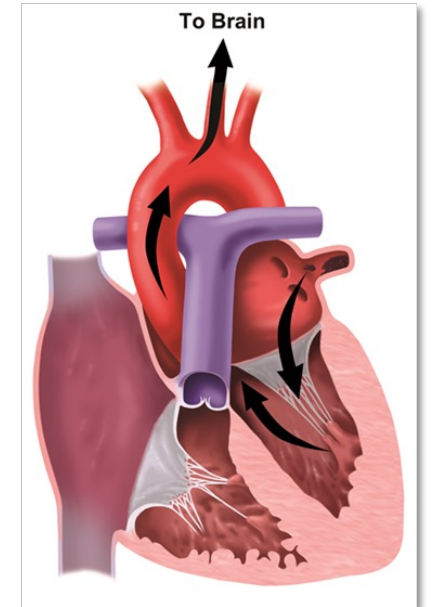
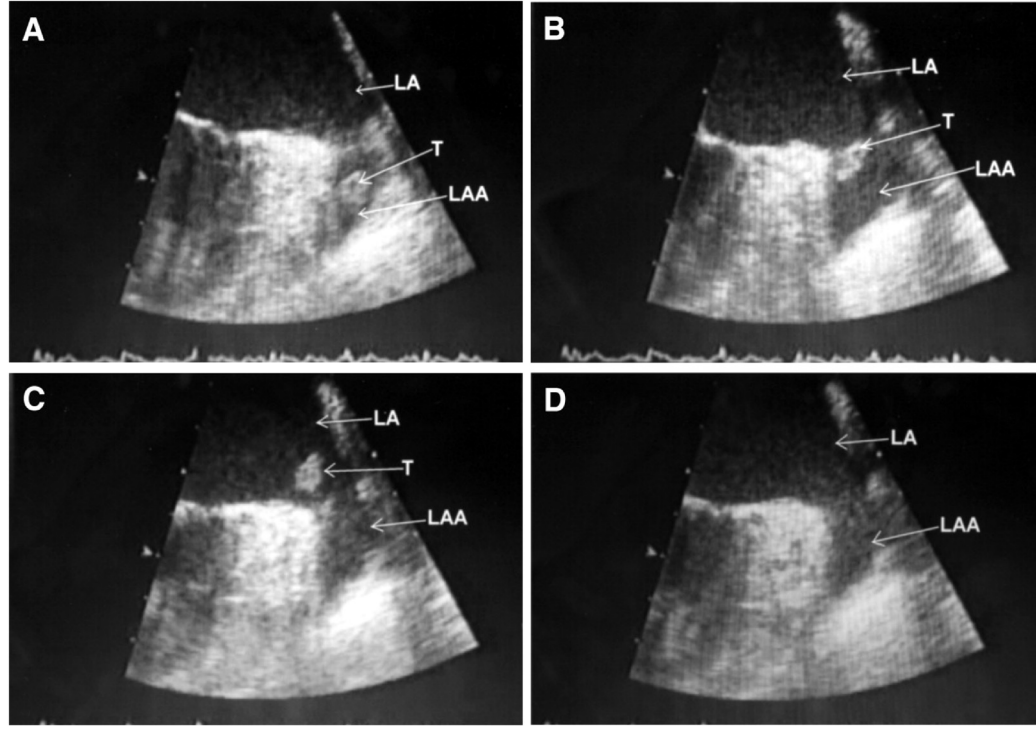


Figure 1. LAA thrombus formation pathophysiology. CD: Cluster of differentiation; CRP: C-reactive protein; IL: interleukin; LAA: left atrial appendage; VEGF: vascular endothelial growth factor

LAA trombüs

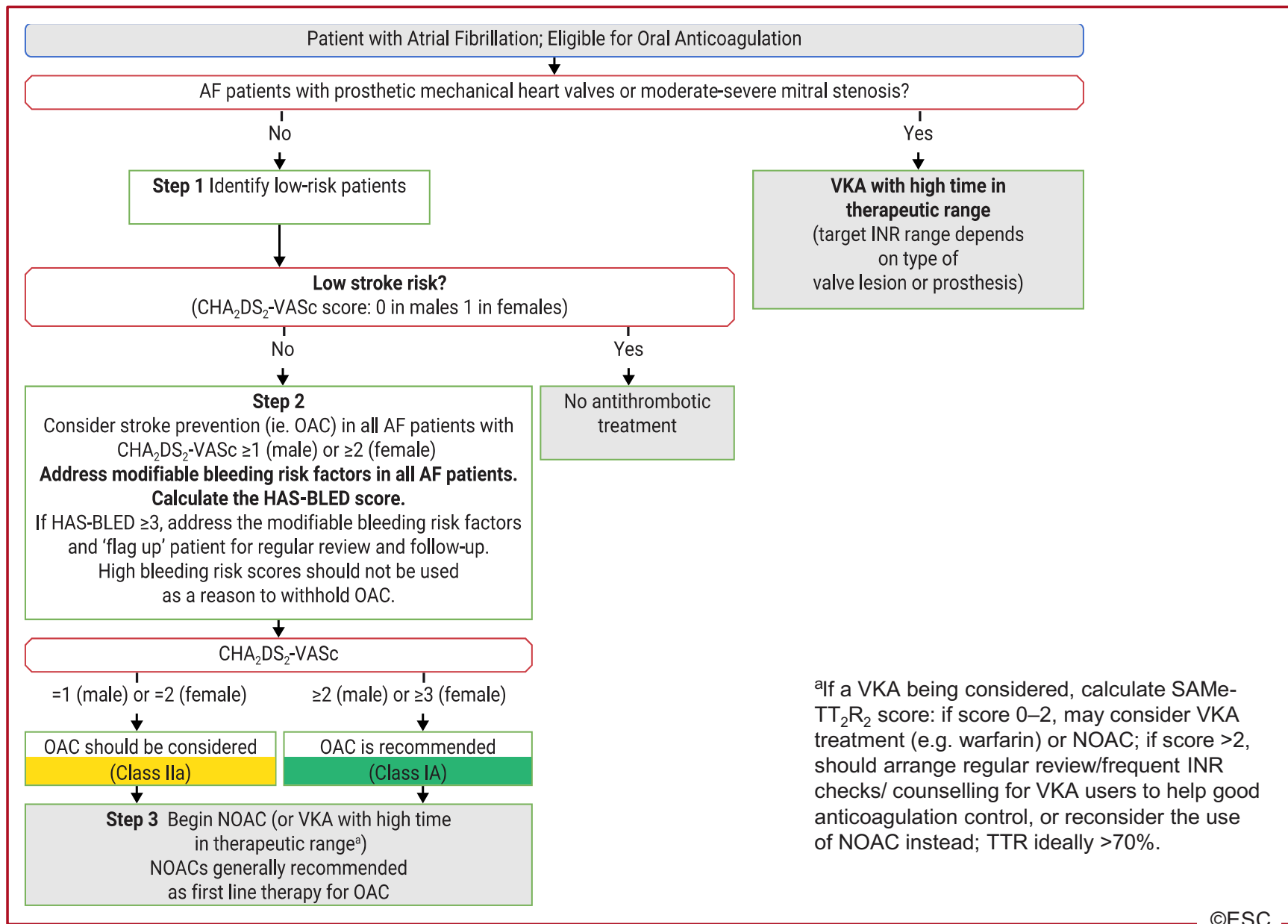
- AF 'si olan bir hastada ekokardiyografide sol atriyal apendiks trombüsünün mobilize olarak inmeye neden olduđu anın görüntüsü ¹



• 1 Parekh, et al., The Case of a Disappearing Left Atrial Appendage Thrombus. Circulation 2006;114:e513-e514

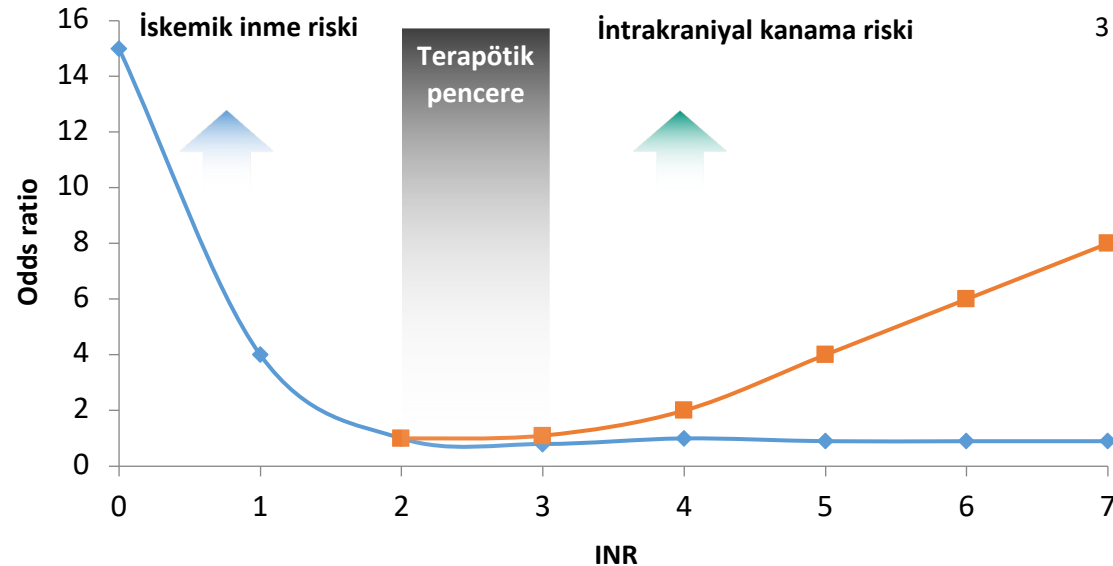
Atriyal Fibrilasyon Yönetimi

Ritm Kontrolü		<ul style="list-style-type: none">▪ Hastayı sinüs ritminde tutmak için medikasyonlar veya girişimsel yöntemler▪ Semptomatik hastalarda en iyi strateji▪ Antiaritmik ilaçlar▪ Ablasyon▪ Kardiyoversiyon
Hız kontrolü		<ul style="list-style-type: none">▪ Hastanın kalp hızını kontrol altında tutmak için medikasyonlar veya girişimsel yöntemler▪ Af devam etse de ventriküler kontraksiyon dinamiğinin regülasyonu
Sistemik emboli önlenmesi		<ul style="list-style-type: none">▪ Atriyal trombüs oluşumunun engellenmesi için antikoagülasyon veya cihaz tedavisi



İnme önleme: Warfarin

- Warfarin inmeyi önlüyor¹
 - İnme riskinde tedavi ile %60–70 azalma
- Ayarlanmış standart doz warfarin 28 inmeyi engellemiş – 11 fatal kanama



- Sık INR takibi
- Diyet ve ilaçlar ile etkileşim
- Kompliyans
- Dar terapötik aralık
- Sık doz değişimi olasılığı

1. Lip, G. Y., & Edwards, S. J. (2006). Stroke prevention with aspirin, warfarin and ximelagatran in patients with non-valvular AF: a systematic review and meta-analysis. *Thrombosis Research*, 118(3), 321-333.
2. Cooper NJ, Sutton AJ, Lu G, & Khunti K.(2006). Mixed comparison of stroke prevention treatments in individuals with nonrheumatic AF. *Archives of Internal Medicine*, 166, 1269-1275.
3 . Adapted from Hobbs, F. D., and Leach, I. (2011). Challenges of stroke prevention in patients with atrial fibrillation in clinical practice. *QJM*, 104(9), 739-46.

AF'de emboli engellenmesi için stratejiler

VKA Oral antikoagulan (OAK) ¹	Non-vitamin K antagonist oral antikoagulanlar (NOACs) ¹	Girişim ²
Warfarin (Kumadin™)	Edoksaban Rivaroksaban Dabigatran Apiksaban	Ligasyon Klipsleme Sol atriyal apendiks oklüzyon cihazları

Uzun süre warfarin altın standart

NOAC'lar en az warfarin kadar etkili, daha az kanama riski

OAK kontrendikasyonu olanlarda cihaz tedavileri alternatif olabilir

1. . *Lancet*. 2014 Mar 15;383(9921):955-62

2. *J Thorac Dis*. 2014 Mar;6 Suppl 1:S70-7.

Risk denge¹

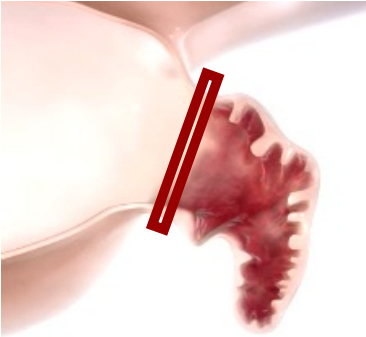
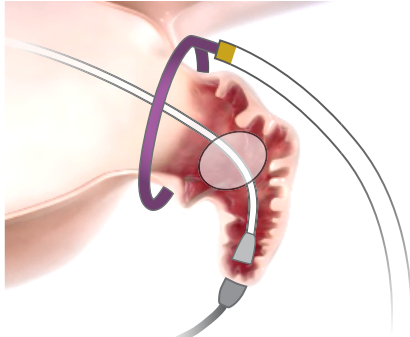
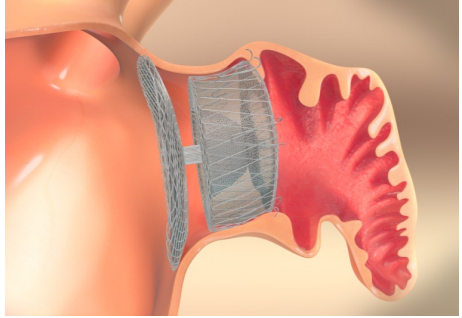


İnme riski		
CHA ₂ DS ₂ -VASc		
C	Konjestif kalp yetersizliği	1
H	Hipertansiyon	1
A	Yaş > 75	2
D	Diyabetes mellitus	1
S	İnme/TIA	2
V	Vasküler hastalık	1
A	Yaş 65–74	1
Sc	Cinsiyet kategorisi (kadın)	1
Maksimum skor		9
Skor yükseldikçe emboli riski artıyor (CHA ₂ DS ₂ -VASc)		

Kanama Riski		
HAS-BLED		
H	Hipertansiyon	1
A	Renal / hepatik disfonksiyon	1 veya 2
S	İnme	1
B	Kanama öyküsü	1
L	Labil INR	1
E	Yaş > 65 yıl	1
D	İlaç veya alkol alımı	1 veya 2
Maximum score		9
Skor yükseldikçe kanama riski artıyor (HAS-BLED)		

1. Camm, A., Kirchhof, P., Lip, G., Schotten, U., Savelieva, I., Ernst, S., . . . Rutten, F. H. (2010). Guidelines for the management of atrial fibrillation. *European Heart Journal*, 31(19), 2369-2429.

Sol Atriyal Apendiks İzolasyon Yöntemleri

Eksizyon	Ligasyon/Klipsleme	Sol atriyal apendiks oklüzyonu
Cerrahi/Sternotomi	Endokardiyal/Epikardiyal	Femoral ven yolu ile kateter ile yaklaşım
İnvaziv	İnvaziv	Minimal invaziv
Genellikle eş zamanlı mitral kapak cerrahisine giden hastalarda. 1930'lardan beri uygulanan yöntem. ¹	Perkütan endokardiyal / epikardiyal yaklaşım. Epikardiyal kayan suture LAA üzerine kementleme. ²	Apendiks orifis oklüzyonu için kateter temelli cihaz yerleşimi. ²
		

- 1. Johnson, W., Ganjoo, A., Stone, C., Srivayas, R., & Howard, M. (2000). The left atrial appendage: our most lethal human attachment! Surgical implications. *European Journal of Cardiothoracic Surgery*, 17(6), 718-722.
- 2. Meier, B., Blaauw, Y., Khattab, A. A., Lewalter, T., Sievert, H., Tondo, C. & Gilkson, M. (2014). EHRA/EAPCI expert consensus statement on catheter-based left atrial appendage occlusion. *Europace*, 16, 1397-1416.

LAA Kapama Cihazları

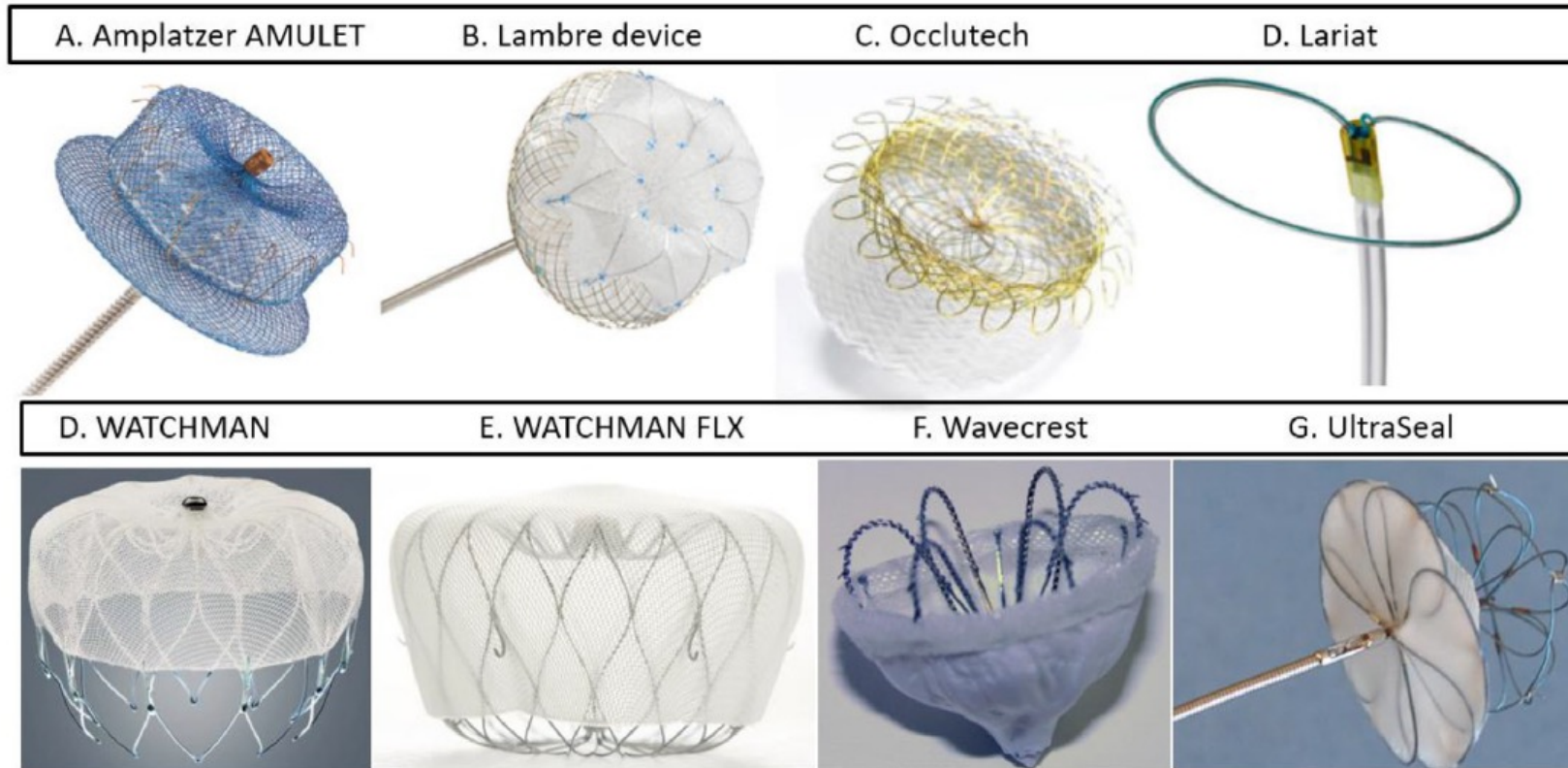
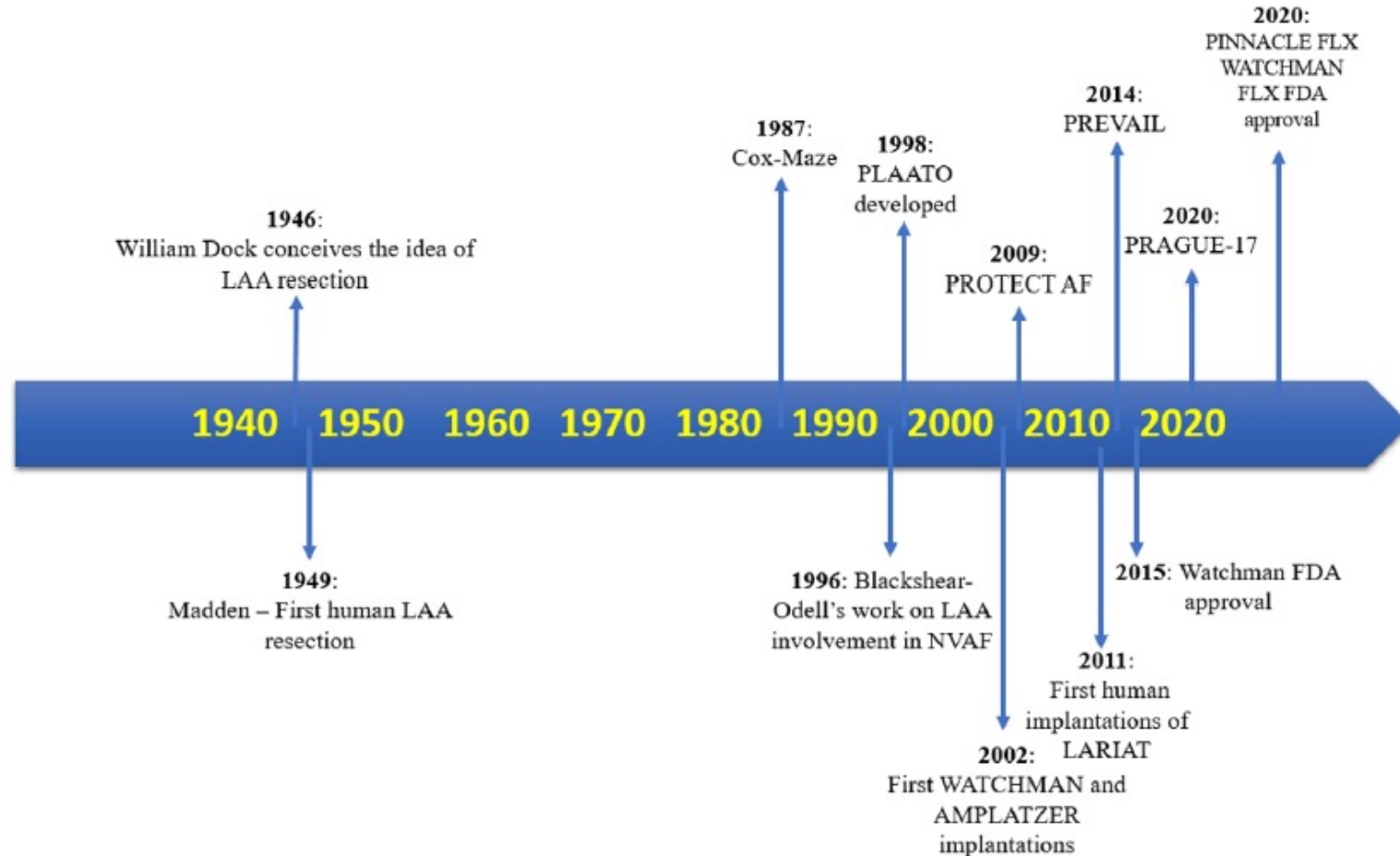


FIGURE 2 Commonly Employed LAAO Devices [Color figure can be viewed at wileyonlinelibrary.com]

Sol Atriyal Apendiks Oklüzyonu– önemli olaylar



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Left Atrial Appendage Occlusion during Cardiac Surgery to Prevent Stroke

R.P. Whitlock, E.P. Belley-Cote, D. Paparella, J.S. Healey, K. Brady, M. Sharma, W. Reents, P. Budera, A.J. Baddour, P. Fila, P.J. Devereaux, A. Bogachev-Prokophiev, A. Boening, K.H.T. Teoh, G.I. Tagarakis, M.S. Slaughter, A.G. Royse, S. McGuinness, M. Alings, P.P. Punjabi, C.D. Mazer, R.J. Folkerling, A. Colli, Á. Avezum, J. Nakamya, K. Balasubramanian, J. Vincent, P. Voisine, A. Lamy, S. Yusuf, and S.J. Connolly, for the LAAOS III Investigators*

BACKGROUND

Surgical occlusion of the left atrial appendage has been hypothesized to prevent ischemic stroke in patients with atrial fibrillation, but this has not been proved. The procedure can be performed during cardiac surgery undertaken for other reasons.

CONCLUSIONS

Among participants with atrial fibrillation who had undergone cardiac surgery, most of whom continued to receive ongoing antithrombotic therapy, the risk of ischemic stroke or systemic embolism was lower with concomitant left atrial appendage occlusion performed during the surgery than without it. (Funded by the Canadian Institutes of Health Research and others; LAAOS III ClinicalTrials.gov number, NCT01561651.)

Sol Atriyal Apendiks Randomize Çalışmalar

TABLE 3 Review of Landmark Randomized Trials on LAOO

Study	PROTECT-AF	PREVAIL	PRAGUE-17
Patients in the device arm	463	269	201
Device	WATCHMAN	WATCHMAN	WATCHMAN-36%, Amulet-61%, WATCHMAN-FLX-3%
Control Arm	VKA	VKA	DOAC
Mean follow-up	18 months	12 Months	20 months
CHA2DS2-VASc	3.4	4	4.7
Implant success	91%	95.10%	90%
Outcomes in The Device Arm			
Ischemic stroke	3.20%	1.80%	4.50%
Hemorrhagic stroke	0.20%	3.70%	0
Cardiovascular/ unexplained death	1%	2.60%	5.40%
Systemic emboli	0.40%	0.30%	0
Procedural or Device Related Complication			
Pericardial effusion requiring surgery	1.60%	0.40%	0
Pericardial effusion requiring pericardiocentesis	2.40%	1.50%	0.50%
Procedure related stroke	1.10%	0.70%	0
Device embolization	0.60%	0.70%	0.50%
Major bleeding	3.50%	0.40%	8.90%

Recommendations for the prevention of thromboembolic events in AF (5)

Recommendations for occlusion or exclusion of the LAA	Class	Level
LAA occlusion may be considered for stroke prevention in patients with AF and contraindications for long-term anticoagulant treatment (e.g. intracranial bleeding without a reversible cause).	IIb	B
Surgical occlusion or exclusion of the LAA may be considered for stroke prevention in patients with AF undergoing cardiac surgery.	IIb	C

Table 2. 2019 AHA/ACC/HRS focused update of the 2014 AHA/ACC/HRS guideline for the management of patients with atrial fibrillation.

Recommendations	Class of recommendation	Level of evidence
After surgical occlusion or exclusion of the LAA, it is recommended to continue anticoagulation in at-risk patients with AF for stroke prevention.	I	B
LAA occlusion may be considered for stroke prevention in patients with AF and contraindications for long-term anticoagulant treatment (eg, those with a previous life-threatening bleed without reversible cause).	IIb	B
Surgical occlusion or exclusion of the LAA may be considered for stroke prevention in patients with AF undergoing cardiac surgery.	IIb	B
Surgical occlusion or exclusion of the LAA may be considered for stroke prevention in patients undergoing thoracoscopic AF surgery.	IIb	B

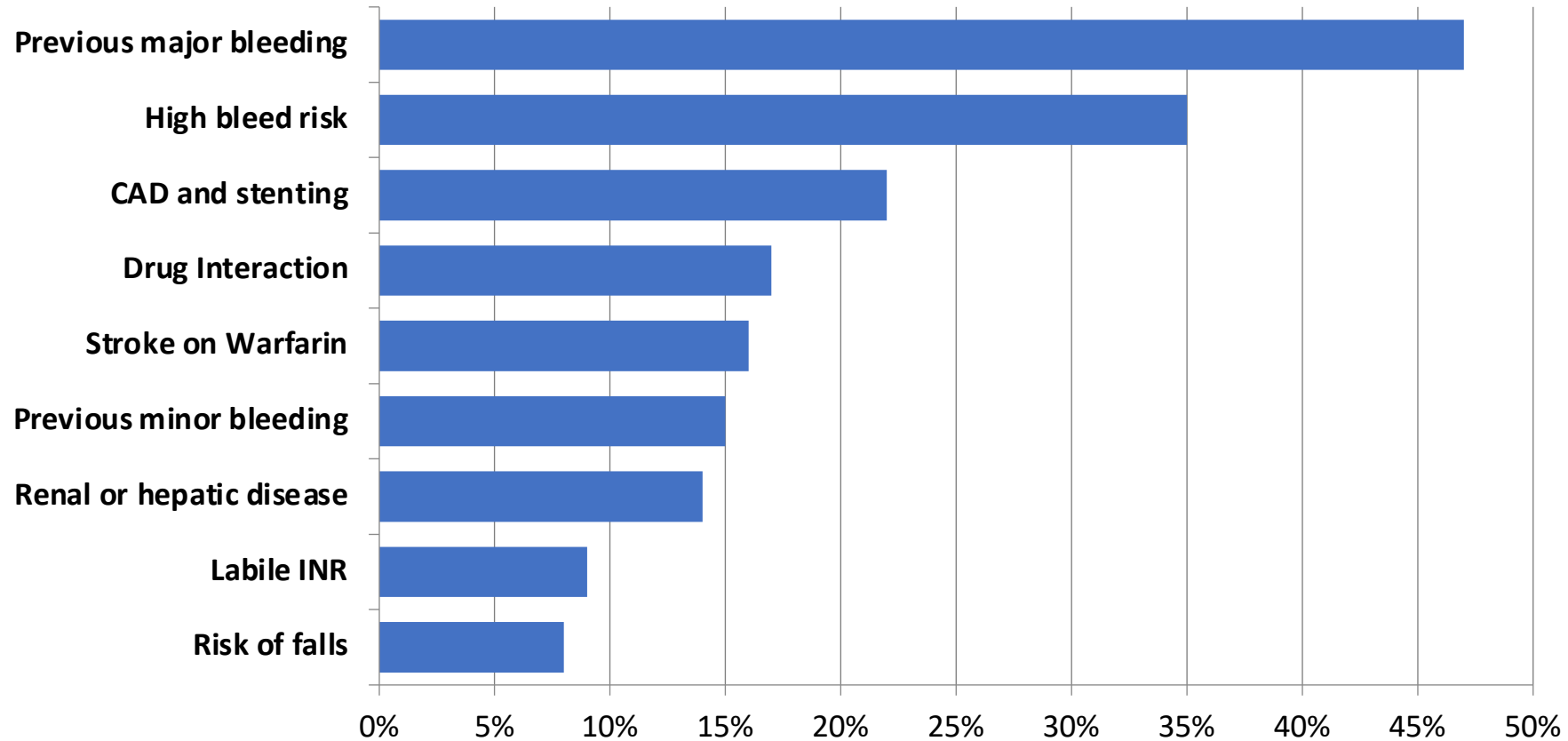
ACC, American College of Cardiology; AF, atrial fibrillation; AHA, American Heart Association; HRS, Heart Rhythm Society; LAA, left atrial appendage.
Adapted from January et al.¹⁹

SOL ATRİYAL APENDİKS POTANSİYEL KAPAMA ENDİKASYONLARI ¹

Potansiyel Endikasyonlar	Örnekler
A. Uzun dönem OAK kullanımının uygun olmadığı hastalar (OAK için kesin veya relatif kontrendikasyonlar)	
1. Kanama için yüksek risk	
Major veya minör kanama öyküsü (OAK tedavisi ile birlikte veya OAK olmadan)	<ul style="list-style-type: none">▪ Intrakraniyal kanama▪ GIS kanama▪ Kritik organda semptomatik kanama (i.e. oküler, perikardiyal, spinal kord)▪ Tıbbi tedavi gerektiren rekürren epistaksis
Fiziksel durum veya komorbiditelere bağlı artan kanama riski	<ul style="list-style-type: none">▪ Kafa travması veya yaralanmaya neden olan tekrarlayan düşmeler▪ KAH ve stentleme nedeniyle ek dual antiplatelet ajan ihtiyacı olan durumlar▪ Difüz intrakraniyal amyloid anjiyopatisi▪ GIS anjiyodisplazisi▪ Son dönem renal yetmezlik /dializ▪ Kan hücre diskrazileri
2. Yüksek kanama riski dışında sebeplerden OAK kullanımında kısıtlılık	
	<ul style="list-style-type: none">▪ İntolerans▪ Dokümente edilen tedaviye uyum sorunu▪ Warfarin kullanımı sırasında dokümente edilen labil INR▪ Yaralanma riskinin yüksek olduğu meslekler▪ Hasta tercihi
B. Uygun OAK kullanımına rağmen tromboembolik olay gelişimi veya sol atriyal apendikte trombüs varlığı	
	<ul style="list-style-type: none">▪ Uygun OAK tedavisine rağmen sol atriyal apendikte trombüs dokümantasyonu ile birlikte embolik inme veya sistemik ("malign LAA")▪ Uygun OAK tedavisine rağmen sol atriyal apendikte trombüs gelişimi

Gerçek Yaşam Verisi¹

- 1000 üzeri hastadaki endikasyonlar



1. Tzikas, A., Shakir, S., Gafoor, S., Omran, H., Berti, S., Santoro, G., . . . Park, J. W. (2016). Left atrial appendage occlusion for stroke prevention in atrial fibrillation: multicentre experience with the AMPLATZER Cardiac Plug. *EuroIntervention*, 11(10), 1170-1179.

Efficacy and safety of left atrial appendage closure with WATCHMAN in patients with or without contraindication to oral anticoagulation: 1-Year follow-up outcome data of the EWOLUTION trial



BACKGROUND Left atrial appendage (LAA) occlusion with WATCHMAN has emerged as viable alternative to vitamin K antagonists in randomized controlled trials.

OBJECTIVE EWOLUTION was designed to provide data in routine practice from a prospective multicenter registry.

METHODS A total of 1025 patients scheduled for a WATCHMAN implant were prospectively and sequentially enrolled at 47 centers. Indication for LAA closure was based on European Society of Cardiology guidelines. Follow-up and transesophageal echocardiography (TEE) were performed per local practice.

RESULTS The baseline CHA₂DS₂-VASc score was 4.5 ± 1.6 ; the mean age was 73.4 ± 9 years; previous transient ischemic attack/ischemic stroke was present in 312 (30.5%), 155 (15.1%) had previous hemorrhagic stroke, and 320 (31.3%) had a history of major bleeding; and 750 (73%) were deemed unsuitable for oral anticoagulation therapy. WATCHMAN implant succeeded in 1005 (98.5%) of patients, without leaks >5 mm in 1002 (99.7%) with at least 1 TEE follow-up in 875 patients (87%). Antiplatelet therapy was used in 784 (83%), while vitamin K antagonists were used in only 75 (8%). At 1 year, mortality was 98 (9.8%), reflecting the advanced age and comorbidities in this population. Device thrombus was

observed in 28 patients at routine TEE (3.7%) and was not correlated with the drug regimen ($P = .14$). Ischemic stroke rate was 1.1% (relative risk 84% vs estimated historical data); the major bleeding rate was 2.6% and was predominantly (2.3%) nonprocedure/device related.

CONCLUSION LAA closure with the WATCHMAN device has a high implant and sealing success. This method of stroke risk reduction appears to be safe and effective with an ischemic stroke rate as

low as 1.1%, even though 73% of patients had a contraindication to and were not using oral anticoagulation.

KEYWORDS Stroke; Left atrial appendage; Atrial fibrillation; LAA closure; Bleeding

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EHRA/EAPCI expert consensus statement on catheter-based left atrial appendage occlusion – an update

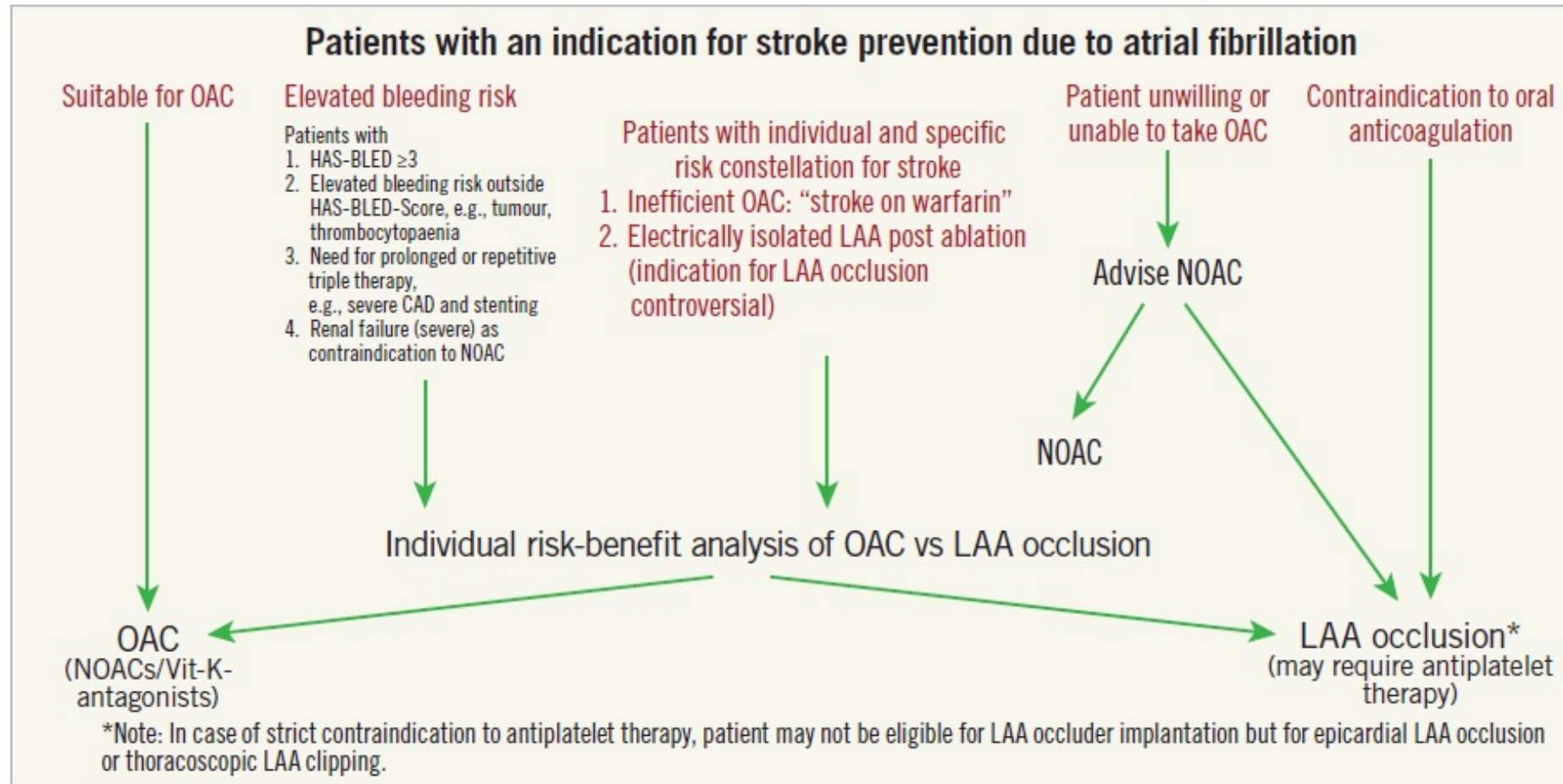
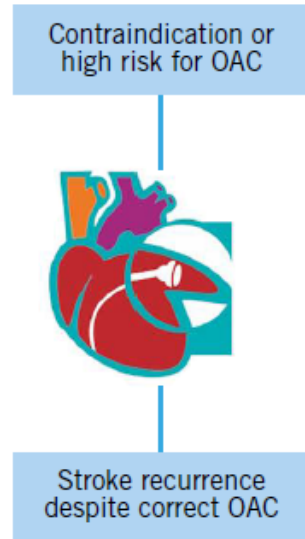


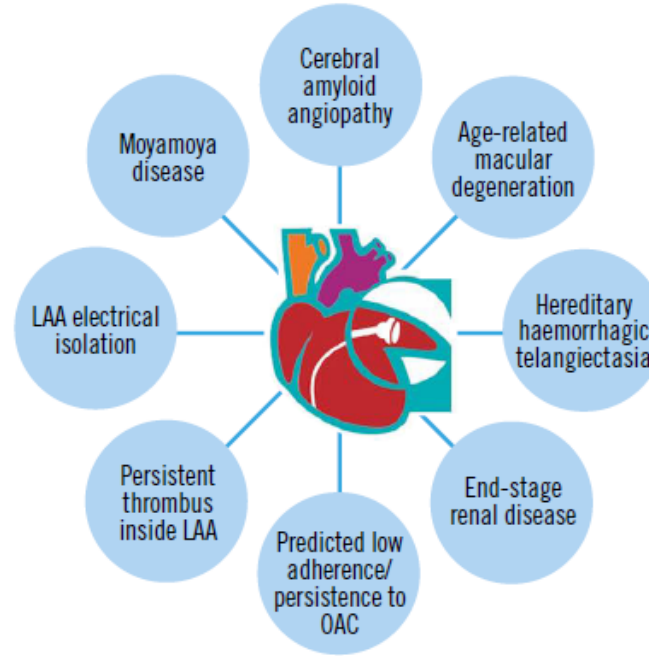
Figure 22. Decision tree for LAA closure.

CENTRAL ILLUSTRATION Left atrial appendage closure (LAAC); beyond the classic indications.

A Classic indications for LAAC



B Potential additional indications for LAAC



Classic (A) and potential additional indications (B) for LAAC. LAA: left atrial appendage

Nöroloji– OAK ikilemi

- OAK kullanan hastaların %1'inde intrakraniyal kanama gelişmektedir.¹
- İntrakraniyal kanama sonrası OAK'nin nasıl başlanması konusu ile ilgili net veri yok²

1/3 hastada OAK tekrar başlanıyor ²

IKK gelişen AF hastalarında antitrombotik olmadan iskemik inme ve mortalite riski fazla

OAK ve aspirin ile benzer IKK riski mevcut (özellikle yaşlılarda)¹

1. *Circulation*, 132(6), 517-525.

2. *Canadian Journal of Cardiology*, 28(1), 33-39.

Gastroenteroloji – OAK ikilemi

	Dabigatran	Rivaroksaban	Apiksaban	Edoksaban
Gastrointestinal kanama %/yıl NOAC vs. warfarin (tam doz)¹	1.51 vs. 1.02	3.15 vs. 2.16	.76 vs. .86	1.51 vs. 1.23

- AF'li hastalarda OAK tedavisi altında en sık kanama izlenen alan gastrointestinal sistem (GIS)²
- GIS kanaması sonrası antitrombotik tedavinin ne zaman tekrar başlanması veya ne kadar süre durdurulması gerektiği net değil²
- > %25 GIS kanaması sonrası OAK başlanmıyor²

Qureshi W. Ve ark. AF hastalarında major GIS kanaması sonrası antikoagülasyonun tekrar başlanması³

- 1329 hasta, 5-yıla kadar takip
- Warfarin tekrar başlanması tromboemboliyi (HR 0.71, 0.54–0.93) ve mortaliteyi (HR 0.67, 0.56–0.81) azaltıyor, GIS kanama riskini artırmıyor (HR 1.18, 0.94–1.30)
- < 7 gün, TE (0.76, 0.3–1.59), Mortalite (0.56, 0.33–0.93)
- < 7 gün, rekürren GIS kanama riskinde artış (HR 3.27, 95% CI 1.82-5.91, p = 0.002)

1. *Lancet* 2014; 383(9921), 955-962.

2. *BMJ* 2015; 351, h5876.

3. *American Journal of Cardiology* 2014; 113(4), 662-668.

Nefroloji– OAK ikilemi

	Dabigatran ¹	Rivaroksaban ²	Apiksaban ³	Edoksaban ⁴
Renal yetmezlik doz ayarı (FDA)	CrCl > 30 mL/dk 150 mg bd CrCl 15–30 mL/dk 75mg bd CrCl < 15mL/dk kullanımı önerilmez	Normal–CrCl > 50 mL/dk 20 mg od CrCl 15–50 mL/dk 15 mg od CrCl < 15 mL/dk kullanımı önerilmez	CrCl > 30 mL/dk 5 mg bd CrCl 15–30 mL/dk 2.5 mg bd CrCl < 15mL/dk kullanımı önerilmez	Normal 60 mg od CrCl > 50 ile ≤ 95 mL/dk 60 mg od CrCl 15–50 mL/dk 30 mg od CrCl < 15 mL kullanımı önerilmez

- KBY hastalarında AF prevelansı %15-20. Prevelans yaş ile artıyor⁵
- Son dönem böbrek yetmezliğinde AF prevelansı %11.6.⁵

Renal disfonksiyon= Artmış kanama ve inme riski.⁶

- Warfarin – INR kontrolü zor (komorbiditeler, beslenme eksikliği , üremiye ve çoklu medikasyona bağlı değişen farmakokinetik).⁶
- Warfarin-ilişkili nefropati – serum kreatininde INR ≥ 3.0 iken (1 hafta içerisinde) ≥ 0.3 mg/dL artış olması. Glomerüler kanama? , RBC kastlarına bağlı renal tübüler obstrüksiyon?.⁶
- Warfarin ilişkili vasküler kalsifikasyon

1. *New England Journal of Medicine*, 2009; 361, 1139-1151.
2. *New England Journal of Medicine*, 2011; 365, 883-891.
3. *New England Journal of Medicine*, 2011; 365, 981-992.
4. *New England Journal of Medicine*, 2013; 369, 2093–2104.
5. *American Journal of Cardiology*, 2016; 117(3), 477-482.
6. *American Heart Journal*, 2013; 166(2), 230-239.

Hepatolojist – OAK ikilemi

Hepatik disfonksiyonda NOAK önerileri değişken¹

Hepatik disfonksiyon = Artan kanama riski²

Hepatik disfonksiyonu olan hastalarda warfarin: Terapötik aralıkta geçirilen zaman

Hepatik disfonksiyon olanlar (53.5%) vs olmayanlar (61.7%; $P < 0.001$)

Artan kanama (hazard ratio, 2.02; $P < 0.001$)¹

1. *Europace* 2015; 17(10): 1467-1507

2. *Circulation: Cardiovascular Quality and Outcomes* 2014; 7(3): 461-467.

LAA Elektriksel İzole Edilmiş Hastalar

- Sinus ritmi sağlansa dahi LAA izolasyonu yapılan hastaların yaklaşık %20'sinde LAA'da trombüs geliştiği bildirilmiş. ¹
- OAK optimal değilse CHA₂DS₂VASc skorundan bağımsız olarak inme riski 10 kat daha fazla ²
- LAA kapama LAA izolasyonu yapılan hastalarda kanama riski yüksek durumlarda OAK alternatifi olabilir.
- LAA kapama LAA izolasyonu yapılan hastalarda yeterli OAK kullanımına karşın persistan trombüsü olan hastalarda ek tedavi olarak uygulanabilir.
- Ablasyon sırasında veya 4-6 hafta sonra (LAA rekonneksiyon oranı %37)³

1 Circ Arrhythm Electrophysiol 2020; 13: e008390

2 J Am Coll Cardiol 2019; 74: 1019-1028

3 Asiaintervention 2023; 9: 70-77

LAA İÇERİSİNDE PERSİSTAN TROMBÜS VARLIĞI

- 35 çalışmayı içeren 15000 üzerindeki hastanın datasının incelendiği metaanalizde en az 3 haftalık optimal antikoagülasyon sonrası LA trombüs oranı %2.73 olarak bildirilmiş. Bu oran persistan AF'lerde ve CHA₂DS₂VASc skoru ≥ 3 olanlarda daha fazla ¹
- OAK dozunun artırılması ile trombüs rezolüsyonu %75 vakada sağlanabiliyor.²
- LAA kapama için potansiyel endikasyon.³
- Serebral koruma cihazı kullanımı ?

1. J Am Coll Cardiol 2021; 77: 2875-2886

2. Heart 2022; 108: 1098-1106

3. Asiaintervention 2023; 9: 70-77

CLINICAL PRACTICE GUIDELINE

2023 ACC/AHA/ACCP/HRS Guideline for the Diagnosis and Management of Atrial Fibrillation

A Report of the American College of Cardiology/American Heart Association
Joint Committee on Clinical Practice Guidelines

*Developed in Collaboration With and Endorsed by the American College of Clinical Pharmacy
and the Heart Rhythm Society*

Writing Committee Members*

José A. Joglar, MD, FACC, FAHA, FHRS, *Chair*
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Anastasia L. Armbruster, PHARM D, FACC †
Emelia J. Benjamin, MD, ScM, FACC, FAHA
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Anita Deswal, MD, MPH, FACC, FAHA †
Lee L. Eckhardt, MD, MS, FHRS
Zachary D. Goldberger, MD, FACC, FAHA, FHRS
Rakesh Gopinathannair, MD, MA, FACC, FAHA, FHRS
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Mark Hlatky, MD, FACC, FAHA
Gail Hogan ‡
Chinwe Ibeh, MD
Julia H. Indik, MD, PhD, FACC, FAHA, FHRS
Kazuhiko Kido, PHARM D, PhD, MS, FCCP †
Fred Kusumoto, MD, FACC, FAHA, FHRS
Mark S. Link, MD, FACC, FAHA, FHRS
Kathleen T. Linta ‡
Gregory M. Marcus, MD, MAS, FACC, FAHA, FHRS
Patrick M. McCarthy, MD, FACC

Nimesh Patel, MD
Kristen K. Patton, MD, FACC, FAHA, FHRS
Marco V. Perez, MD, FAHA
Jonathan P. Piccini, MD, MHS, FACC, FAHA, FHRS
Andrea M. Russo, MD, FACC, FAHA, FHRS ¶
Prashanthan Sanders, MBBS, PhD, FAHA, FHRS
Megan M. Streur, PhD, MN, ARNP
Kevin L. Thomas, MD, FACC, FHRS
Sabrina Times, DHSC, MPH #
James E. Tisdale, PHARM D, FACC, FAHA, FCCP
Anne Marie Valente, MD, FACC, FAHA **
David R. Van Wagoner, PhD, FAHA, FHRS

*Writing committee members are required to recuse themselves from voting on sections to which their specific relationships with industry may apply; see [Appendix 1](#) for detailed information.

†ACC/AHA Joint Committee on Clinical Practice Guidelines liaison.

‡ACC/AHA Joint Committee on Performance Measures liaison.

§Lay stakeholder representative.

||American College of Clinical Pharmacy representative.

¶Heart Rhythm Society representative.

#Joint ACC/AHA staff representative.

**ACC/AHA Joint Committee on Clinical Data Standards liaison.

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6.5.1. Percutaneous Approaches to Occlude the LAA

Recommendations for Percutaneous Approaches to Occlude the LAA
 Referenced studies that support the recommendations are
 summarized in the [Online Data Supplement](#).

COR	LOE	Recommendations
2a	B-NR	1. In patients with AF, a moderate to high risk of stroke (CHA ₂ DS ₂ -VASc score ≥2), and a contraindication (Table 14) to long-term oral anticoagulation due to a nonreversible cause, percutaneous LAAO (pLAAO) is reasonable. ¹⁻⁴
2b	B-R	2. In patients with AF and a moderate to high risk of stroke and a high risk of major bleeding on oral anticoagulation, pLAAO may be a reasonable alternative to oral anticoagulation based on patient preference, with careful consideration of procedural risk and with the understanding that the evidence for oral anticoagulation is more extensive. ^{1-3,5,6}

Table 14. Situations in Which Long-Term Anticoagulation Is Contraindicated and Situations When It Remains Reasonable

Long-Term Anticoagulation Contraindicated	Long-Term Anticoagulation Is Still Reasonable
Severe bleeding due to a nonreversible cause involving the gastrointestinal, pulmonary, or genitourinary systems	Bleeding involving the gastrointestinal, pulmonary, or genitourinary systems that is treatable
Spontaneous intracranial/intraspinal bleeding due to a nonreversible cause	Bleeding related to isolated trauma
Serious bleeding related to recurrent falls when cause of falls is not felt to be treatable	Bleeding related to procedural complications

6.5.2. Cardiac Surgery—LAA Exclusion/Excision

Recommendations for Cardiac Surgery—LAA Exclusion/Excision
Referenced studies that support the recommendations are summarized in the [Online Data Supplement](#).

COR	LOE	Recommendations
1	A	1. In patients with AF undergoing cardiac surgery with a CHA ₂ DS ₂ -VASc score ≥ 2 or equivalent stroke risk, surgical LAA exclusion, in addition to continued anti-coagulation, is indicated to reduce the risk of stroke and systemic embolism. ¹⁻³
1	A	2. In patients with AF undergoing cardiac surgery and LAA exclusion, a surgical technique resulting in absence of flow across the suture line and a stump of <1 cm as determined by intraoperative trans-esophageal echocardiography should be used. ^{1,4,5}
2b	A	3. In patients with AF undergoing cardiac surgery with CHA ₂ DS ₂ -VASc score ≥ 2 or equivalent stroke risk, the benefit of surgical LAA exclusion in the absence of continued anticoagulation to reduce the risk of stroke and systemic embolism is uncertain. ¹⁻³

TEŐEKKÜR EDERİM