

VASKÜLER CERRAHİDE HASTA KAN YÖNETİMİ

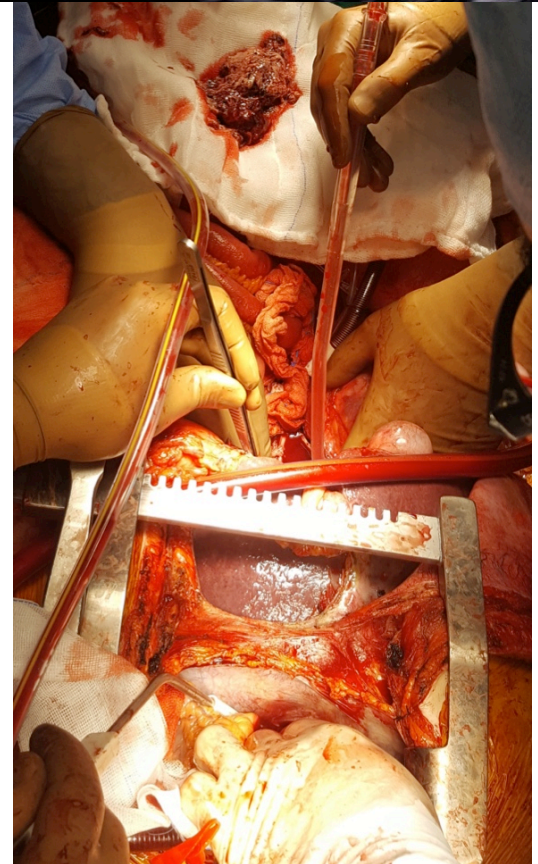
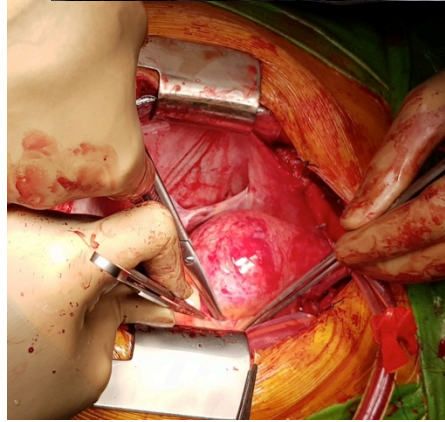
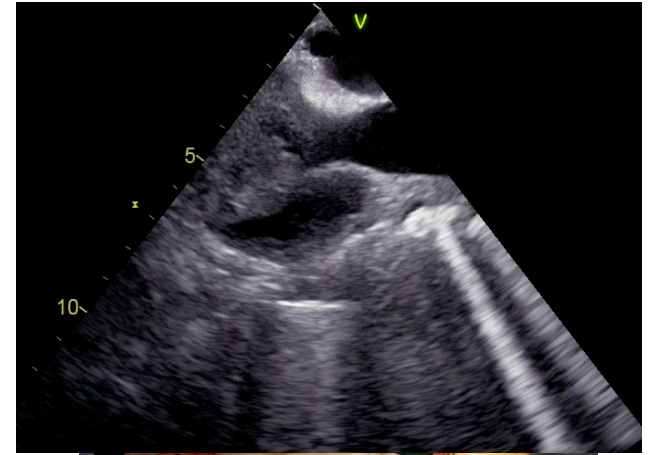
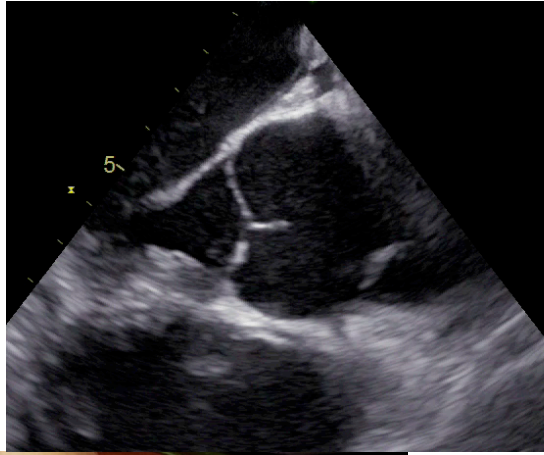
Dr. Muharrem Koçyiğit

Acıbadem Mehmet Ali Aydınlar Üniversitesi

Acıbadem Maslak Hastanesi

Sunum Akışı

- Preoperatif uygulamalar
 - İntraoperatif uygulamalar
 - Postoperatif uygulamalar
- 
- Farmakolojik
 - Farmakolojik olmayan



Cause of Death Following Surgery for Acute Type A Dissection

Evidence from the Canadian Thoracic Aortic Collaborative

Aorta (Stamford). 2017 Apr 1;5(2):33-41

Mortalite nedenleri	
Kardiyak	%25
İnme	%22
Kanama	%21
Çoklu organ yetmezliği	%12
Diğer organ iskemileri	%11
Sepsis	%4
Diğer nedenler	%5

Risk değerlendirilmesi

Hastaya Ait Riskler

- İleri yaş
- Anemi
- Kompleks hemostatik problemler
- Karaciğer disfonksiyonu
- Diabet
- Böbrek disfonksiyonu

Operasyona Ait Riskler

- İntraoperatif heparin
- Redo operasyonlar
- Uzamış Kardiyopulmoner baypas süresi
- Derin sirkulator arrest

Preoperatif Anemi

Table IV. Independent predictors of perioperative transfusion

<i>Predictors</i>	<i>OR (95% CI)</i>	<i>P value</i>
Gender (reference = male)		
Female	2.57 (2.09-3.17)	<.001
BMI (reference = normal)		
Low BMI (<18)	1.21 (0.71-2.09)	.482
High BMI (>30)	0.63 (0.51-0.79)	<.001
Race (reference = white)		
Black	1.45 (1.06-1.99)	.021
Other	2.74 (1.44-5.24)	.002
Smoking status (reference = never)		
Former	0.83 (0.6-1.16)	.274
Current	0.67 (0.47-0.94)	.02
Admission status (reference = home)		
Skilled facility	1.49 (0.91-2.41)	.11
Other acute care hospital	2.58 (1.27-5.26)	.009
Other	0.67 (0.12-3.83)	.65
Pre anemia	4.15 (3.35-5.14)	<.001
Prior congestive heart failure	1.42 (1.08-1.87)	.011
Prior percutaneous coronary intervention	0.81 (0.62-1.05)	.108
Previous myocardial infarction	1.28 (1.01-1.63)	.041
Atrial fibrillation	1.3 (0.98-1.74)	.07
Other atherosclerotic vascular disease	1.21 (0.98-1.49)	.071
Clopidogrel	1.44 (1.15-1.81)	.001
Beta blocker	1.24 (1-1.53)	.053
Warfarin	1.26 (0.92-1.72)	.145
Procedure type (reference = EVAR)		
Open AAA repair	25.93 (17.21-39.08)	<.001
Open revascularization bypass	3.49 (2.67-4.55)	<.001
Procedure status (reference = elective)		
Urgent	1.37 (1.06-1.79)	.018

Preoperatif Antiplatelet Tedavi

Table 1. Preoperative and Postoperative Characteristics in Patients With and Without Antiplatelet Therapy

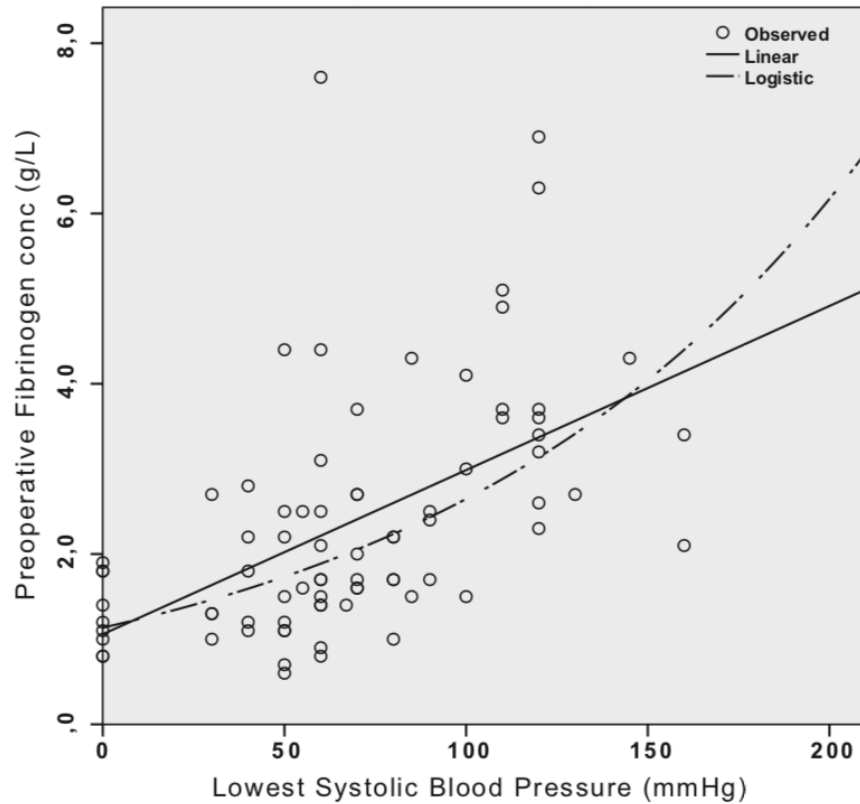
	Antiplatelet Therapy	No Antiplatelet Therapy	p Value
Perioperative data			
Surgery time (min)	497 ± 147	450 ± 129	0.04
CPB time (min)	226 ± 85	226 ± 88	0.92
Aorta clamp time (min)	114 ± 46	113 ± 48	0.72
Circulatory arrest time (min)	5.9 ± 12	5.7 ± 11	0.19
Cerebral perfusion time (min)	25 ± 17	25 ± 19	0.96
Intraoperative bleeding (L)	4.8 ± 3.9	3.3 ± 4.9	0.001
Postoperative data			
Transfusion RBC/24 h (L)	3.6 ± 3.4	2.1 ± 2.1	0.002
Transfusion plasma/24 h (L)	3.8 ± 3.3	2.5 ± 2.0	0.004
Transfusion platelets/24 h (L)	2.5 ± 2.1	1.6 ± 1.6	0.009
30-day mortality (%)	21 (29)	20 (20)	0.18
Reoperation for hemorrhage (%)	23 (31)	18 (18)	0.05

Table 3. Intraoperative Bleeding in Patients Treated With Dual Antiplatelet Therapy

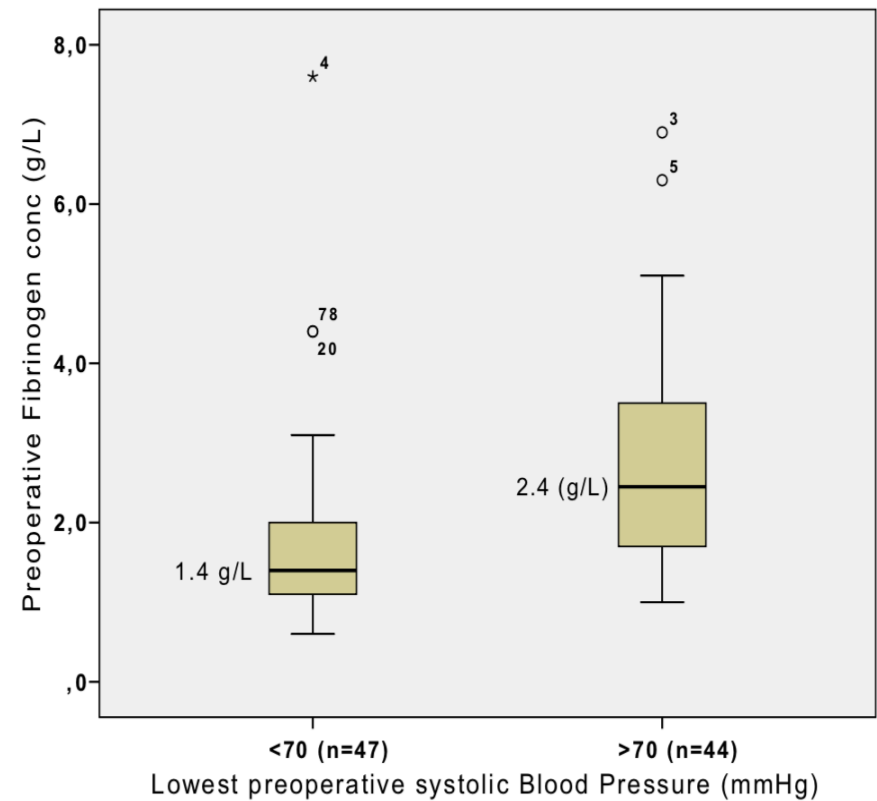
	ASA + Clopidogrel	ASA + Ticagrelor	p Value
N	29	15	
Intraoperative bleeding (L)	4.7 ± 4.1	7.6 ± 3.1	0.004

Preoperativ Fibrinogen

Preoperative Fibrinogen vs Lowest Systolic Blood Pressure



Boxplot median Fibrinogen (g/L) in patients with preop BP <70 vs 70 (mmHg)



Preoperatif Kan Transfüzyonu

Table 3. The operative factors and the amount of preoperative transfusion

	Survivor	Death	p-value
Interval time between ER to OR (min)	254.5	503.0	<0.001
Duration of operation (min)	295.3	400.0	0.80
Preoperative packed cell transfusion (mL)	448	2,240	0.05
Preoperative fresh frozen plasma transfusion (mL)	384	1,446	0.04
Preoperative platelet transfusion (mL)	256	640	0.347

Values are presented as mean or number.

ER, emergency room; OR, operating room.

Preoperatif Demir ve Eritropoetin

Kronik Tip B Aort Disseksiyonu

- Eritropoetin: haftada 3 kez 3000 U

2 ayda Hb 12.5 g/dL → 15.5 g/dL

- Haftada 2 kez 250 IU ve Demir 200 mg

3 haftada Hb 14.6 → 17.4 g/dL

Thoraco-abdominal aneurysm repair in a Jehovah's Witness: maximising blood conservation

Rahman IA¹, Hoth T², Doughty H³ and Bonser RS¹

Perfusion 2007; 22: 363–364

Rupture of Chronic Type B Aortic Dissection in a Jehovah's Witness: Successful Surgical Repair Without Blood Transfusion

Hiroshi Yamamoto, Fumio Yamamoto, Gembu Yamaura, Mamika Motokawa, Fuminobu Tanaka, Hiroshi Sato, Kazuyuki Ishibashi, and Keisuke Shioto, Akita, Japan

Ann Vasc Surg 2012; 26: 571.e11

Intraoperatif uygulamalar

Teknolojik Uygulamalar

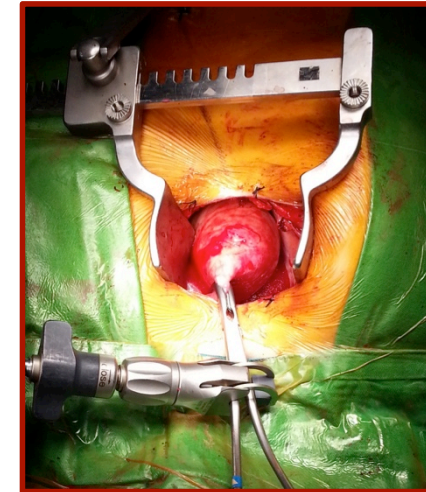
- Kısa EKD hatları
- KPB sonrası rezervuarda kalan kanın kullanımı
- Minimal extracorporeal dolaşım sistemi
- Minimal invasiv yöntemler
- Cell Saver

Farmakolojik Uygulamalar

- Hemostatik ilaçlar
- Antifibrinolitik ilaçlar
- Topikal hemostatik ilaçlar
- Protamin

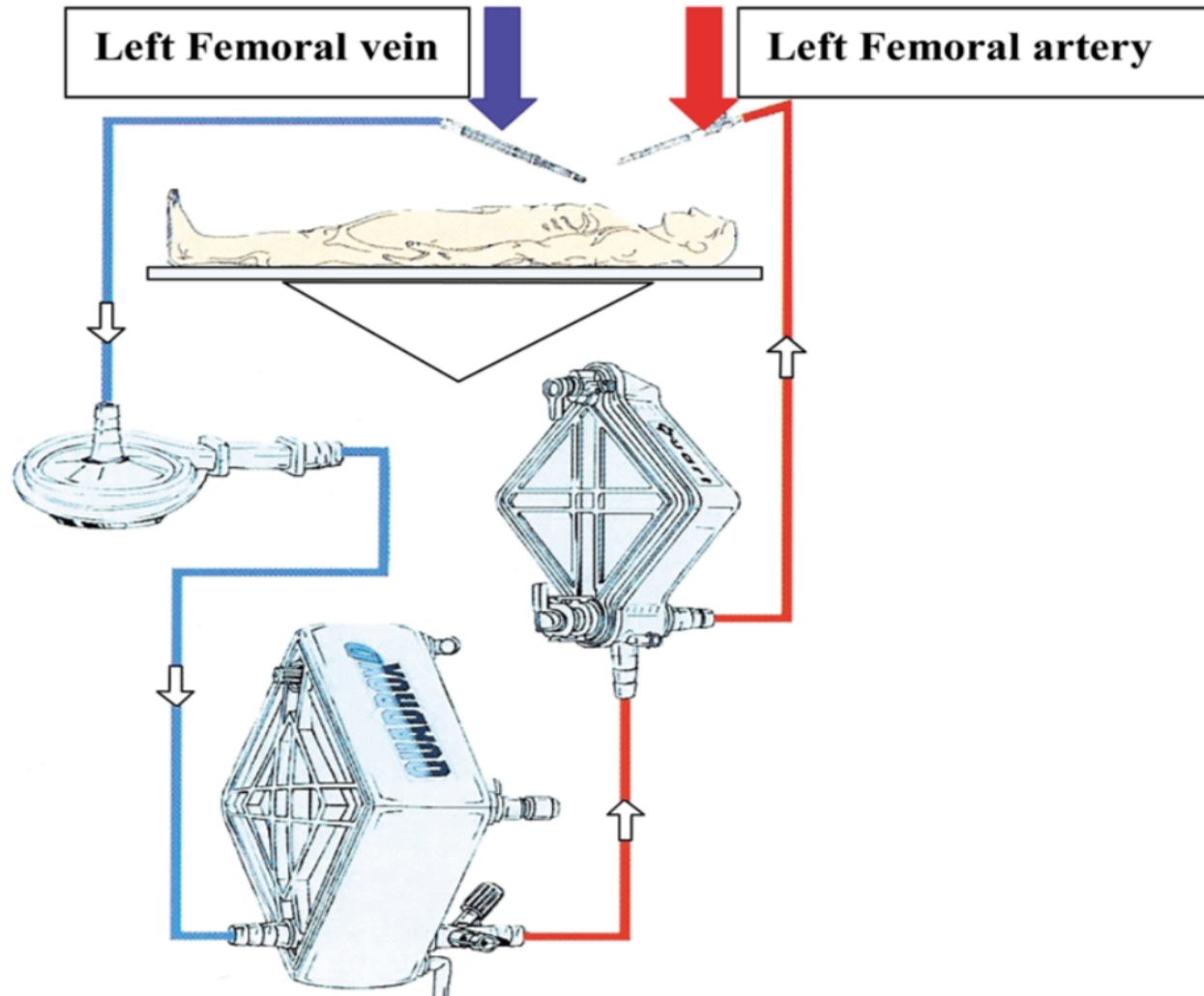
Minimal Invasiv Yaklaşım

Outcome	Propensity Matched				<i>p</i>
	J Incision (n = 483)		Full Sternotomy (n = 483)		
	No. ^a	No. (%)	No. ^a	No. (%)	
Death	483	0 (0)	483	2 (0.41)	0.16
Stroke	483	3 (0.62)	483	3 (0.62)	1.0
Renal failure	483	3 (0.62)	483	6 (1.2)	0.3
Sternal wound infection	483	0 (0)	483	0 (0)	...
Return to OR for bleeding	483	17 (3.5)	483	15 (3.1)	0.7
Prolonged ventilation (>24 h)	483	10 (2.3)	483	12 (2.8)	0.6
Heart block	483	2 (0.41)	483	5 (1.0)	0.3
Intraoperative transfusion					
Red blood cell	411	26 (6.3)	407	34 (8.4)	0.3
Fresh frozen plasma	411	13 (3.2)	407	24 (5.9)	0.06
Total blood products (any)	411	60 (15)	407	78 (19)	0.08
Postoperative transfusion					
Red blood cell	480	69 (14)	474	73 (15)	0.7
Fresh frozen plasma	480	18 (3.8)	474	32 (6.8)	0.04
Total blood products (any)	480	97 (20)	474	103 (22)	0.6



Minimal Ekstracorporeal Sistem

Eur J Vasc Endovasc Surg. 2004 Mar;27(3):324-6



Fibrin yapıştırıcılar

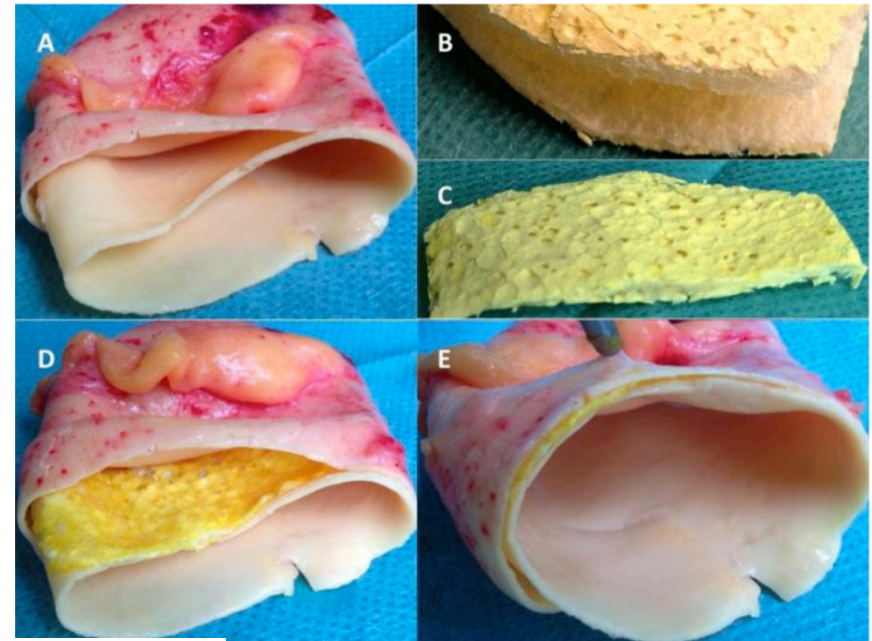
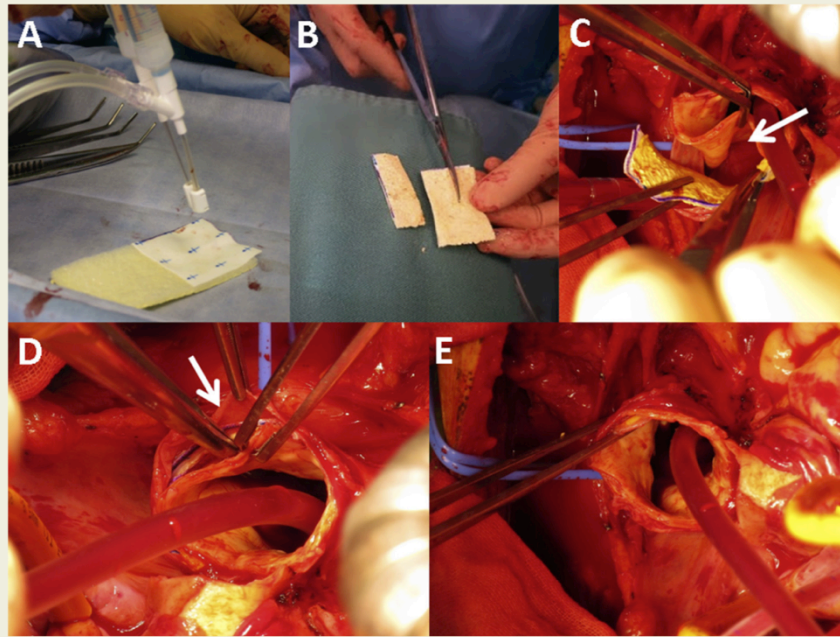
Fibrin Sealant Patch for Repair of Acute Type A Aortic Dissection

Milan Lisy, M.D.,* Mahmut Kahlil, M.D.,† J Card Surg. 2013 Nov;28(6):736-41

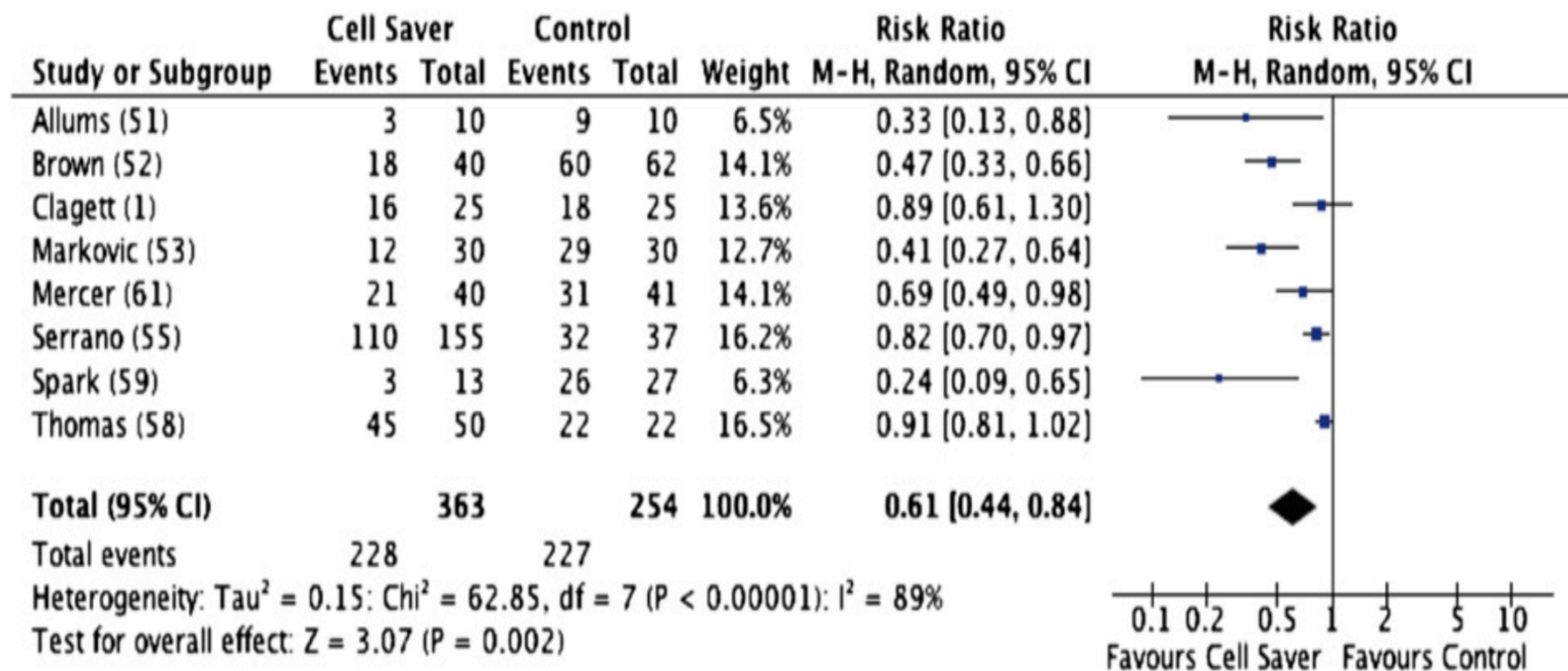
Novel Technique Using Polyester Fabric and Fibrin Sealant Patch for Acute Aortic Dissection

Heart Lung Circ. 2016 Aug;25(8):885-7

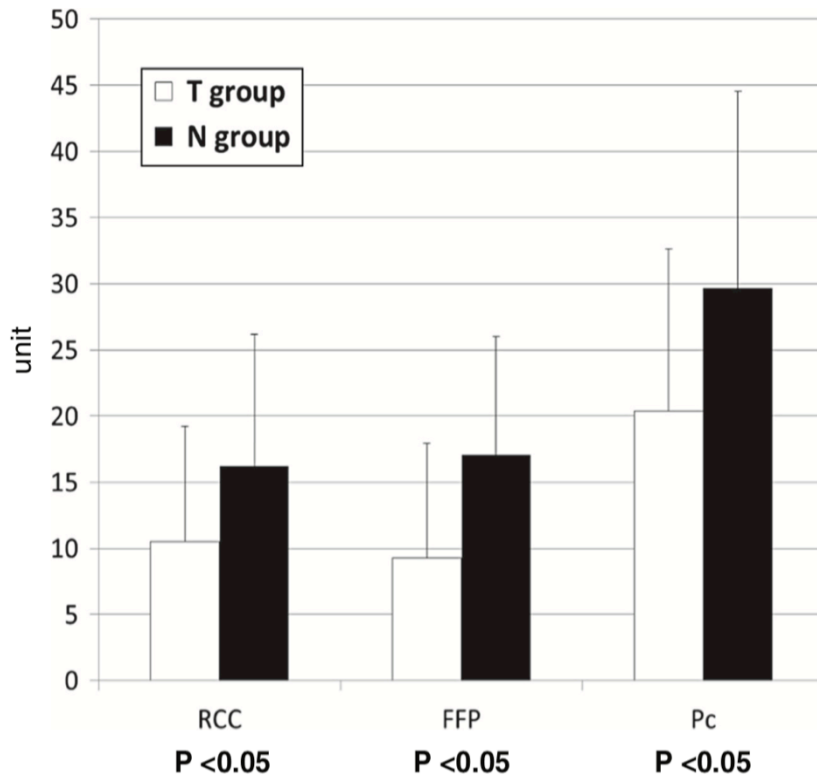
Suguru Ohira, MD^{a*}, Atsushi Fukumoto, MD, PhD^b



Cell-saver

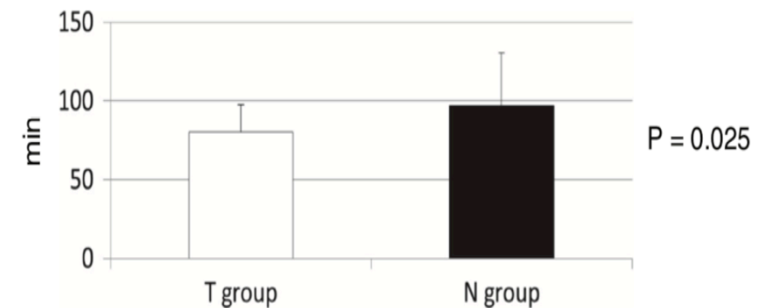


Traneksamik Asid

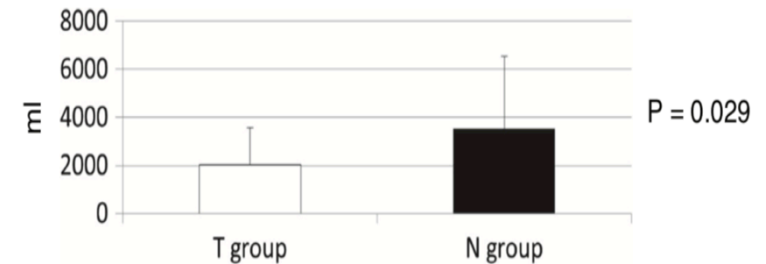


16 mg/kg/st

• The time of chest closure



• Total amount of chest tube drainage

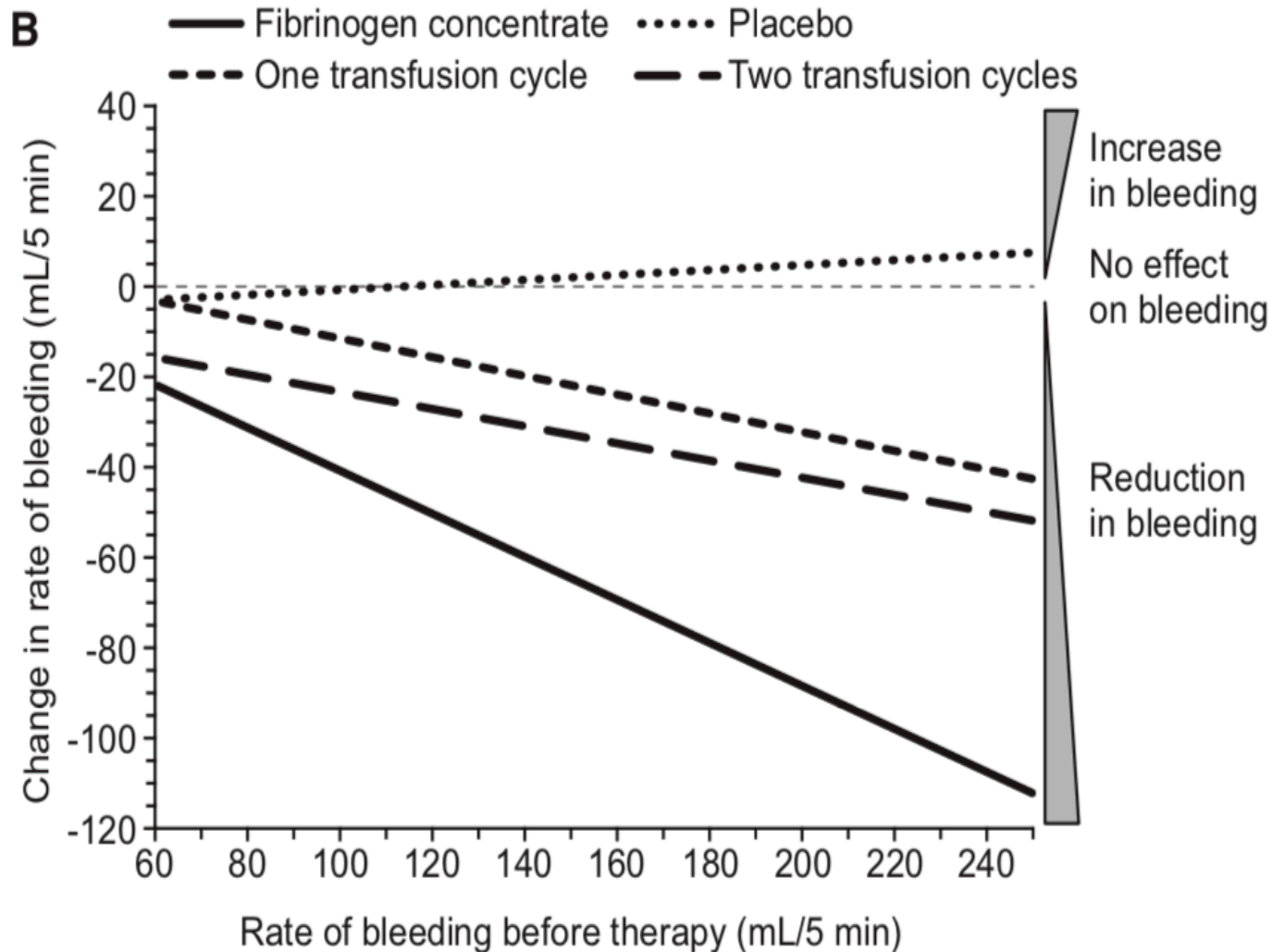


Traneksamik Asid

Postoperative Outcome Parameters in Propensity Score-Matched groups

Patient Characteristic	TXA Administration Before the Policy (n = 956)	No TXA Administration After the Policy (n = 956)	p Value
Seizure (%)	93 (9.7)	35 (3.7)	< 0.001
Thrombosis (%)	31 (3.2)	22 (2.3)	0.26
Reoperation for bleeding (%)	39 (4.1)	52 (5.4)	0.20
Renal dysfunction (%)	26 (2.7)	29 (3.0)	0.74
Transfusion (mL)	1,880 (1,040-3,300)	2,170 (1,133-4,125)	< 0.001
Blood loss (mL)	1,260 (640-2,070)	1,456 (815-2,444)	< 0.001
Duration of mechanical ventilation (h)	15 (8-23)	13 (7-21)	< 0.001
ICU stay (d)	3 (2-4)	3 (2-4)	0.52
30-day mortality (%)	13 (1.4)	16 (1.7)	0.58

Fibrinogen



Aktive FVII

Combination use of platelets and recombinant activated factor VII for increased hemostasis during acute type a dissection operations

Wen Yan¹, Chengluan Xuan², Guojia Ma³, Liang Zhang¹, Ning Di¹ J Cardiothorac Surg. 2014 Sep 2;9:156.

Intraoperative use of recombinant activated factor VII during complex aortic surgery

J Thorac Cardiovasc Surg. 2012 May;143(5):1198-204

Deniz Goksedef, MD,^a Georgia Panagopoulos, PhD,^a Naiem Nassiri, MD,^b Randy L. Levine, MD,^c

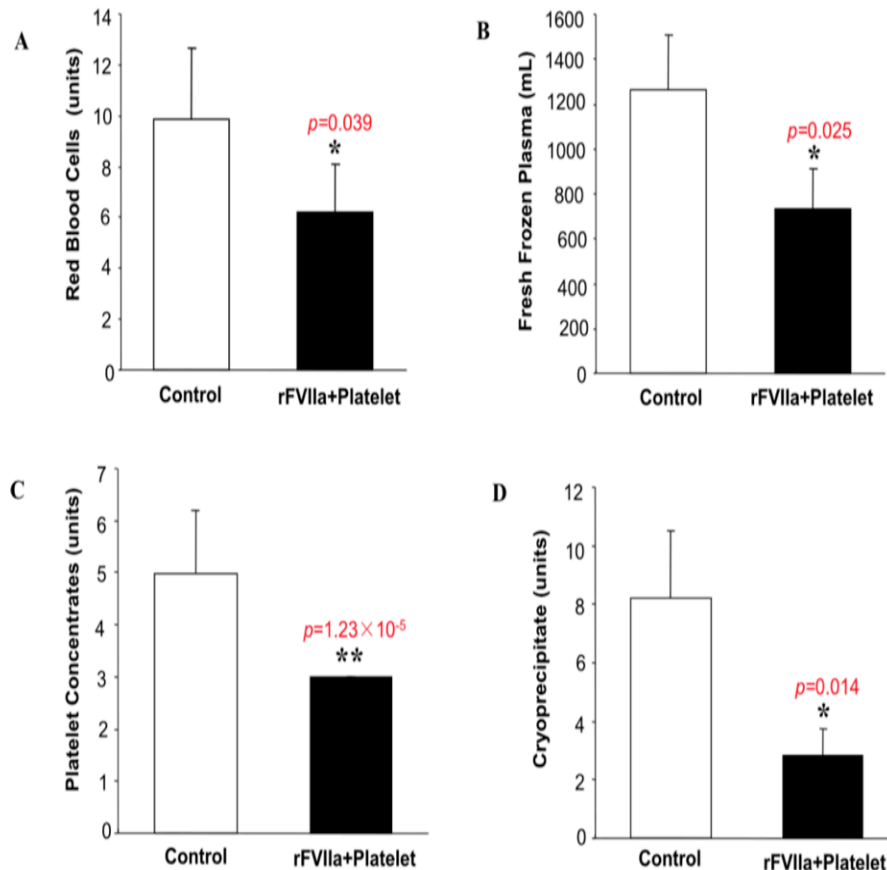


TABLE 3. Postoperative blood and blood product use and bleeding-related complications in matched patients

	rFVIIa (n = 29)	Control (n = 29)	P value
Blood and blood product use			
PRBC (units)	7 ± 2	9 ± 4	.01
FFP (units)	4 ± 1	6 ± 2	.04
Platelets (single donor)	3 ± 2	4 ± 2	.097
Cryoprecipitate (units)	12 ± 2	14 ± 3	.091
Clinical bleeding-related complications			
Delayed chest closure (%)	2 (6)	5 (17)	.25
Postoperative tamponade (%)	1 (3)	4 (13)	.25
Re-exploration (%)	5 (17)	14 (48)	.004
Total average chest tube output (mL)	810 ± 376	1020 ± 515	.01
Hospital outcomes			
Median ICU stay (d)	2 (1–7)	3 (1–15)	.44
Prolonged intubation (%)	8 (27)	17 (58)	.004
ARDS	2 (6)	5 (17)	.25
Pulmonary infection	2 (6)	3 (10)	1
Duration of hospitalization (d)	9 ± 5	10 ± 7	.32
Mortality (%)	2 (6)	2 (6)	1

FFP, Fresh-frozen plasma; ICU, intensive care unit; PRBC, packed red blood cell; rFVIIa, recombinant activated factor VII; ARDS, acute respiratory distress syndrome.

Aprotinin

Characteristic	Matched Population		
	Aprotinin (n = 107)	Non-Aprotinin (n = 107)	p Value
In-hospital mortality	8 (7.5)	7 (6.5)	1
Major bleeding	16 (15.0)	21 (19.6)	0.44
Transfusion			
RBC transfusion	39 (36.4)	51 (47.7)	0.09
PLT transfusion	14 (13.1)	16 (15.0)	0.83
FFP transfusion	26 (24.3)	12 (11.2)	< 0.01
Cryoprecipitate transfusion	4 (3.7)	5 (4.7)	1
12 hours bleeding, mL, median (IQR)	450 (350)	500 (362)	0.15
Redo surgery for bleeding	7 (6.5)	8 (7.5)	1
Renal failure	36 (33.6)	31 (29.0)	0.45
CVA	5 (4.7)	6 (5.6)	1

Hipotermi

- Trombin üretimi azalır
- Koagülasyon faktör tüketimi
- Trombosit sayısında ve fonksiyonlarında azalma
- Fibrinojen yetersizliği
- Hiperfibrinolizis
- Heparinin rezidüel etkileri
- PT ve aPTT uzar



Derin Sirkulatuar Arrest

Moderate hypothermic circulatory arrest in total arch repair for acute type A aortic dissection: clinical safety and efficacy

Ming Gong, Wei-Guo Ma, Xin-Liang Guan, Long-Fei Wang, Jia-Chen Li, Feng Lan, Li-Zhong Sun, Hong-Jia Zhang

J Thorac Dis. 2016 May;8(5):925-33

Does moderate hypothermia really carry less bleeding risk than deep hypothermia for circulatory arrest? A propensity-matched comparison in hemiarch replacement[†]

J Thorac Cardiovasc Surg. 2016 December ; 152(6): 1

Jeffrey E. Keenan, MD^a, Hanghang Wang, MD^{a,b}, Brian C. Gulack, MD^a, Asvin M. Ganapathi,

Table 3 Operative outcomes

Variable	MHCA group (n=39, %)	DHCA group (n=35, %)	P value
Operative mortality	4 (10.2)	5 (14.3)	0.862
Morbidities			
Reexploration for bleeding	4 (10.2)	3 (8.6)	1.000
Low cardiac output syndrome	1 (2.6)	0	1.000
Dialysis-dependent renal failure	3 (7.7)	5 (14.3)	0.591
Stroke	2 (5.1)	3 (8.6)	0.900
Paralysis	3 (7.7)	2 (5.7)	1.000
Prolonged ventilation (>48 hours)	3 (7.7)	5 (14.3)	0.591
Sepsis	5 (12.8)	6 (17.1)	0.602
Multiorgan failure	6 (15.4)	4 (11.4)	0.876
Bleeding and blood transfusions			
Total drainage up to 7 postop. days (mL)	2,937±2,205	2,850±2,408	0.874
Postoperative hemoglobin (g/dL)	9.7±2.0	9.4±2.2	0.389
Packed red blood cells (mL)	1,431±1,195	1,877±1,704	0.479
Fresh frozen plasma (mL)	790±619	680±521	0.415
Platelet concentrate (unit)	1.2±1.5	1.6±2.2	0.558
Length of hospital stay (day)	15.2±8.9	16.6±6.7	0.437
Length of intensive care unit stay (day)	5.6±7.4	6.6±6.6	0.292

DHCA, deep hypothermic circulatory arrest; MHCA, moderate hypothermic circulatory arrest.

Tromboelastogram

Table 2. Postoperative Bleeding and Administration of Blood Products and Clotting Factor Concentrates During Surgery and the First 24 Hours in the ICU

	All Patients (n = 194)	Thromboelastometry guidance (n = 155)	Conventional (n = 41)	p Value
Bleeding volume from mediastinal drainage within 24 h after surgery (mL)	490 (300-740)	450 (275-670)	540 (375-1375)	0.007
Major bleeding* (%)	31 (16)	19 (13)	12 (26)	0.032
Red blood cells				
No. patients (%)	95 (49)	63 (41)	32 (78)	< 0.001
Total number (units)	0.5 (0-3)	0 (0-2)	3 (1-4.5)	< 0.001
Intraoperative	0 (0-1.5)	0 (0-1)	1 (0-4)	< 0.001
First 24 h in ICU	0 (0-1)	0 (0-1)	1 (0-2)	< 0.001
Fresh frozen plasma				
No. patients (%)	63 (33)	34 (22)	29 (71)	< 0.001
Total number (units)	0 (0-4)	0 (0-0)	4 (0-7)	< 0.001
Intraoperative	0 (0-2)	0 (0-0)	4 (0-5.5)	< 0.001
First 24 h in ICU	0 (0-0)	0 (0-0)	0 (0-3)	0.074
Platelets				
No. patients (%)	38 (20)	25 (16)	13 (32)	0.028
Total number (units)	0 (0-0)	0 (0-0)	0 (0-1)	0.053
Intraoperative	0 (0-0)	0 (0-0)	0 (0-1)	0.054
First 24 h in ICU	0 (0-0)	0 (0-0)	0 (0-0)	0.285
Fibrinogen concentrate				
No. patients (%)	139 (72)	107 (70)	32 (78)	0.306
Total amount (g)	2 (0-4)	2 (0-4)	3 (1.5-4)	0.312
Intraoperative	2 (0-4)	2 (0-4)	2 (0.5-4)	0.275
First 24 h in ICU	0 (0-0)	0 (0-0)	0 (0-0)	0.943
Prothrombin complex concentrate				
No. patients (%)	33 (17)	26 (17)	7 (17)	0.990
Total amount (units)	0 (0-0)	0 (0-0)	0 (0-0)	0.975
Intraoperative	0 (0-0)	0 (0-0)	0 (0-0)	0.564
First 24 h in ICU	0 (0-0)	0 (0-0)	0 (0-0)	0.461

Endovasküler girişim

Kan transfüzyonu için prediktörler:

- ASA sınıflaması
- İleri yaş
- Kadın
- Preoperatif düşük Hb
- Artmış anevrizma çapı

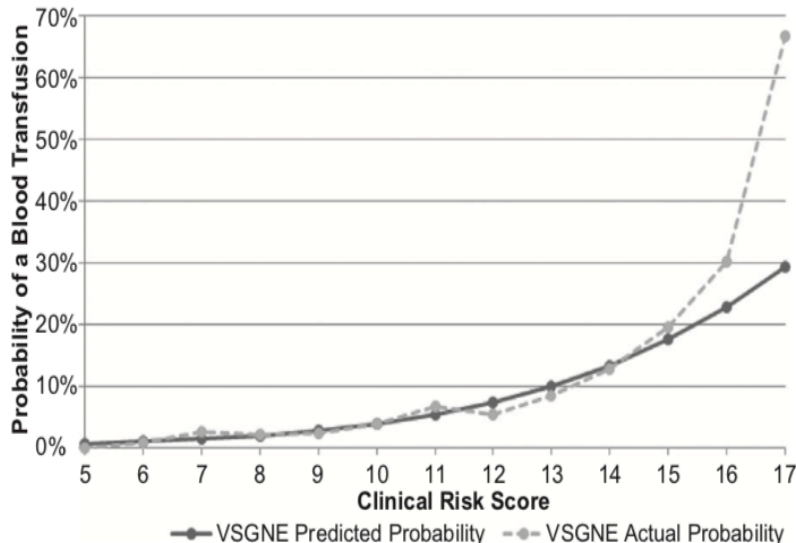


Table III. Clinical risk score

Factor	Value	Points assigned
ASA classification	Class 1	1
	Class 2	2
	Class 3	3
	Class 4	4
	Class 5	5
Hemoglobin concentration, g/dL	>14.5	1
	13.6-14.5	2
	12.3-13.5	3
	<12.3	4
Aneurysm diameter, mm	<52	1
	52-55	2
	56-60	3
	>60	4
Age, years	<69	1
	69-75	2
	76-81	3
	>81	4

Postoperatif hasta yönetimi

- Hb > 7 g/dL Transfüzyon ⊖
- 7-8 gr/dl : Postoperatif hastalar, kardiyovasküler problemi olanlarda transfüzyon düşünülmeli
- 8-10 gr/dl : Genellikle transfüzyon endikasyonu yok (semptomatik anemi, devam eden kanama, akut MI, unstabil anjina)
- > 10 gr/dl : Transfüzyon endikasyonu yok

Doku oksijenasyon takibi

Global parametreler

- SvO₂
- Santral CO₂(v-a)
- Baz açığı
- pH
- Arteriyel laktat düzeyi
- Laktat/pirüvat oranı
- MetHb düzeyi

Rejyonel Parametreler

- Gastrik intramukozal pH
- Mukozal oksijenasyon
- Sublingual mikrosirkülasyon
- İdrar parsiyel O₂ basıncı
- Spektroskopi yöntemleri (NIRS)
- Doku CO₂ ve O₂ basınç ölçümleri

TEŞEKKÜR EDERİM...