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ORIGINAL ARTICLE / ÖZGÜN MAKALE

Acute kidney injury after surgical treatment of failed endovascular aneurysm repair

Başarısız endovasküler anevrizma onarımının cerrahi tedavisi sonrası akut böbrek hasarı

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ABSTRACT

Background: This study aims to report the incidence of acute kidney injury following surgical reconstruction after a failed endovascular aneurysm repair (EVAR) in patients with abdominal aortic aneurysms.

Methods: This retrospective study included 44 patients (39 males, 5 females; mean age: 70±11.3 years; range, 35 to 84 years) who underwent emergency or elective surgical reconstruction after failed EVAR between February 2015 and January 2019. Patients were divided into two groups: acute kidney injury group and no acute kidney injury group. The primary end-point of the study was to evaluate the development of acute kidney injury following surgery. The secondary end-points included the 30-day and one-year mortality rates.

Results: Surgical reconstruction of the abdominal aorta was performed electively in 29 (65.9%) patients and urgently in 15 (34.1%) patients. Acute kidney injury occurred in 12 (27.3%) patients. The interval from endovascular aneurysm repair to surgical reconstruction was statistically significantly higher in the no acute kidney injury group than in the acute kidney injury group (24.6±11.5 and 18.1±13.3 months, respectively; p=0.145). The mean abdominal aortic aneurysm diameter, neck angulation, and neck diameter were statistically significantly higher in the acute kidney injury group than in the no acute kidney injury group (p=0.001, p=0.009, and p<0.001, respectively). No statistically significant difference was observed between the acute kidney injury and no acute kidney injury groups for the overall 30-day mortality (p=0.185) and one-year mortality (p=0.999).

Conclusion: Acute kidney injury is not uncommon after the surgical reconstruction of a failed EVAR. Aneurysm-related anatomical factors may have an impact on the development of postoperative acute kidney injury. Comprehensive surgical planning should be performed for open abdominal aortic surgery after a failed EVAR.

Keywords: Abdominal aortic aneurysm, acute kidney injury, failed endovascular aneurysm repair, mortality.

ÖZ

Amaç: Bu çalışma, abdominal aort anevrizması olan hastalarda başarısız endovasküler anevrizma onarımı (EVAR) sonrası yapılan cerrahi rekonstrüksiyonu takiben gelişen akut böbrek hasarı insidansını bildirmeyi amaçlamaktadır.

Çalışma planı: Bu retrospektif çalışmaya Şubat 2015 - Ocak 2019 tarihleri arasında başarısız EVAR sonrası acil veya elektif cerrahi rekonstrüksiyon uygulanan toplam 44 hasta (39 erkek, 5 kadın; ort. yaş: 70±11.3 yıl; dağılım, 35-84 yıl) dahil edildi. Hastalar iki gruba ayrıldı: akut böbrek hasarı grubu ve akut böbrek hasarı olmayan grup. Çalışmanın birincil sonlanım noktası ameliyat sonrası akut böbrek hasarı gelişimini değerlendirmekti. İkincil sonlanım noktaları 30 günlük ve bir yıllık mortalite oranları idi.

Bulgular: Cerrahi rekonstrüksiyon 29 (%65.9) hastada elektif olarak, 15 (%34.1) hastada ise acil olarak uygulandı. On iki (%27.3) hastada akut böbrek hasarı gelişti. Endovasküler anevrizma onarımından cerrahi rekonstrüksiyona kadar geçen süre, akut böbrek hasarı grubunda akut böbrek hasarı olmayan gruba göre istatistiksel olarak anlamlı derecede daha uzun idi (24.6±11.5 ay, 18.1±13.3 ay; p=0.145). Ortalama abdominal aort anevrizması çapı, ortalama boyun açılanması ve ortalama boyun çapı, akut böbrek hasarı grubunda akut böbrek hasarı olmayan gruba göre istatistiksel olarak anlamlı derecede yüksekti (sırasıyla p=0.001, p=0.009, p<0.001). Akut böbrek hasarı olan ve olmayan gruplar arasında 30 günlük mortalite (p=0.185) ve bir yıllık mortalite (p=0.999) açısından istatistiksel olarak anlamlı bir fark gözlemlenmedi.

Sonuç: Akut böbrek hasarı, başarısız bir EVAR'nin cerrahi rekonstrüksiyonundan sonra nadir değildir. Anevrizma ile ilişkili anatomik faktörlerin ameliyat sonrası akut böbrek hasarı gelişimi üzerinde etkisi olabilir. Başarısız bir EVAR sonrası yapılan açık abdominal aort cerrahisinin detaylı planlaması yapılmalıdır.

Anahtar sözcükler: Abdominal aort anevrizması, akut böbrek hasarı, başarısız endovasküler anevrizma onarımı, mortalite.

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Endovascular aneurysm repair (EVAR) is an effective alternative procedure for treating infrarenal abdominal aortic aneurysms (AAAs).[1] Since Parodi et al.[2] reported the first successful procedure, the EVAR rate for the treatment of infrarenal AAA has increased from 5.2 to 74% during the last decade.[3] Endovascular aneurysm repair is increasingly used for the treatment of AAA, delivering evident advantages in perioperative mortality and morbidity compared to open repair. However, this well-known method exhibited a lack of success in some patients.[4] The underlying factors for the failure can be examined through the assessment of two main mechanisms: the dynamic relation between the aorta and stent graft and the nonadherence to the manufacturer's instructions for use during stent graft deployment.[4,5] Various catheter techniques have been used to reconstruct aortic structures.[6] Chung et al.[7] recommended not performing EVAR in patients with severe unfavorable neck anatomy or coexisting infection sources. Consequently, for patients with failed catheterization and those inappropriate for rescue with catheterization, surgical reconstruction is the gold standard.

Surgical reconstruction of a failed EVAR is much more complicated than primary surgical reconstruction of AAA.[8] Georgiadis et al.[9] reported that the overall 30-day mortality for surgical repair of a failed EVAR was 21.1%. Endoleaks were the most common indication (50.1-73.6%) for surgical conversion of a failed EVAR.[9,10] Other indications were aortic rupture, graft infection, graft occlusion, and graft migration.

Since the first successful standard AAA repair, significant surgical knowledge has been accumulated on abdominal aortic surgery.[11] The acute kidney injury (AKI) rate of surgical AAA repair has been reported as 20% for elective patients.[12] However, information on AKI is inadequate after surgical reconstruction after a failed EVAR.

In this study, the AKI incidence was reported following surgical reconstruction after a failed endovascular abdominal aneurysm repair in two different tertiary vascular surgery centers.

PATIENTS AND METHODS

This retrospective study included 44 patients (39 males, 5 females; mean age: 70±11.3 years; range, 35 to 84 years) who underwent emergency or elective surgical reconstruction after a failed EVAR at two centers, Mehmet Akif Ersoy Thoracic and Cardiovascular Surgery Training and Research Hospital and University of Health Sciences, Ahi Evran Thoracic and Cardiovascular Surgery Training and Research Hospital between February 2015 and January 2019. During the study period, 396 EVARs were performed electively for AAA at the study institutions. The initial EVAR was performed at the study institutions in 36 (81.8%) of 44 patients. The inclusion criteria were as follows: availability of all medical records and pre- and postoperative evaluation by computed tomography angiography (CTA). Patients were divided into the AKI group and the no AKI group and compared in terms of pre-, intra-, and postoperative data. All patients had CTA in picture archiving and communication systems. Computed tomography angiographies were evaluated by the senior surgeon to determine the surgical indication and plan. An arthrogram was performed when necessary for further evaluation of endoleaks. The patients' preoperative characteristics and intra- and postoperative data were retrieved from patient files in the hospital's electronic database. Detailed information about the demographic data of the patients was obtained via telephone interviews. The duration from the initial EVAR to surgical reconstruction, types of the stent graft, surgical indication, aortic cross-clamp site, extent of stent graft removal, and type of surgery were collected. The primary end-point of the study was the development of AKI postoperatively. The secondary end-points included 30-day and one-year mortality.

Preoperative chronic renal failure was defined as an estimated glomerular filtration rate of <60 mL/min or serum creatinine level of >2.0 mg/dL (KDIGO [Kidney Disease: Improving Global Outcomes] G3a or higher).[13] Intra- and postoperative complications were recorded. Postoperative AKI diagnosis was made according to the following three major criteria: *(i)* a ≥1.5-time increase in serum creatinine level compared to baseline, *(ii)* an increase ≥0.3 mg/dL (≥26.4 mmol/L) in serum creatinine, or *(iii)* urine output <0.5 mL/kg/h for >6 h. Postoperative data included 30-day mortality, one-year mortality, major perioperative complications, length of intensive care unit stay, and length of hospital stay.

Surgical technique

All patients underwent surgery via midline laparotomy. Aortic cross-clamping was placed in the infrarenal or suprarenal aorta for proximal aortic control. If possible, a total excision of the EVAR graft was performed. In the remaining patients, to avoid damage to the native aortic wall and renal arteries, the proximal parts of the stent grafts were left in the native aortas. The surgical strategy was partial excision

of the stent graft, leaving approximately 3 to 5 cm of the proximal segment inside the native aorta. The rest of the graft was excised completely (Figure 1). Hence, this proximal part was considered to be a pledget for anastomosis of the native aorta. Following the stent graft excision, Dacron graft reconstruction was performed as an aortobifemoral bypass, aortobiiliac bypass, or tube graft interposition. Renal artery bypass or reimplantation was performed if necessary (Figure 2). Renal protection was achieved by infusing the renal arteries with the Custodiol solution (Essential Pharmaceuticals, LLC, NC, USA) in patients who underwent suprarenal clamping. However, perfusion with a solution or blood was not used for visceral organs. Laparotomy was closed conventionally. Following hospital discharge, patients underwent a CTA scan in the first month (Figure 3). In the following years, radiological follow-up was performed using ultrasonography in routine examinations. Emergency surgical reconstruction was performed for painful and ruptured aneurysms, stent graft migration, and endoleak with acute malperfusion syndrome.

Statistical analysis

Statistical analysis was performed using IBM SPSS version 19.0 software (IBM Corp., Armonk, NY, USA). The normality distribution of continuous variables was tested using the Kolmogorov-Smirnov test. Continuous variables with normal distribution were expressed as mean ± standard deviation (SD), whereas those without normal distribution were expressed as medians (25^{th}-75^{th} percentiles). Categorical variables were expressed as frequencies and percentages. Continuous variables were compared using Student's t-test or the Mann-Whitney U test when applicable. The chi-square test or Fisher exact test was used to compare categorical variables as appropriate. A two-sided *p*-value of <0.05 was considered statistically significant.

RESULTS

Surgical reconstruction of the abdominal aorta was performed electively in 29 (65.9%) patients and urgently in 15 (34.1%) patients. Acute kidney injury developed in 12 (27.3%) patients. No significant difference was observed between the AKI and no AKI groups in terms of preoperative patient characteristics, including age, sex, prevalence of diabetes mellitus, hypertension, chronic obstructive pulmonary disease, coronary artery disease, congestive heart failure, chronic renal failure,

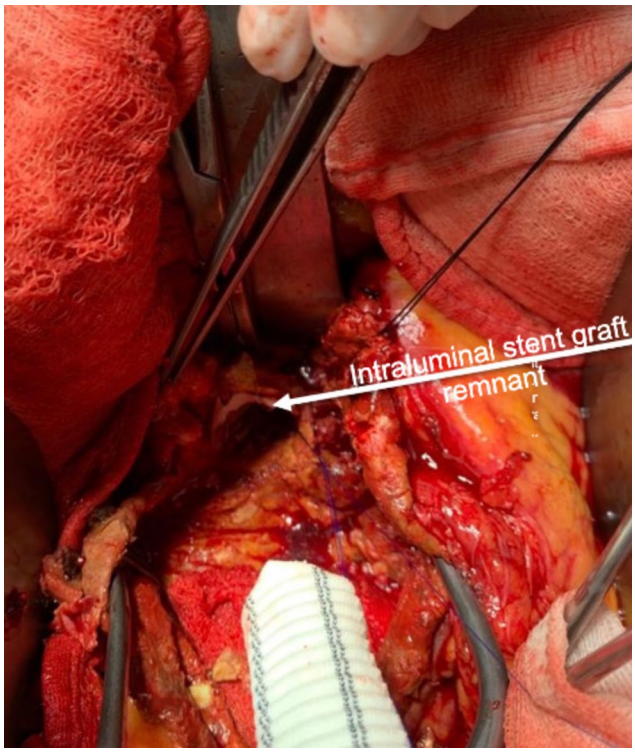

Figure 1. Intraoperative view of partial excision of stent graft. The arrow sign indicates the intraluminal stent graft remnant in the proximal anastomosis line.

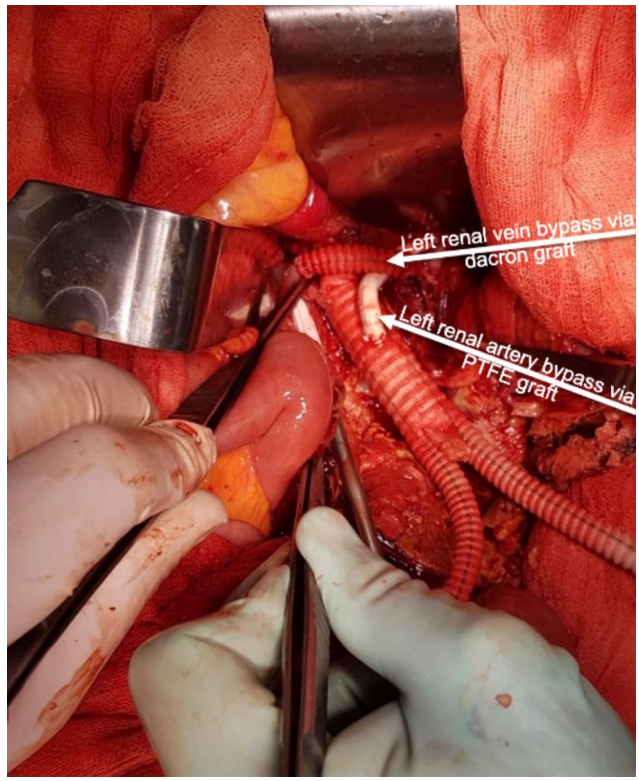

Figure 2. Operative view of left aortarenal arterial bypass and left renocaval venous bypass.

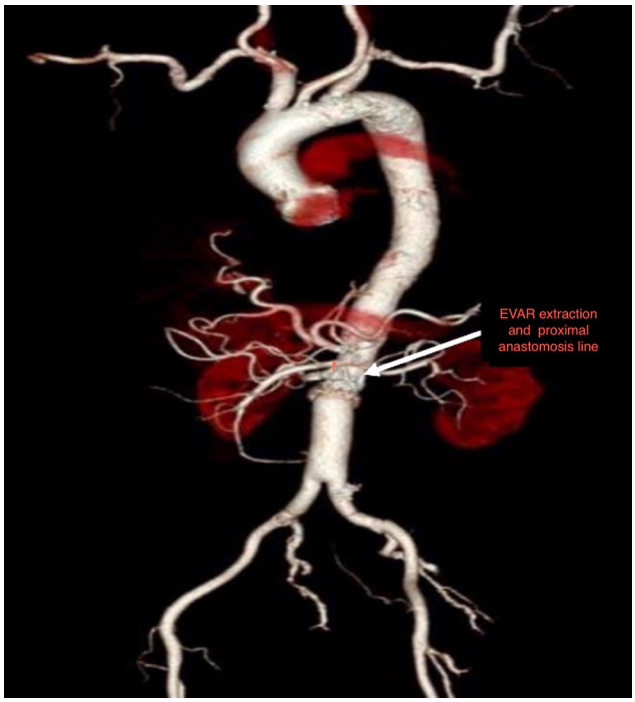

Figure 3. Computed tomographic image of the EVAR extraction and anastomosis line.
EVAR: Endovascular aneurysm repair.

hyperlipidemia, cigarette smoking, and atrial fibrillation (Table 1). The time interval between EVAR and surgical reconstruction was 18.1±13.3 months in the no AKI group and 24.6±11.5 months in the AKI group (p=0.145).

The mean AAA diameter, neck angulation, and neck diameter were significantly higher in the AKI group than in the no AKI group (p=0.001, p=0.009, and p<0.001, respectively). No statistically significant difference was observed between the two groups in terms of aneurysm neck length (p=0.08). Stent graft brand distribution is listed in Table 2. The Talent stent graft system (Medtronic Endovascular, Santa Rosa, CA, USA) was the most frequently performed graft and occupied most of the market at these centers.

The most common indications for surgical reconstruction were endoleak (54.5%), followed by stent graft rupture (36.4%), stent graft thrombosis (22.7%), migration (13.6%), and stenosis (9.1%). No difference was observed between the two groups in terms of emergency surgery (p=0.284). Type 1 endoleak was statistically significantly higher in the AKI group (66.7 *vs*. 28.1%, p=0.035). Stent graft thrombosis was statistically significantly higher in the no AKI group (31.2 *vs*. 0%, p<0.041, Table 3).

No difference in the level of the aortic cross-clamp and operation types was observed between the two groups. The aortic cross-clamp was placed on the infrarenal aorta in 28 patients (p=0.732), the suprarenal aorta in 15 (p=0.722), and supraceliac aorta in one (p=0.99). A suprarenal aorta (including supraceliac aorta) cross-clamp was placed in five patients with chronic renal failure, and AKI developed in four of these five patients (80%). In addition, suprarenal (including supraceliac) cross clamps were placed in seven patients who underwent emergency surgery, and AKI developed in four (57.1%) of them. Aortobiiliac

Table 1. Preoperative patient characteristics

	Total (n=44)			No-AKI (n=32)			AKI (n=12)			
	n	%	Mean±SD	n	%	Mean±SD	n	%	Mean±SD	*p*
Age (year)			70±11.3			65±12.3			72±5.9	0.054
Sex										
Male	39	88.6		28	87.5		11	91.7		0.99
Diabetes mellitus	8	18.2		7	21.9		1	8.3		0.413
Hypertension	31	70.5		20	69		11	73.3		0.763
Atrial fibrillation	5	11.4		5	15.6		0	0		0.301
Prior CAD	17	39.5		13	41.9		4	33.3		0.735
COPD	7	15.9		5	15.6		2	16.7		0.99
Smoker	25	56.8		18	56.2		7	58.3		0.99
Chronic renal failure	13	29.5		7	21.9		6	50.0		0.135
Hyperlipidemia	10	22.7		9	28.1		1	8.3		0.241

AKI: Acute kidney injury; SD: Standard deviation; CAD: Coronary artery disease; COPD: Chronic obstructive pulmonary disease.

Table 2. Abdominal aortic aneurysm related anatomical parameters and types of stent grafts

	Total (n=44)			No-AKI (n=32)			AKI (n=12)			
	n	%	Mean±SD	n	%	Mean±SD	n	%	Mean±SD	*p*
Maximum AAA diameter (mm)			76.7±11.3			71.1±11.3			87.9±21.0	**0.001**
Iliac tortuosity	13	29.5		10	31.2		3	25		0.99
Neck angulation (degrees)			43.4±21.5			38.3±16.1			57.0±28.4	**0.009**
Neck diameter (mm)			30.7±7.3			28.4±5.4			37.1±8.2	**<0.001**
Neck length (mm)			23.8±9.2			25.4±9.5			19.9±7.6	0.08
Iliac involvement	3	6.8		2	6.2		1	8.3		0.99

AKI: Acute kidney injury; SD: Standard deviation; AAA: Abdominal aortic aneurysm.

Table 3. Summary of indications for open conversion after endovascular abdominal aortic aneurysm repair

	Total (n=44)		No-AKI (n=32)		AKI (n=12)		
Variables	n	%	n	%	n	%	*p*
Endoleak							
Type 1	17	38.6	9	28.1	8	66.7	**0.035**
1a	12	27.2	6	18.8	6	50.0	0.059
1b	5	11.4	3	9.4	2	16.7	0.603
Type 2	5	11.4	3	9.4	2	16.7	0.603
Type 3	1	2.3	1	3.1	0	0	0.999
Type 4	1	2.3	1	3.1	0	0	0.999
Type 5	0	0	0	0	0	0	
Stent-graft rupture	16	36.4	12	37.5	4	33.3	0.999
Stent-graft kinking	4	9.1	4	12.5	0	0	0.562
Stent-graft migration	6	13.6	3	9.4	3	25.0	0.321
Stent-graft thrombosis	10	22.7	10	31.2	0	0	**0.041**
Stent-graft infection	0	0	0	0	0	0	-
Elective surgery	29	65.9	23	71.9	6	50.0	0.284
Emergency surgery	15	34.1	9	28.1	6	50.0	0.284
ASA III	29	65.9	23	71.9	6	50.0	0.284
ASA IV	9	20.5	5	15.6	4	33.3	0.227
ASA V	6	13.6	4	12.5	2	16.7	0.658

AKI: Acute kidney injury; ASA: American Society of Anesthesiologists.

bypass was performed in 30 (p=0.722), aortobifemoral bypass in nine (p=0.999), and tube graft interposition in five (p=0.999) patients (Table 4).

The aortorenal bypass was performed in two patients since the ostium of the left renal arteries was damaged due to the fragility of the anastomosis line. No 30-day mortality occurred in these patients. Acute kidney injury developed in one of these patients. Renal replacement therapy was not required. One other patient underwent supraceliac cross-clamp surgery due to an aortic rupture with a huge hematoma. The patient died on the second postoperative day due to multiorgan failure.

The results were similar in both groups in terms of 30-day mortality, reoperation for bleeding (p=0.999), severe ischemic colitis (p=0.176), pneumonia (p=0.551), and intensive care unit stay (p=0.661). In the early period (30 days), no myocardial infarction or stroke was recorded. Overall hospital stay was longer in the AKI group (p=0.047, Table 4).

Table 4. Summary of surgical techniques and outcomes

	Total (n=44)				No-AKI (n=32)				AKI (n=12)				
Variables	n	%	Median	Min-Max	n	%	Median	Min-Max	n	%	Median	Min-Max	*p*
Cross-clamping level													
Suprarenal	15	34.1			10	31.2			5	41.7			0.722
Infrarenal	28	63.6			21	65.6			7	58.3			0.732
Supraceliac	1	2.3			1	3.1			0	0			0.999
Graft interposition													
Aortobiiliac bypass	30	68.2			21	65.6			9	75.0			0.722
Aortobifemoral bypass	9	20.5			7	21.9			2	16.7			0.999
Aortic tube-graft	5	11.3			4	12.5			1	8.3			0.999
Renal artery reimplantation	3	6.8			0	0			3	25.0			**0.017**
Reoperation for bleeding	4	9.1			3	9.4			1	8.3			0.999
Severe ischemic colitis	3	6.8			1	3.1			2	16.7			0.176
Pneumonia	3	6.8			3	9.4			0	0			0.551
Renal replacement therapy	4	9.1			0	0			4	33.3			**0.004**
Intensive care unit stay (day)			2.5	1.5-4.00			2.00	1.00-3.00			3.50	1.75-7.50	0.661
Length of hospital stay (day)			8	7.5-12.0			7.00	5.75-9.00			14.50	8.00-25.00	**0.047**
30-day mortality	8	18.2			4	12.5			4	33.3			0.185
1-year mortality	4	9.1			3	9.4			1	8.3			0.999

AKI: Acute kidney injury.

After a mean follow-up of 15.9±16.2 months, four all-cause deaths occurred (three in the no AKI and one in the AKI group). In the no AKI group, the cause of long-term mortality was ischemic stroke in one patient and myocardial infarction in two patients. In the AKI group, the cause of long-term mortality was aortoenteric fistula. No statistically significant difference was observed between the two groups in terms of one-year mortality (p=0.999). Late surgical complications during follow-up included a total of six incisional hernias (four in the no AKI group and two in the AKI group; p=0.590), seroma in one patient in the no AKI group, and a total of two postoperative wound infections (one in the no AKI group and one in the AKI group; p=0.999).

DISCUSSION

One of the most important findings of our study is the effect of aneurysm neck angulation and diameter on the development of postoperative AKI after surgical reconstruction of a failed EVAR. It is widely known that aneurysm-related anatomical factors have important effects on the outcomes of EVAR.[14] In addition, short aneurysm necks affect the mortality after an open AAA repair.[15] Neck angulation and aneurysm diameter complicate aortic clamping and anastomosis. Thus, aneurysm-related anatomical factors may affect postoperative AKI. In this series, 15 patients underwent suprarenal clamping, in whom renal protection was achieved by infusing the renal arteries with the Custodiol solution. In this way, good renal protection was acquired. In these patients, proximal procedures were performed in the shortest time possible. Supraceliac clamping was performed on only one patient who had undergone an emergency operation. Conversely, the AKI rate was high in specific groups, such as patients with chronic renal failure who underwent surgery via suprarenal cross-clamp or those who underwent emergency surgery via suprarenal cross-clamp despite the Custodiol solution.

In line with what has been observed in the literature, endoleaks were also the leading cause of surgical reconstruction in this series.[16-19] Type 1 endoleaks were also more common in patients with AKI. Typically, the risk of type 1 endoleaks is higher in aneurysms with a compelling aneurysm neck anatomy, which also increases the risk for postoperative AKI. Stent graft thrombosis was not observed in the AKI group. Compared to other causes of open conversion, stent graft thrombosis causes fewer pre- and intraoperative renal problems, which may be explained by the fact that thrombosis mostly occurs in the infrarenal abdominal aorta.

Late rupture of AAA after a failed EVAR repair continues to have catastrophic outcomes, thus warranting significant concern.[18-21] Antoniou et al.,[22] in their recently published meta-analysis, reported rupture in 0.9% of cases after EVAR procedures, and the pooled estimated perioperative mortality was 32%. Hence, clinical follow-up and patient compliance should be closely evaluated and discussed with the patient before the initial choice of treatment between EVAR and standard open repair of the abdominal aorta. Furthermore, EVAR replacement to the aorta triggers inflammation and changes the tissue characteristics, and the complexity of surgical procedures is subsequently higher than that of the untouched aorta.[23]

Although most of the stent grafts had suprarenal fixation, in our series, most of the aortic clamps were placed in the infrarenal aorta. In contrast, Dias et al.[24] reported higher rates of suprarenal or supraceliac aortic clamping. Since the surgical team did not aim to extract the EVAR stent graft completely in our series, aortic laceration or rupture was possible during the removal of aortic fixation points. The skeleton of EVAR stent grafts is composed of nitinol-based materials that are memory-shaped. Consequently, this property enabled us to clamp the infrarenal aorta with the EVAR stent graft, which was reshaped in the same way after Dacron graft replacement. Recently, a study reported by Ben Abdallah et al.[25] reported that infrarenal clamping may reduce AKI. In contrast, in our study, no difference was observed between the AKI development in terms of suprarenal and infrarenal cross-clamp techniques. This may be the result of our renal protection technique by infusing Custodiol solution into the renal arteries.

There is no clear expert opinion regarding stent graft management (i.e., complete or partial stent graft removal) during surgical reconstruction, which is a controversial issue. Regardless of acute or elective conditions, if the stent graft is not firmly anchored to the aortoiliac wall, the fixed segment is aneurysmal, or there is a graft infection, complete removal of the graft may be considered.[22] However, if it is not possible to separate the stent graft from the vascular wall, aortic reconstruction or the neo-neck technique can be considered rather than the complete removal of the stent graft.[26] In terms of graft infection, all efforts must be shown for the total removal of the graft.

Therefore, in our series, EVAR graft limbs were completely resected in all patients, and no material remained at the iliac artery segments. However, Dias et al.[24] reported that the rate of distal remaining stent graft material was 26% in all patients. Complete resection was performed to prevent an iliac artery or limb thrombosis since a stent graft placed in the iliac artery segment would be prone to thrombosis.

Georgiadis et al.[9] and Xodo et al.[10] reported that the overall 30-day mortality for surgical repair of the failed EVAR was 21.1% and 13.9%, respectively. These results are similar to those of our study. In contrast, Ben Abdallah et al.[25] reported that 30-day mortality was 6% in similar patient groups. However, our lengths of intensive care unit and hospital stay were shorter than those reported by Ben Abdallah et al.[25] (2.5 *vs*. 7 days and 8 *vs*. 21 days, respectively). In all three studies, unlike our study, EVAR grafts were removed in more than half of the patients.

This study has several limitations. Methodological limitations include the small number of patients and the retrospective study design. The diversity of patient groups, different stent graft failure mechanisms, diverse clinical presentations, and different indications complicate the comparison of results. Furthermore, the notable prevalence of complex cases could have exerted a certain degree of influence on both in-hospital mortality and morbidity rates.

In conclusion, acute kidney injury commonly occurs after the surgical reconstruction of a failed endovascular aneurysm repair. Aneurysm-related anatomical factors have an impact on the development of postoperative acute kidney injury after the surgical reconstruction of a failed endovascular aneurysm repair. Comprehensive surgical planning of the procedure should be made, and the surgeon should be ready for probable anatomic and hemodynamic events.

Ethics Committee Approval: The study protocol was approved by the Istanbul Mehmet Akif Ersoy Thoracic Cardiovascular Surgery Training and Research Hospital Ethics Committee (date: 29.08.2022, no: 2022.06.44). The study was conducted in accordance with the principles of the Declaration of Helsinki.

Patient Consent for Publication: A written informed consent was obtained from each patient.

Data Sharing Statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.

Author Contributions: Idea/concept: Ü.A.; Design: Ü.A., Z.M.D.; Control/supervision: M.B.; Data collection and/or processing: E.Y., A.K.A.; Analysis and/or interpretation: A.K.A.; Literature review: E.K., S.E.; Writing the article: Z.M.D., E.Y., E.K.; Critical review: A.K.A., S.E.; References and fundings:Ü.A., M.O.H.; Materials: M.B., M.O.H.

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