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Incidence and Risk Factors of Perioperative Complications in Patients Undergoing Elective Endovascular Aneurysm Repair for Asymptomatic Infrarenal Abdominal Aortic Aneurysms

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Abstract Endovascular aneurysm repair (EVAR) is currently the main therapeutic intervention for abdominal aortic aneurysm. The present study aimed to evaluate the incidence and perioperative factors associated with perioperative complications in patients who underwent EVAR for elective asymptomatic abdominal aortic aneurysm. This retrospective descriptive study was conducted in patients with asymptomatic infrarenal aortic aneurysm who underwent elective EVAR at Siriraj Hospital between 2010 and 2020. Demographic data, procedural data, anesthetic data, and perioperative adverse events were extracted. The primary outcome was the incidence of in-hospital perioperative complications. Multivariable logistic regression was used to determine perioperative factors associated with perioperative adverse events. A total of 427 patients with asymptomatic abdominal aortic aneurysm who underwent elective EVAR were included. The mortality rate was 1.2%. The incidence of perioperative complications was 23.9%, with a total of 169 adverse events. The most common complications were wound hematoma (7.0%), acute kidney injury (6.9%), and hospital-acquired pneumonia (4.7%). Multiple logistic regression identified factors associated with perioperative complications, including pre-existing arrhythmia (adjusted OR, aOR 3.84; 95%CI, 1.74-8.49, p<0.05), anesthesia duration of more than 4 hours (aOR 2.25; 95%CI, 1.31-3.88, p<0.05), general anesthesia (aOR 2.06; 95%CI, 1.19-3.54, p<0.05), and maximum aneurysm diameter of more than 60 mm (aOR 1.88; 95%CI, 1.12-3.13, p<0.05).In conclusion, the incidence of perioperative complications in asymptomatic abdominal aortic aneurysm patients who underwent elective EVAR was common. Optimization of preoperative conditions and avoidance of modifiable factors might prevent postoperative complications related to the EVAR procedure.

Keywords: **perioperative complication; endovascular aneurysm repair; abdominal aortic aneurysm; anesthesia**

Introduction

An abdominal aortic aneurysm (AAA) is a major cause of death and disability in adults. It is often asymptomatic until rupture, which leads to delayed diagnosis and treatment, and carries a mortality rate of about 85-90%[1]. Therefore, the key principle is to diagnose and treat the aneurysm before rupture occurs.

Two methods are currently used to repair infrarenal abdominal aortic aneurysms (AAA): open repair and endovascular aneurysm repair (EVAR)[1]. EVAR is a less invasive procedure and the primary treatment for AAA. It reduces operative time, blood loss, transfusion requirements, intensive care unit (ICU) and hospital stays, and mortality compared to open repair[2,3].

Perioperative adverse events are associated with various factors, including patient-related, surgical-related, and anesthesia-related factors. Perioperative complications following EVAR may include systemic complications and device-related complications[4]. Perioperative complications from EVAR ranges from approximately 11-31%[3,5] and included neurological deficits, myocardial ischemia, renal failure, hypotension, and device-related issues[4]. However, evidence on the role of anesthesia-related factors in these complications remains limited[5,6]. This study aimed to determine the incidence of perioperative complications and to identify associated patient-, surgical-, and anesthesia-related risk factors in asymptomatic infrarenal AAA patients undergoing elective EVAR, with the goal of informing early risk stratification and preventive strategies.

Methods

The research protocol was approved by the Mahidol University Institutional Review Board (COA No. Si 632/2021). The study period was from August 2021 to October 2023. This retrospective analytical study included patients with asymptomatic infrarenal abdominal aortic aneurysms (AAA) who underwent elective EVAR at Siriraj Hospital between 2010 and 2020. Adult patients with asymptomatic infrarenal AAA who were treated with elective EVAR under anesthesia were included. Eligible patients were identified using ICD-10 codes (I71.9) and ICD-9 procedure codes (39.71). Patients who had undergone prior endovascular aortic repair, required re-operations, or had incomplete electronic medical records were excluded.

Data were extracted from hospital, surgery, and anesthesia department databases into case record forms. Collected data included preoperative demographics, comorbidities, surgical and anesthesia details, and hospital length of stay. Perioperative adverse events were classified as follows: (1) cardiac complications (cardiac arrest, myocardial infarction, new or unstable pre-existing arrhythmia, and prolonged hypotension (SBP <90 mmHg for more than 30 minutes); (2) respiratory complications (pulmonary embolism, atelectasis, hospital-acquired pneumonia, aspiration, and desaturation from unidentified causes); (3) neurological complications (new stroke and spinal ischemia); (4) bowel ischemia; (5) acute kidney injury; (6) vascular complications (thrombosis and hematoma); and (7) device-related complications (endoleak, graft migration, ruptured aneurysm, aortic dissection, graft infection, and graft thrombosis).

Outcomes, including death, re-operation, and post-operative embolization, were also recorded.

Statistical analysis

With the estimated perioperative complication rate after EVAR of 20%[7], a sample size of 427 cases was calculated with a 5% margin of error and a 99% significance level. Demographic data were summarized as frequency and percentage for categorical variables and as median with interquartile range for continuous variables. Categorical data were compared using the Chi-square test or Fisher's exact test, while continuous data were analyzed with a T-test or Mann-Whitney U test. Logistic regression was used to identify factors associated with perioperative complications. Variables with a univariable p-value <0.1 were included in a multivariable logistic regression model. Crude and adjusted odds ratios (aOR) with 95% confidence intervals (95%CI) were reported. All tests were two-sided, and significance was set at a p-value <0.05. Data analysis was performed using SPSS Statistics for Windows, version 18 (SPSS Inc., Chicago, IL, USA).

Results

Patients' characteristics

The study included 427 patients who underwent elective EVAR between 2010 and 2020 (Table 1).

Table 1. Demographic data and comorbidity

Variables	Total (n = 427)	Without adverse event (N = 325)	With adverse event (N = 102)	p-value
Age (yr)*	76 (70 - 80)	75 (69 - 80)	78 (72 - 82)	0.006
Sex : Male; n (%)	355 (83.1)	274 (84.3)	81 (79.4)	0.249
Body mass index (kg/m2)*	23.01 (20.2 - 25.4)	22.8 (20.0 - 25.3)	23.4 (20.7 - 25.7)	0.198
Comorbidity; n (%)				
Hypertension	368 (86.2)	273 (84.0)	95 (93.1)	0.020
Dyslipidemia	208 (48.7)	156 (48.0)	52 (51.0)	0.599
Coronary artery disease	132 (30.9)	89 (27.4)	43 (42.2)	0.005
Diabetes mellitus	92 (21.5)	65 (20.0)	27 (26.5)	0.166
Chronic kidney disease	83 (19.4)	53 (16.3)	30 (29.4)	0.004
Cerebrovascular disease	66 (15.5)	50 (15.4)	16 (15.7)	0.941
COPD	41 (9.6)	30 (9.2)	11 (10.8)	0.642
Preexisting arrhythmia	36 (8.4)	15 (4.6)	21 (20.6)	<0.001
Preoperative investigation (median IQR)*				
Preoperative hemoglobin (g/dl)	11.9 (10.7 - 13.1)	12.2 (10.9 - 13.3)	11.6 (10.1 - 12.8)	0.002
Creatinine (mg/dl)	1.2 (1.0 - 1.5)	1.2 (1.0 - 1.4)	1.3 (1.0 - 1.6)	0.179
Albumin (mg/dl)	4.0 (3.6 - 4.2)	4.0 (3.7 - 4.3)	3.8 (3.5 - 4.1)	0.231
Aneurysm diameter (mm)*	57.0 (50.0 - 66.0)	55.0 (49.5 - 64.9)	61.0 (53.0 - 70.9)	<0.001
Position of aneurysm; n (%)				0.920
Abdominal	253 (59.3)	193 (59.4)	60 (58.8)	
Aortoiliac	174 (40.7)	132 (40.6)	42 (41.2)	
Preoperative embolization; n (%)	43 (10.1)	26 (8.0)	17 (16.7)	0.011
ASA classification; n (%)				0.104
I-II	119 (27.9)	97 (29.8)	22 (21.6)	
III-V	308 (72.1)	228 (70.2)	80 (78.4)	

* median (interquartile range); COPD=chronic obstructive pulmonary disease

Of these, 83.1% were male, with a median age of 76 years. The most common comorbidities were hypertension (86.2%), dyslipidemia (48.7%), and coronary artery disease (30.9%). Most patients were classified as ASA III-IV (72.1%). The aneurysm types were infrarenal abdominal aortic aneurysm (59.3%) and aorto-iliac aneurysm (40.7%).

Operative and anesthesia details were shown in Table 2. Spinal anesthesia was used in 53.9% of cases, and general anesthesia was used in 40.5%. The mean anesthesia duration was 3.6 hours. Vasopressors and vasodilators were required in 15.5% and 19.0% of patients, respectively. Intravenous fluids were administered based on clinical judgment, with a median of 1,280 mL. The median estimated blood loss was 200 mL, and blood products were transfused in 14.1% of cases. ICU admission occurred in 29.3% of patients, with a median hospital stay of 6 days.

Perioperative complications

Perioperative complications occurred in 102 patients (23.9%), with a total of 169 events (Table 3). The most common complications were wound

Table 2. Surgical and anesthesia data

Variables	Total (n = 427)	Without adverse event (N = 325)	With adverse event (N = 102)	p-value
Choice of anesthesia; n (%)				<0.001
Regional anesthesia (RA)	230 (53.9)	194 (59.7)	36 (35.3)	
General anesthesia (GA)	173 (40.5)	116 (35.7)	57 (55.9)	
RA convert to GA	19 (4.4)	11 (3.4)	8 (7.8)	
Monitored anesthesia care	5 (1.2)	4 (1.2)	1 (1.0)	
Duration of anesthesia (hr)*	3.6 (2.9 - 4.3)	3.4 (2.8 - 4.1)	4.3 (3.5 - 5.0)	<0.001
Intraoperative fluid management				
Crystalloid (ml)*	1280 (900-1750)	1200 (900-1600)	1500 (1050-2300)	<0.001
Blood transfusion; n (%)	60 (14.1)	37 (11.4)	23 (22.5)	0.005
Estimated blood loss (ml)*	200 (100-350)	200 (100-300)	280 (200-450)	<0.001
Urine output (ml/kg/hr)*	1.8 (1.1-2.8)	1.9 (1.2-3.0)	1.5 (0.9-2.5)	0.055
Vasopressor requirement; n (%)	66 (15.5)	49 (15.1)	17 (16.7)	0.698
Vasodilator requirement; n (%)	81 (19.0)	57 (17.5)	24 (23.5)	0.178
Convert to open surgery; n (%)	1 (0.2)	0 (0.0)	1 (1.0)	0.074
ICU admission; n (%)	125 (29.3)	67 (20.6)	58 (56.9)	<0.001
Reoperation	12 (2.8)	0 (0.0)	12 (11.3)	<0.001
Postoperative embolisation; n (%)	7 (1.6)	0 (0.0)	7 (6.9)	<0.001
Hospital length of stay (days)*	6 (4-9)	5 (4-7)	10 (7-17)	<0.001
In hospital mortality; n (%)	5 (1.2)	0 (0.0)	5 (4.9)	<0.001

* median (interquartile range)

Table 3. Perioperative adverse events

Perioperative adverse event	n	%
Incidence of perioperative adverse events	102	23.9
Cardiac complication		
Cardiac arrest	7	1.6
Myocardial infarction	5	1.2
New or unstable arrhythmia	18	4.2
Prolong hypotension	11	2.6
Renal complication		
Acute kidney injury	29	6.8
Vascular complication		
Vascular thrombosis	5	1.2
Aortic dissection	5	1.2
Wound hematoma	30	7.0
Neurological complication		
New stroke	2	0.5
Spinal cord ischemia	2	0.5
Respiratory complication		
Hospital aquired pneumonia	20	4.7
Atelectasis	4	0.9
Pulmonary embolism	1	0.2
Pulmonary aspiration	1	0.2
Desaturation from other cause	5	1.2
Gastrointestinal complication		
Bowel ischemia	2	0.5
Graft related complication		
Endoleak	19	4.4
Graft infection	1	0.2
Graft thrombosis	2	0.5
Total complication	169	

hematoma (7.0%), acute kidney injury (6.8%), and hospital-acquired pneumonia (4.7%). The mortality rate after EVAR was 1.2%.

Patients with complications were older (78 vs. 75 years; p=0.006) and had a higher prevalence of the following conditions: hypertension (93.1% vs. 84.0%; p=0.020), coronary artery disease (42.2% vs. 27.4%; p=0.005), arrhythmia (20.6% vs. 4.6%; p<0.001), chronic kidney disease (29.4% vs. 16.3%; p=0.004), preoperative anemia (60.8% vs. 47.1%; p=0.017), and albumin levels <3.5 mg/dL (22.5% vs. 13.5%; p=0.041). These patients were more likely to have undergone preoperative embolization (16.7% vs. 8.0%; p=0.015), received general anesthesia (55.9% vs. 35.7%; p<0.001), had anesthesia lasting >4 hours (59.8% vs. 30.2%; p<0.001), received >30 mL/kg of crystalloid (37.3% vs. 17.8%; p=0.001), required blood components (22.5% vs. 11.4%; p=0.006), had a positive fluid balance >10 mL/kg (62.7% vs. 52.6%; p=0.087), urine output <0.5 mL/kg/hr (12.7% vs. 5.8%; p=0.030), and higher estimated blood loss (280 mL vs. 200 mL; p<0.001).

Among patients with complications, 2.8% required re-operation, and 1.6% underwent embolization, mainly for hematoma or device-related issues. The in-hospital mortality rate was 1.2%. Patients with complications had significantly longer hospital stays (10 days vs. 5 days; p<0.001).

Factors associated with perioperative complications

Multiple logistic regression for factor associated with perioperative complication (Table 4) identified the following factors associated with perioperative complications: preexisting arrhythmia (aOR 3.84; 95%CI, 1.74-8.49, p<0.001), anesthesia duration >4 hours (aOR 2.25; 95%CI, 1.31-3.88, p=0.003), use of general anesthesia (aOR 2.06; 95%CI, 1.19-3.54, p=0.009), and aneurysm diameter >60 mm (aOR 1.88; 95%CI, 1.12-3.13, p=0.016).

Table 4. Factor associated with perioperative complications

Variable	Without complications N = 325	With complications N = 102	p-value	Crude OR [95%CI]	p-value	Adjusted OR [95%CI]	p-value
Age at least 75 year	171 (52.6)	67 (65.7)	0.020	1.72 [1.09-2.74]	0.021	1.33 [0.79-2.25]	0.288
Sex: Male	274 (84.2)	81 (79.4)	0.249	1.39 [0.79-2.45]	0.251	1.69 [0.87-3.30]	0.122
Comorbidity							
hypertension	273 (84.0)	95 (93.1)	0.021	2.59 [1.14-5.89]	0.024	2.16 [0.84-5.56]	0.109
coronary artery disease	89 (27.4)	43 (42.2)	0.007	1.93 [1.22-3.07]	0.005	1.17 [0.68-2.02]	0.572
preexisting arrhythmia	15 (4.6)	21 (20.6)	<0.001	5.36 [2.64-10.86]	<0.001	3.84 [1.74-8.49]	<0.001
chronic kidney disease	53 (16.3)	30 (29.4)	0.004	2.14 [1.27-3.59]	0.004	1.28 [0.67-2.45]	0.457
Preoperative Investigation							
albumin <3.5 mg/dl	44 (13.5)	23 (22.5)	0.041	1.86 [1.06-3.26]	0.031	1.29 [0.67-2.48]	0.454
hemoglobin <12 g/dl	153 (47.1)	62 (60.8)	0.017	1.74 [1.11-2.74]	0.016	1.06 [0.60-1.87]	0.848
Aneurysm diameter >60 mm	121 (37.2)	58 (56.9)	0.001	2.22 [1.42-3.49]	0.001	1.88 [1.12-3.13]	0.016
Preoperative embolisation	26 (8.0)	17 (16.7)	0.015	2.30 [1.19-4.44]	0.013	1.78 [0.82-3.87]	0.146
Anesthesia factor							
GA (vs. RA)	116 (35.7)	57 (55.9)	<0.001	2.65 [1.64-4.26]	<0.001	2.06 [1.19-3.54]	0.009
anesthesia duration >4 hr	98 (30.2)	61 (59.8)	<0.001	3.45 [2.17-5.47]	<0.001	2.25 [1.31-3.88]	0.003
urine output <0.5 ml/kg/hr	19 (5.8)	13 (12.7)	0.030	0.43 [0.20-0.89]	0.024	0.52 [0.21-1.28]	0.154
crystalloid >30 ml/kg	58 (17.8)	38 (37.3)	0.001	2.73 [1.67-4.47]	<0.001	1.70 [0.84-3.43]	0.139
blood transfusion	37 (11.4)	23 (22.5)	0.006	2.27 [1.27-4.04]	0.01	0.95 [0.46-1.95]	0.879
positive intake >10 ml/kg	171 (52.6)	64 (62.7)	0.087	1.52 [0.96-2.40]	0.074	0.94 [0.52-1.71]	0.841

GA - general anesthesia, RA - regional anesthesia

Discussion

EVAR is currently the primary treatment method for abdominal aortic aneurysms, improving patient outcomes[8]. This study examined perioperative complications in asymptomatic infrarenal AAA patients who underwent elective EVAR at Siriraj Hospital over a 10-year period. The mortality rate in this study was 1.2%, which was lower than earlier reports, such as the EVAR-2 trial (7.3%)[9], likely reflecting advancements in technology, surgical expertise, and anesthesia management.

Anesthesia adverse events in vascular surgery accounted for 1.7% of all anesthesia adverse events[10]. The overall perioperative complication rate was 23.9%, which was lower than previous studies in the same hospital (40.3%)[3]. The most common complications were wound hematoma (7.0%), acute kidney injury (6.8%), and hospital-acquired pneumonia (4.7%).

Wound hematoma was the most common complication and the leading cause of re-operation or intervention. Factors contributing to wound hematoma included antiplatelet therapy, intraoperative heparinization, and incomplete closure of femoral artery puncture sites[11]. Hematoma resulted in significant morbidity, including blood loss and the need for re-operation[11]. Implementing measures such

as meticulous compression, heparin reversal, and ensuring adequate procedural closure might have reduced the incidence of groin hematoma[12].

Acute kidney injury (AKI) occurred in 6.8% of patients, consistent with previously reported incidence rates ranging from 3.7% to 18.8%[13,14]. AKI remained a significant complication due to its association with long-term morbidity. Although this study focused on a relatively low-risk population undergoing elective EVAR for asymptomatic aneurysms, the AKI incidence was comparable to prior findings in similar populations[3]. Potential factors that contributed to AKI included contrast-induced nephropathy, stent-induced renal ischemia, and negative fluid balance[15,16]. Aggressive fluid resuscitation and strategies to minimize contrast volume usage remained essential in preventing AKI.

Postoperative hospital-acquired pneumonia occurred in 4.7% of patients, a reduction compared to prior studies[3]. The higher proportion of patients who received spinal anesthesia in this study may have contributed to this outcome, as regional anesthesia reduced the need for mechanical ventilation, thereby lowering the risk of pulmonary complications. Factors that contributed to the risk of pneumonia included preoperative pulmonary status, prolonged mechanical ventilation, aspiration, atelectasis, and the type of operation, including AAA surgery[17]. Preventative measures such as low tidal volume ventilation[18], postoperative continuous positive pressure[19], employing the pneumonia prevention bundle[20], and early extubation might have decreased the incidence of postoperative pulmonary complications.

Cardiac complications were found in 8.7% of patients, with arrhythmia being the most common issue (4.2%). Perioperative arrhythmias, particularly atrial fibrillation, may result from various factors such as myocardial ischemia, hypoxia, or dehydration[21]. Given the high prevalence of preexisting cardiac conditions (over 30%), early cardiac monitoring and optimization of fluid status were critical in mitigating these complications.

This study identified several factors associated with perioperative complications, including preexisting arrhythmia, aneurysm diameter >60 mm, use of general anesthesia, and anesthesia duration >4 hours. Patients with preexisting arrhythmias had nearly four times the risk of complications (OR 3.84). Optimizing cardiac status and ensuring preoperative stability may help reduce this risk.

EVAR procedures were more complex in patients with larger aneurysms, leading to longer surgical times, greater blood loss, and increased use of contrast agents[22]. In this study, aneurysm diameter >60 mm was associated with higher incidences of AKI, endoleaks, and the need for reintervention. Although the odds ratio for aneurysm size >60 mm was lower (aOR 1.88), it still represented a meaningful increase in risk, underscoring the need for heightened vigilance in patients with larger aneurysms. Despite advancements in EVAR techniques and devices, managing large aneurysms remains challenging and requires careful patient selection.

Previous studies have shown that EVAR outcomes and complication rates are not significantly influenced by the choice of anesthesia[6,23]. However, in this study, general anesthesia and prolonged anesthesia duration were associated with higher complication risks. This suggests that careful selection of anesthetic techniques and efforts to minimize operative time may be

beneficial. General anesthesia was linked to longer procedures, greater fluid administration, more blood loss, and increased risks of AKI, pneumonia, and endoleaks. In contrast, spinal anesthesia offered advantages such as reduced pulmonary complications and improved postoperative pain control, though it also carried risks, including hypotension and patient discomfort. Therefore, anesthetic technique should be individualized based on patient-specific risk factors and procedural complexity.

This study had several limitations, primarily due to its retrospective design. The nature of the study may result in underreporting or incomplete documentation of complications, which could have affected the observed outcomes. For example, smoking, an important risk factor, was not thoroughly documented and appeared relatively low compared to other studies, potentially underestimating its contribution to post-operative complications.

Additionally, the lack of data on procedural complexity posed challenges in evaluating its potential impact on complications and the choice of anesthesia. Procedural complexity might have influenced outcomes, particularly in patients who underwent general anesthesia, as these patients were found to have a higher proportion of coronary artery disease compared to those who received regional anesthesia. This selection bias might have affected the comparison between anesthetic techniques, as general anesthesia was often favored for higher-risk patients, whereas spinal anesthesia was typically reserved for less severe cases or those with pulmonary comorbidities. However, no significant differences were observed between the two groups in terms of age, number of comorbidities, aneurysm size, or preoperative hemoglobin and albumin levels.

The perioperative complication data were extracted from medical records, which may have introduced inconsistencies due to variations in diagnostic criteria or definitions used during the study period. Furthermore, this study assessed patients over a decade, during which advancements in surgical techniques and devices might have influenced outcomes, adding variability to the findings.

To address these limitations, prospective studies or randomized controlled trials are essential. Future research should aim to collect detailed data on procedural complexity, refine diagnostic criteria for complications, and explore interventions to mitigate risk factors. Studies comparing the impact of anesthetic techniques on outcomes would be particularly valuable in providing evidence-based guidance for optimal perioperative management in EVAR patients.

Conclusion

The occurrence of perioperative complications among asymptomatic infrarenal AAA patients who underwent elective EVAR was 24.3%, demonstrating a reduction from the past but remaining significant. Mortality was low at 1.2%. Risk factors for complications included preexisting arrhythmia, prolonged anesthesia duration, large aneurysm size, and general anesthesia. Addressing modifiable factors, such as optimizing anesthesia techniques, might have further improved outcomes in this population.

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อุบัติการณ์และปัจจัยเสี่ยงของภาวะแทรกซ้อนจากการผ่าตัดในผู้ป่วยที่เข้ารับการผ่าตัดหลอดเลือดใหญ่ส่วนท้องโป่งพองที่ไม่มีอาการด้วยวิธีใส่หลอดเลือดเทียมผ่านสายสวนแบบไม่เร่งด่วน

ณัฐชยา กิริวรรณา พ.บ.*; **นนทิดา โรจนพิทยากร พ.บ.****

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บทคัดย่อ: การใส่หลอดเลือดแดงเทียมทางสายสวน (Endovascular repair; EVAR) เป็นการรักษาหลักสำหรับภาวะเส้นเลือดแดงใหญ่ส่วนท้องโป่งพอง (Abdominal aortic aneurysm; AAA) การศึกษานี้มีวัตถุประสงค์เพื่อประเมินอุบัติการณ์และปัจจัยเสี่ยงที่เกี่ยวข้องกับการเกิดภาวะแทรกซ้อนระหว่างการผ่าตัด EVAR แบบไม่ฉุกเฉิน เป็นการศึกษาแบบย้อนหลังในผู้ป่วยโรค AAA ระดับใต้ไตที่ไม่มีอาการ ซึ่งได้รับการรักษาด้วย EVAR แบบไม่ฉุกเฉินที่โรงพยาบาลศิริราช ในระหว่างปี พ.ศ. 2553 ถึง พ.ศ. 2563 โดยเก็บลักษณะพื้นฐาน ข้อมูลการผ่าตัด ข้อมูลการระงับความรู้สึก และเหตุการณ์ไม่พึงประสงค์ระหว่างการผ่าตัด มีการใช้การวิเคราะห์ถดถอยโลจิสติกแบบหลายตัวแปรเพื่อระบุปัจจัยระหว่างการผ่าตัดที่เกี่ยวข้องกับเหตุการณ์ไม่พึงประสงค์ระหว่างการผ่าตัด มีผู้ป่วย 427 ราย เข้าร่วมในการศึกษา อัตราการเสียชีวิตคือ ร้อยละ 1.2 อุบัติการณ์ของภาวะแทรกซ้อนระหว่างการผ่าตัดคือ ร้อยละ 23.9 เหตุการณ์ไม่พึงประสงค์ทั้งหมดมี 169 เหตุการณ์ ภาวะแทรกซ้อนที่พบบ่อยที่สุดคือเลือดคั่งในแผลผ่าตัด (ร้อยละ 7.0) ภาวะไตวายเฉียบพลัน (ร้อยละ 6.9) และปอดอักเสบในโรงพยาบาล (ร้อยละ 4.7) ตามลำดับ การวิเคราะห์ถดถอยโลจิสติกแบบหลายตัวแปรระบุปัจจัยเสี่ยงของภาวะแทรกซ้อนระหว่างการผ่าตัด ได้แก่ ภาวะหัวใจเต้นผิดจังหวะที่มีอยู่ก่อนผ่าตัด (adjusted odd ratio, aOR 3.84; 95%CI, 1.74-8.49, p<0.05) ระยะเวลาการระงับความรู้สึกมากกว่า 4 ชั่วโมง (aOR 2.25; 95%CI, 1.31-3.88, p<0.05) การระงับความรู้สึกแบบทั้งตัว (aOR 2.06; 95%CI, 1.19-3.54, p<0.05) และขนาดเส้นผ่านศูนย์กลางสูงสุดของหลอดเลือดแดงโป่งพองมากกว่า 60 มม. (aOR 1.88; 95%CI, 1.12-3.13, p<0.05) โดยสรุป อุบัติการณ์ของภาวะแทรกซ้อนระหว่างการผ่าตัดในผู้ป่วยโรคหลอดเลือดแดงใหญ่โป่งพองในช่องท้องที่ไม่มีอาการที่ได้รับการรักษาด้วย EVAR แบบไม่ฉุกเฉินนั้น พบได้บ่อย การปรับสภาวะของผู้ป่วยก่อนผ่าตัด และการหลีกเลี่ยงปัจจัยที่สามารถเปลี่ยนแปลงได้ อาจช่วยป้องกันภาวะแทรกซ้อนหลังการผ่าตัดที่เกี่ยวข้องกับการรักษาด้วย EVAR ได้

คำสำคัญ: **ภาวะแทรกซ้อนระหว่างการผ่าตัด; การผ่าตัดใส่หลอดเลือดเทียมผ่านสายสวน; หลอดเลือดแดงใหญ่โป่งพองในช่องท้อง; การระงับความรู้สึก**