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Effects of Surgery on Hemodynamics and Postoperative Delirium in Stanford Type A Aortic Dissection

Yongfeng Fan, Xiulun Liu, Zhongkui Li, Daokang Xiang

Department of Cardiac Surgery, Guizhou Provincial People's Hospital, Guizhou, 550499, People's Republic of China

Correspondence: Daokang Xiang, Email dao57115973@163.com

Objective: To investigate the impact of surgical intervention on hemodynamic parameters and postoperative delirium in Stanford Type A aortic dissection patients.

Methods: A retrospective analysis was conducted on 139 patients who underwent surgery for Stanford Type A aortic dissection from February 2022 to February 2024. Hemodynamic parameters, including maximum ascending aortic diameter (MAAD), left ventricular end-diastolic diameter (LVEDd), and ejection fraction (LVEF), were compared pre- and post-surgery. Patients were divided into two groups based on delirium occurrence postoperatively: Group A (n=49, with delirium) and Group B (n=90, without delirium). Differences in surgical factors and intensive care conditions were analyzed, and risk factors for postoperative delirium were identified. Group sizes differ due to retrospective categorization based on observed outcomes rather than controlled sampling.

Results: ① Hemodynamic parameters: Postoperative MAAD and LVEDd were significantly reduced, while LVEF increased compared to preoperative levels ($P < 0.05$). ② Surgical and postoperative conditions: Group A had longer surgery, cardiopulmonary bypass, and deep hypothermic circulatory arrest times than Group B ($P < 0.05$). ③ Univariate analysis of baseline data: Group A had higher rates of patients aged ≥60, hypertension, history of stroke, and elevated preoperative D-dimer levels ($P < 0.05$). ④ Multivariate logistic analysis: Independent risk factors for postoperative delirium included age ≥60, hypertension, history of stroke, surgery time >6 hours, cardiopulmonary bypass time >3 hours, and deep hypothermic circulatory arrest time >40 minutes ($OR > 1$, $P < 0.05$).

Conclusion: Surgical treatment of Stanford Type A aortic dissection has a good effect, significantly improving long-term cardiac function. However, the incidence of postoperative delirium is relatively high and is closely related to factors such as age, hypertension, history of stroke, surgery time, cardiopulmonary bypass time, and deep hypothermic circulatory arrest time.

Keywords: Stanford Type A aortic dissection, surgical intervention, hemodynamic parameters, postoperative delirium, impact, investigation

Introduction

Stanford Type A aortic dissection is one of the most dangerous cardiovascular emergencies, characterized by extremely high mortality and morbidity rates.[1] The pathogenesis of this disease is complex, involving multiple factors such as hypertension, atherosclerosis, and genetic connective tissue disorders.[2] Due to its sudden onset and rapid progression, the majority of Stanford Type A aortic dissection patients require emergency surgical intervention to reduce mortality risk and improve prognosis.[3] Surgical intervention is the primary treatment method for Stanford Type A aortic dissection, aiming to reconstruct or replace the affected aortic segment to restore normal blood flow.[4] With continuous advancements in aortic surgery techniques, postoperative mortality rates for patients with aortic dissection have significantly decreased. However, postoperative complications remain an independent risk factor for in-hospital mortality among these patients.[5] Postoperative delirium, one of the most common neurological complications, has increasingly become a focus of clinical attention. Delirium is an acute organic brain dysfunction characterized by sudden, transient, and widespread cognitive impairment, with disturbances in consciousness being particularly prominent.[6] In surgeries for Stanford Type A aortic

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dissection, the extended surgical duration and deep hypothermic circulatory arrest time, along with procedures involving the ascending aorta and aortic arch, can impact cerebral perfusion, leading to a high incidence of postoperative delirium. The incidence rate ranges from 37% to 52%, and when delirium occurs, it raises the risk of hospital-acquired infections, increases mortality, prolongs hospital stay, and adds to medical costs.

Previous studies[7] have confirmed that patients with Stanford Type A aortic dissection exhibit significant changes in hemodynamic parameters after surgery, which may be closely related to the recovery of cardiac function and long-term prognosis. However, current research on the relationship between changes in hemodynamic parameters and postoperative delirium in patients with Stanford Type A aortic dissection is limited. Therefore, this study aims to retrospectively analyze the clinical data of 139 patients who underwent surgical treatment for Stanford Type A aortic dissection at our hospital, to explore the impact of surgical intervention on hemodynamic parameters, and to analyze the risk factors for postoperative delirium. This is intended to provide a reference for clinical practice, further optimize surgical strategies and postoperative management, and improve long-term patient outcomes.

Materials and Methods

Basic Information

A retrospective analysis was conducted on the clinical data of 139 patients who underwent surgical treatment for Stanford Type A aortic dissection at our hospital between February 2022 and February 2024. Inclusion criteria: ① Age ≥ 18 years, regardless of gender; ② Diagnosed with Stanford Type A aortic dissection by MRI (using a Siemens 1.5T magnetic resonance imaging system, model ESSENZA) or aortic angiography (CTA examination conducted with a Siemens Somatom Drive dual-source CT scanner); ③ First-time surgical treatment for Stanford Type A aortic dissection with clear surgical indications;[8] ④ Patients with clear consciousness, sound mind, and complete data available for analysis. Exclusion criteria: ① Concurrent malignant tumors; ② Coexisting immune system, hematologic system, or thyroid disorders; ③ Severe hyponatremia and/or infection; ④ Postoperative coma duration ≥ 3 days; ⑤ Perioperative death; ⑥ ICU stay < 24 hours (To ensure that included cases had sufficient postoperative monitoring data for comprehensive analysis); ⑦ Cognitive, communicative, or psychiatric disorders; ⑧ Incomplete participation in the study or insufficient clinical data. This study was approved by the ethics committee of Guizhou Provincial People's Hospital. Due to the retrospective nature of this study, potential biases such as selection bias and missing data may be present. Selection bias may arise as only patients with complete data were included, potentially omitting cases with different outcomes. Missing data was minimized by stringent data collection protocols, yet some variability remains inherent to retrospective analyses.

Surgical Methods and Postoperative Management

Upon admission, patients immediately received comprehensive ECG monitoring and oxygen therapy, while multiple measures were actively taken to control the condition, including blood pressure reduction, heart rate control, sedation, and pain relief. Meanwhile, medical staff expedited the completion of all necessary preoperative tests and examinations to prepare for surgery. Surgical intervention was performed within 30 minutes to 2 days after a definitive diagnosis. For anesthesia management, all patients received combined intravenous-inhalation general anesthesia to ensure adequate anesthesia throughout the procedure. Intraoperatively, deep hypothermic circulatory arrest was employed, with naso-pharyngeal temperature reduced to 20°C to protect organ function, particularly the brain. To further minimize neurological damage, selective cerebral perfusion was applied, and the most appropriate surgical approach was chosen based on the specific aortic lesion of the patient. These approaches included but were not limited to aortic root replacement, aortic sinus repair, aortic valve replacement, aortic valve repair, and, if necessary, simultaneous coronary artery bypass grafting. Following surgery, patients were transferred to the Intensive Care Unit (ICU) for close postoperative monitoring. During their ICU stay, patients continued to receive sedation and analgesia, along with mechanical ventilation support to stabilize respiratory function. The criteria for extubation included full recovery of consciousness, normal spontaneous breathing function, maintenance of blood oxygen saturation within the normal range, stable circulatory system, absence of significant infection, and hemodynamic stability without or with minimal vasopressor support. All these measures aimed to ensure prompt postoperative recovery while minimizing the occurrence of complications.

Data Collection and Observation Indicators

Changes in hemodynamic parameters, including maximum ascending aortic diameter (MAAD), left ventricular end-diastolic diameter (LVEDd), and left ventricular ejection fraction (LVEF), before and after surgery were collected, along with preoperative clinical characteristics of the two groups of patients. These characteristics included age, gender, body mass index (BMI), underlying diseases, laboratory test results, surgery-related information, and postoperative intensive care information. The risk factors for postoperative delirium in patients with Stanford Type A aortic dissection were analyzed. A D-dimer level > 0.5 mg/L indicated an elevated D-dimer level.

Delirium Assessment Method

The Confusion Assessment Method for the Intensive Care Unit (CAM-ICU)[9] scale was used to assess delirium in patients. Postoperative delirium was characterized by the following: ① Inattention; ② Acute onset with fluctuating course; ③ Disorganized thinking; ④ Altered level of consciousness. A diagnosis of delirium could be made if the patient exhibited a combination of ①, ②, ③ or ①, ②, ④. Delirium assessment typically began 24 hours after surgery, with an evaluation frequency of every 8 hours. Reassessment was conducted promptly upon any change in consciousness, continuing until the 10th postoperative day or until discharge from the ICU.

Statistical Analysis

GraphPad Prism 8 software was used for plotting, and SPSS 22.0 software was employed for data processing. Measurement data were described as ($\bar{x} \pm s$), and independent samples *t*-test was used for intergroup comparisons. Count data were described as n (%), and the chi-square test was used for intergroup comparisons. A multivariate Logistic regression model was used to analyze the risk factors for postoperative delirium in patients with Stanford Type A aortic dissection. A P-value < 0.05 was considered statistically significant.

Results

Comparison of Hemodynamic Parameters

As shown in Figure 1, there were statistically significant improvements in hemodynamic parameters following surgery (*P* < 0.05). The maximum ascending aortic diameter (MAAD) decreased significantly from 48.24 ± 3.57 mm preoperatively to 29.65 ± 3.39 mm postoperatively. Similarly, the left ventricular end-diastolic diameter (LVEDd) was significantly reduced from 52.41 ± 5.57 mm to 43.14 ± 2.85 mm. The left ventricular ejection fraction (LVEF) showed a significant increase from 48.23 ± 7.56% to 58.69 ± 7.88%, All changes were statistically significant.

Comparison of Intraoperative and Postoperative Intensive Care Indicators Between Group a and Group B

In Group A, operation time, cardiopulmonary bypass time, and deep hypothermic circulatory arrest time were significantly longer compared to Group B (P<0.05), with the 95% confidence intervals for differences as follows: operation time [303.89, 331.77] minutes, cardiopulmonary bypass time [106.67, 131.47] minutes, and deep hypothermic circulatory arrest time [20.29, 42.03] minutes. There were no statistically significant differences between the groups in terms of postoperative mechanical ventilation time (95% CI [106.41, 136.45] minutes, P=0.273), use of sedatives (P=0.339), or intraoperative blood loss (95% CI [959.24, 991.72] mL, P=0.083) (Table 1).

Univariate Analysis of Basic Information

Univariate analysis indicated that age, proportion of hypertension, history of stroke, and preoperative D-dimer levels were significantly higher in Group A compared to Group B (P < 0.05). No statistically significant differences were observed between the two groups in terms of gender, diabetes status, body mass index, systolic blood pressure, blood

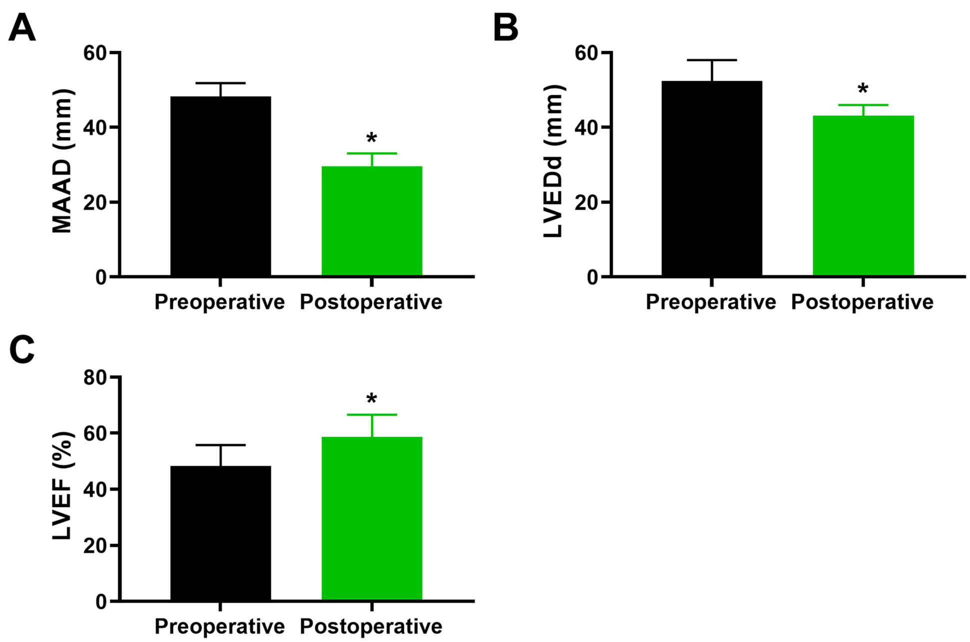

Figure 1 Comparison of Hemodynamic Parameters ($\bar{x} \pm s$), (**A**) MAAD; (**B**) LVEDd; (**C**) LVEF.
Note: Comparison between groups, *P < 0.05.

glucose, total cholesterol, triglycerides, alanine aminotransferase, creatinine, C-reactive protein, white blood cell count, hemoglobin, platelet count, and prothrombin time (P > 0.05), as shown in Table 2.

Multivariate Logistic Analysis of Factors Affecting Postoperative Delirium in Patients with Stanford Type A Aortic Dissection

Postoperative delirium (No = 0, Yes = 1) was used as the dependent variable, and the above statistically significant factors (age, hypertension, history of stroke, preoperative D-dimer level, operation time, cardiopulmonary bypass time, and deep hypothermic circulatory arrest time) were used as independent variables in a multivariate Logistic regression model analysis (variable assignments are shown in Table 3). The results showed that age ≥ 60 years, hypertension, history of stroke, operation time > 6 hours, cardiopulmonary bypass time > 3 hours, and deep hypothermic circulatory arrest time > 40 minutes were independent risk factors affecting the occurrence of postoperative delirium in patients with Stanford Type A aortic dissection (OR > 1, P < 0.05), as shown in Table 4.

Table 1 Comparison of Intraoperative and Postoperative Intensive Care Indicators Between Group a and Group B [$\bar{x} \pm s$, n (%)]

Indicator	Group A (n=49)	Group B (n=90)	t/x²	P	95% CI for Difference
Operation time (min)	393.67±88.52	347.95±75.84	3.198	0.001	[303.89, 331.77]
Cardiopulmonary bypass time (min)	149.83±39.65	127.99±30.76	3.603	<0.001	[106.67, 131.47]
Deep hypothermic circulatory arrest time (min)	37.24±6.73	29.51±6.08	6.894	<0.001	[20.29, 42.03]
Postoperative mechanical ventilation time (min)	184.59±72.31	171.62±63.16	1.098	0.273	[106.41, 136.45]
Use of sedatives	–	–	0.912	0.339	–
Yes	37 (75.51)	61 (67.78)	–	–	
No	12 (24.49)	29 (32.22)	–	–	
Intraoperative blood loss (mL)	1152.35±209.42	1093.95±176.87	1.741	0.083	[959.24, 991.72]

Table 2 Univariate Analysis of Basic Information [$\bar{x} \pm s$, n (%)]

Indicator	Group A (n=49)	Group B (n=90)	t/x^2	P
Gender	–	–	1.864	0.172
Male	40 (81.63)	64 (71.11)	–	–
Female	9 (18.37)	26 (28.89)	–	–
Age (years)	50.43±8.36	46.87±7.26	2.616	0.009
BMI (kg/m²)	24.35±3.47	24.62±3.19	0.462	0.644
Hypertension	–	–	8.130	0.004
Yes	32 (65.31)	36 (40.00)	–	–
No	17 (34.69)	54 (60.00)	–	–
Diabetes	–	–	0.297	0.585
Yes				–
No				–
History of stroke				0.006
Yes				–
No	38 (77.55)	84 (93.33)	–	–
Systolic blood pressure (mmHg)	147.86±14.83	150.27±13.41	0.974	0.331
Blood glucose (mmol/L)	6.32±1.54	6.51±1.37	0.747	0.456
Cholesterol (mmol/L)	5.79±0.82	5.64±0.76	1.081	0.281
Triglycerides (mmol/L)	2.32±0.65	2.43±0.52	1.089	0.278
ALT (U/L)	27.59±6.11	28.42±5.68	0.801	0.424
Creatinine (μmol/L)	84.23±13.52	82.19±12.47	0.894	0.372
C-reactive protein (mg/L)	3.13±1.18	3.29±1.09	0.803	0.423
White blood cell count (×10^9/L)	7.96±2.43	7.68±2.24	0.683	0.495
Hemoglobin (g/L)	142.73±8.85	143.56±7.79	0.571	0.568
Platelet count (×10^9/L)	192.41±30.68	196.18±29.87	0.704	0.482
Prothrombin time (s)	12.85±2.46	13.04±2.19	0.467	0.640
D-dimer (mg/L)	3.73±1.12	3.25±0.86	2.818	0.005

Table 3 Variable Assignment Table

Independent Variable	Variable Assignment
Age	Age ≤ 60 years = 0, Age ≥ 60 years = 1
Hypertension	No = 0, Yes = 1
History of stroke	No = 0, Yes = 1
Preoperative D-dimer level	Original value input
Operation time	Operation time ≤ 6 hours = 0, Operation time > 6 hours = 1
Cardiopulmonary bypass time	Cardiopulmonary bypass time ≤ 3 hours = 0, Cardiopulmonary bypass time > 3 hours = 1
Deep hypothermic circulatory arrest time	Deep hypothermic circulatory arrest time ≤ 40 minutes = 0, Deep hypothermic circulatory arrest time > 40 minutes = 1

Table 4 Multivariate Logistic Analysis of Factors Affecting Postoperative Delirium in Patients with Stanford Type a Aortic Dissection

Influencing Factor	*β*	*SE*	*Wald* x^2	*P*	*OR (95% CI)*
Age ≥ 60 years	1.026	0.485	4.557	0.021	1.213 (1.059~1.774)
Hypertension	0.889	0.435	4.306	0.027	1.192 (1.046~1.705)
History of stroke	0.812	0.397	4.092	0.031	1.314 (1.105~1.902)
Operation time > 6 hours	1.184	0.488	5.791	0.013	1.528 (1.116~2.213)
Cardiopulmonary bypass time > 3 hours	0.668	0.394	2.987	0.045	1.102 (1.013~1.642)
Deep hypothermic circulatory arrest time > 40 minutes	0.919	0.458	4.058	0.036	1.359 (1.107~1.954)
Elevated D-dimer level	0.596	0.371	2.586	0.059	1.076 (0.938~1.562)

Discussion

The Impact of Surgical Intervention on Hemodynamic Parameters in Patients with Stanford Type A Aortic Dissection

Stanford Type A aortic dissection is an extremely severe acute cardiovascular disease, characterized primarily by a tear in the aortic intima, leading to blood entering the middle layer and creating a separation between the true and false lumens.[10] This lesion typically occurs in the ascending aorta and is known for its rapidly progressing course and high lethality. Without timely treatment, the mortality rate within 48 hours of onset can reach up to 50%.[11] Therefore, prompt and accurate diagnosis, along with immediate intervention, is crucial for patient survival and long-term prognosis. Surgical intervention is currently the most effective treatment method, especially for critically ill patients. Surgery can repair or replace the damaged aortic segment, not only restoring normal blood flow but also effectively preventing further expansion or rupture of the dissection, thereby reducing fatal risks.[12] During the surgical process for Stanford Type A aortic dissection, maintaining hemodynamic stability is key to the success of the surgery.[13] Due to the complexity of the surgery and the severity of the disease, patients may experience a range of hemodynamic disorders during surgery, such as hypotension, arrhythmias, and potential microvascular embolism during cardiopulmonary bypass, which can lead to insufficient organ perfusion and increased risk of postoperative complications.[14] Changes in intraoperative and postoperative hemodynamic parameters are not only direct indicators of surgical outcomes but also significantly influence the long-term recovery of the patient's cardiac function.

Among these parameters, MAAD, LVEDd, and LVEF are important indicators for assessing cardiac function and surgical outcomes. A reduction in MAAD typically indicates successful closure of the dissection's false lumen and effective reestablishment of blood flow, marking anatomical success in surgery.[15] Changes in LVEDd reflect the compliance of the left ventricle and its adaptability to volume load, with a reduced LVEDd often indicating improvements in left ventricular structure and function.[16] LVEF, as a key indicator of left ventricular systolic function, typically increases postoperatively, reflecting the overall recovery of cardiac systolic function.[17] During the surgical procedure, any improper technical operation or intraoperative complications, such as hypoperfusion induced by cardiopulmonary bypass or prolonged circulatory arrest, may lead to abnormal changes in these hemodynamic parameters, adversely affecting the patient's long-term prognosis.[18] Therefore, close monitoring and evaluation of hemodynamic parameters post-surgery are crucial for developing postoperative management strategies and predicting long-term patient prognosis. In this study, we conducted a detailed analysis of 139 patients with Stanford Type A aortic dissection who underwent surgical treatment and found that postoperative MAAD and LVEDd were significantly reduced compared to preoperative levels, while LVEF was significantly increased ($P<0.05$). These results suggest that the surgery achieved positive outcomes in both anatomical repair and cardiac function recovery. The reduction in MAAD and LVEDd indicates successful closure of the false lumen and improvement in ventricular structure, while the increase in LVEF further validates the recovery of cardiac function. These findings not only confirm the effectiveness of surgical intervention in treating Stanford Type A aortic dissection but also provide a strong basis for the long-term management and prognosis evaluation of postoperative patients. By analyzing the changes in these hemodynamic parameters, this study further strengthens the clinical evidence supporting surgical intervention as the primary treatment method for Stanford Type A aortic dissection and emphasizes the importance of postoperative monitoring and management. The results of this study have important reference value for clinicians in postoperative management and long-term prognosis evaluation, helping to optimize treatment plans and improve overall patient outcomes.

Investigation of Postoperative Delirium in Patients with Stanford Type A Aortic Dissection Following Surgical Intervention

Postoperative delirium is a common acute neuropsychiatric syndrome characterized by sudden cognitive impairment. Its typical symptoms include confusion, disorientation, memory loss, difficulty concentrating, and abnormal behavior.[19] These symptoms usually appear shortly after surgery, with a fluctuating and transient nature. Although the exact pathogenesis of delirium is not yet fully understood, studies[20] suggest that multiple factors may interact to cause this complex pathophysiological phenomenon. Known mechanisms include neuronal damage induced by intraoperative or postoperative cerebral hypoperfusion, activation of systemic inflammatory responses, metabolic disorders (such as electrolyte imbalance and acid-base disturbances), and abnormal regulation of neurotransmitter systems. For patients with Stanford Type A aortic dissection, surgical treatment is not only complex and high-risk but is also often complicated by factors such as advanced age, hypertension, and atherosclerosis, all of which significantly increase the risk of postoperative delirium. In this context, the use of deep hypothermic circulatory arrest and prolonged cardiopulmonary bypass during surgery may further exacerbate cerebral hypoperfusion, triggering delirium. Postoperative delirium not only prolongs hospital stays and increases the need for intensive care but may also have lasting negative effects on patients' long-term cognitive function. In elderly patients, the occurrence of postoperative delirium is often associated with poorer postoperative recovery and higher mortality rates. Therefore, identifying high-risk factors for postoperative delirium and taking effective preventive measures are of great clinical significance for improving patient prognosis. In this study, the incidence of postoperative delirium was 35.25%. Through multivariate Logistic regression analysis, several independent risk factors significantly associated with the occurrence of postoperative delirium were identified. These factors include age ≥60 years, hypertension, history of stroke, surgery duration >6 hours, cardiopulmonary bypass time >3 hours, and deep hypothermic circulatory arrest time >40 minutes. The finding that factors such as advanced age and prolonged cardiopulmonary bypass duration are associated with a higher risk of postoperative delirium is consistent with prior research. Age-related vulnerability may arise due to decreased cerebral autoregulation and increased sensitivity to ischemia, which predispose older adults to neurocognitive disturbances after major surgeries.[21] Prolonged cardiopulmonary bypass, often accompanied by systemic inflammatory responses and cerebral hypoperfusion, can further exacerbate neuronal injury and lead to cognitive dysfunction. This understanding of the physiological mechanisms underlying these risk factors emphasizes the need for careful perioperative management of these patients.[22,23]

In recent years, although research on postoperative delirium following surgery for Stanford Type A aortic dissection has increased, different studies have identified varying risk factors. For example, some studies[24,25] have found that a history of hypertension, preoperative cognitive impairment, significant intraoperative blood pressure fluctuations, prolonged deep hypothermic circulatory arrest, poor postoperative sleep quality, and electrolyte imbalance are all important risk factors for postoperative delirium. However, patient characteristics and surgical conditions in these studies vary, such as fewer elderly patients and a lower proportion of patients with preoperative cognitive impairment. Additionally, clinical practice has yet to establish a unified standard for defining intraoperative blood pressure fluctuations, making it difficult for related research results to be entirely consistent. Other studies[26] have shown that elevated preoperative D-dimer levels, low intraoperative mean arterial pressure, prolonged postoperative mechanical ventilation, and acute renal failure are significantly associated with an increased incidence of postoperative delirium. Although univariate analysis in this study showed that preoperative D-dimer levels were significantly elevated in patients who developed delirium ($P<0.05$), this indicator did not demonstrate significant predictive value for postoperative delirium in the multivariate analysis. A possible reason for this is the presence of more elderly individuals, hypertensive patients, and individuals with a history of stroke in Group A, where delirium occurred, which may have more significantly influenced the occurrence of delirium. Additionally, some studies[27] have shown that higher systolic blood pressure at admission can predict the risk of postoperative delirium; another study[28] suggested that the use of dexmedetomidine sedation during postoperative intensive care can effectively reduce the incidence of delirium. Moreover, blood glucose fluctuations are also believed to be associated with postoperative delirium,[29] and changes in plasma interleukin-6 levels may serve as a biomarker to predict whether a patient will develop delirium postoperatively.[30] By integrating these research findings, it is evident that the mechanisms leading to postoperative delirium in patients with Stanford Type A aortic dissection are complex and multifaceted, involving various pathophysiological changes. Understanding and identifying these risk factors not only helps clinicians prepare adequately preoperatively and reduce the risk of delirium but also improves the overall prognosis of patients and enhances the effectiveness of treatment.

Conclusion and Limitations

The results of this study indicate that surgical intervention has a significant effect on improving patients' hemodynamic parameters, with postoperative MAAD and LVEDd reduced compared to preoperative levels, while LVEF increased compared to preoperative levels, indicating that surgery plays an important role in restoring cardiac function. Additionally, the incidence of postoperative delirium in this study was 35.25%. Multivariate Logistic analysis revealed that age ≥60 years, hypertension, history of stroke, surgery duration >6 hours, cardiopulmonary bypass time >3 hours, and deep hypothermic circulatory arrest time >40 minutes were independent risk factors influencing the occurrence of postoperative delirium in patients with Stanford Type A aortic dissection. These findings provide important evidence for clinicians to identify high-risk patients preoperatively and implement individualized preventive measures, thereby improving postoperative prognosis and long-term quality of life. It is important to note that, despite revealing some important clinical associations and risk factors, this study still has certain limitations, primarily including the following points: ① Limited sample size: This study only included 139 patients, with a relatively small sample size, which may limit the generalizability and external validity of the study results. ② Single-center study: This study was a single-center retrospective analysis, and the characteristics of the patient population and surgical procedures may be influenced by the specific hospital conditions, potentially making it difficult to fully reflect the situation in other medical institutions. ③ This study's retrospective nature relies on the availability and accuracy of medical records, which may contain instances of missing or incomplete data. Future studies using a prospective design could mitigate this limitation by enabling standardized data collection and minimizing potential biases. ④ Unexplored Variability in Postoperative Management: Variations in postoperative management, including sedative use and duration of mechanical ventilation, may influence delirium incidence but were not fully examined in this study. Prospective multi-center studies could further investigate these variables and provide a clearer understanding of their role in postoperative outcomes. In summary, this study has significant implications for revealing the hemodynamic changes and risk of delirium following surgery for Stanford Type A aortic dissection. The findings highlight actionable insights for clinical practice, particularly regarding adjustments to intraoperative management to mitigate delirium incidence and improve outcomes. Specifically, limiting the duration of cardiopulmonary bypass and deep hypothermic circulatory arrest, when feasible, along with enhanced perioperative monitoring for elderly and high-risk patients, may reduce the likelihood of postoperative delirium and promote recovery. Additional strategies, such as optimizing the use of intraoperative sedatives, maintaining meticulous blood pressure control, and closely monitoring hemodynamic parameters, could further enable individualized preventive measures, thus optimizing both immediate and long-term patient outcomes. However, further research involving larger sample sizes, multi-center studies, and prospective designs is needed to validate and expand upon these findings, thereby better guiding clinical practice. In particular, future studies should explore perioperative management variables in detail to identify specific interventions that can reduce delirium risk and improve hemodynamic stability. Such research will enhance the evidence base for best practices in treating patients with Stanford Type A aortic dissection and support the development of optimized postoperative care protocols.

Data Sharing Statement

All data generated or analysed during this study are included in this published article.

Statement of Ethics

This study was approved by the ethics committee of Guizhou Provincial People's Hospital. Informed consent was obtained from all study participants. All the methods were carried out in accordance with the Declaration of Helsinki.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors declare that they have no competing interests.

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