Clinical Research Protocol

Project letter

Program name: A Real World Study of Valvular Heart Disease in Jiangxi Province

Program No.:

Type of study: A real world registration research

Funding Source: Jiangxi Province Science and Technology Department

Version No.: V 1.0

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Program version revision history[1]

Version number : V 1.0 Modified by		
Remarks: First edition		
Version No. : Modified on.		
Chapter	Summary of changes	Reason for change

[1] The table is not enough, you can expand the additional pages, but do not attach other irrelevant materials

1. Major participants in the project [2]

Numbe r	Name	Title	Unit (Section)	Division of labor	Whether to obtain GCP certificate	Signature
1	Yanqing Wu	Director	Cardiovascular Medicine	Project Leader	Yes	
2	Jinsong Xu	Director	Cardiovascular Medicine	Surgery execution	Yes	
3	Ren Gong	Main Treatmen t	Cardiovascular Medicine	Surgery execution	Yes	
4	Shiyuan, Zhang	Deputy Director	Cardiovascular Medicine	Ultrasound of the heart	Yes	
5	Xiao Huang	Deputy Director	Cardiovascular Medicine	Program guidance and adjustment	Yes	
6	Jiandi Liu					
7	Ziheng Tan					
8	Siyi Chen					
9						
10						

[2] Major project members are required to receive GCP training and certification

2. Summary of the study protocol (should include study title, study purpose, design type, study populations, sample size, inclusion criteria, observation indicators, statistical analysis methods, etc.)

Research Title: A Real World Study of Valvular Heart Disease in Jiangxi Province

Purpose of the study.

① Main objectives: To examine the current incidence of valvular heart disease in Jiangxi Province, to establish a "Formal treatment model" for patients with valvular heart disease, and to manage the collection of diagnostic, therapeutic and prognostic data on patients.

② Secondary objective: To investigate the composite of all-cause mortality, disabling stroke, permanent pacemaker implantation, and moderate or greater valve regurgitation in the "Formal treatment model" group and the "Conventional treatment model" group. The Conventional group was matched to patients who were not in the " Formal treatment model " during the same period.

Design type: a prospective, observational, real-world study (at least 1.5 years). No pre-established fixed treatment protocols, only a Formal treatment model,with all treatment choices made entirely by clinicians following relevant textbooks, expert consensus on clinical guidelines, and based on the patient's condition.

Subjects: All patients with moderate to severe heart valve disease were collected from the Second Affiliated Hospital of Nanchang University and hospitals at all levels in Jiangxi Province from September 2022 to September 2023.

Inclusion criteria: ① All moderate-to-severe heart valve disease, including aortic, mitral, and tricuspid valves; ② Comply with the ESC/EACTS Guidelines for the Management of Valvular Heart Disease (2021) indications for surgery for valvular heart disease; ③ Understand and voluntarily sign the informed consent form

Exclusion criteria: (i) those with severe mental disorders and unable to express their will; (ii) those with obvious other abnormal signs, laboratory tests and clinical diseases that, in the judgment of the investigator, make them unsuitable for participation in the study; (iii) those who, in the judgment of the investigator, are unable to complete long-term follow-up.

Main indicators of observation: (a) all-cause death; (b) disabling stroke, cardiogenic death; (c) permanent pacemaker implantation; (d) regurgitation at the diseased valve

Technical approach.

① Outpatient screening of patients with cardiac valve disease, assessed by cardiac ultrasound, arterial CTA and coronary angiography, with definite moderate to severe heart valve disease.

② Eligible patients were divided into "Formal treatment model" and "Conventional treatment model " groups according to whether they received surgical treatment (including medical and surgical treatment), and were enrolled in the study.

③ Postoperative (if any), 30-day, and 1-year follow-up reviews were conducted to inquire about current physical status, medication use, record the occurrence of endpoint events (e.g., cardiac death, all-cause death, myocardial infarction, stroke, pacemaker implantation), cardiac ultrasound to assess valve and cardiac function, and blood was drawn for biochemical indicators such as routine blood and liver and kidney function.

Formal treatment model group: Patients who agree and accept the surgical treatment recommendation (including medical and surgical treatment) enter the formal treatment model group.

Those who have received any of the following treatments (including but not limited to) as recommended by the standardized treatment process are considered to have received the standardized treatment, otherwise, they have not.

1) Surgical procedures: valve repair or replacement, left auricular ligation, left auricular clip.

2) Internal surgery: transcatheter valve replacement, radiofrequency ablation of atrial fibrillation, and left heart ear occlusion.

Conventional treatment model group: Patients who do not agree to enter the Formal treatment model group will automatically enter the Conventional treatment model group.

Study endpoints

(1) Primary endpoints and definitions: all-cause mortality, disabling stroke, and incidence of cardiogenic stroke, permanent pacemaker implantation rate, and moderate or greater valve regurgitation at 1 year after surgery or discharge from treatment.

(2) Secondary endpoints and definitions.

(a) All-cause mortality 30 days after surgery or discharge from hospital after treatment (all-cause mortality includes: cardiac death, non-cardiac death).

(b) Incidence of stroke at 30 days after surgery or discharge from hospital after treatment.

(c) The rate of permanent pacemaker implantation 30 days after surgery or hospital discharge after treatment.

(d) Postoperative or treated discharges with moderate or greater valvular regurgitation.

(e) Readmission rates for complications related to aortic stenosis and/or valve implantation at 30 days and 1 year after discharge from the hospital after surgery or treatment.

(f) The incidence of temporary intraoperative valve size changes (including increasing or decreasing valve size).

(g) The incidence of abnormal intraoperative valve position (abnormal valve position includes: valve displacement, valve embolism, and valve ectopic release).

(h) Incidence of implantation of two or more valves during aortic valve replacement.

(i) The incidence and number of intraoperative valve recoveries (recoveries include partial and complete recoveries).

(j) Incidence of intraoperative conversion to surgical open-heart surgery.

(k) The incidence of extracorporeal circulatory support beyond what is expected intraoperatively.

(l) The incidence of intraoperative coronary occlusion.

(m) Incidence of major vascular complications associated with surgery.

(n) Health status of subjects 30 days after surgery or discharge from hospital after treatment and at 1 year: evaluation using the Barthel index.

(o) 30 days postoperative or post-treatment discharge and 1-year NYHA classification.

3. Study Background

Project basis

Valvular heart disease is a common clinical cardiac disease with high morbidity and mortality. Mitral regurgitation (MR) is the most common valvular defect, followed by aortic stenosis (AS) and aortic regurgitation (AR)[1-4] . These diseases are currently receiving increasing attention in the field of cardiovascular medicine, mainly because of the changes in the etiology and treatment of these diseases over the past 60 years. Although valvular heart disease can be caused by congenital valve defects, systemic inflammatory diseases, endocarditis, and many other conditions, degenerative valve disease has gradually become the predominant lesion type, resulting in important changes in the clinical characteristics of patients and the distribution of valvular lesion types[5] . The management of patients with valvular disease has also undergone important changes in the last few decades with the development of minimally invasive interventional techniques, such as transcatheter aortic valve placement (TAVR) with transcatheter mitral valve repair and other new technologies. Progressive changes in the etiology of cardiac valvular disease, significant differences in clinical presentation, and the diversity of treatment modalities emphasize the importance of documenting signs, symptoms, and treatment outcomes in patients with different heart valve diseases, not only to describe changes in the condition but also to effectively adjust treatment regimens[6] .

The Second Affiliated Hospital of Nanchang University has completed many heart valve disease surgeries since the establishment of the valvular heart disease treatment team in 2015. Under the leadership of our center, the current cause of heart valve disease related treatment in Jiangxi province is developing well, however, so far, we have not yet established the key technology research and full information big data platform construction and cohort construction for the assessment of valvular heart disease in our province.

We intend to establish different cohorts of people with valvular heart disease, to clarify the etiology and pathogenesis, and to control valvular heart disease from the source. We will rely on the all-information big data platform and cohort construction, and take the population characteristics and key technologies of disease assessment as the important foothold of the platform and cohort construction. Through large real-world cohort studies, we will examine the current incidence of valvular heart disease and the influence of related risk factors on its occurrence, development, treatment, prognosis and control; establish

appropriate technologies for effective prevention and treatment of valvular heart disease and its risk factors, focus on building a diagnosis and treatment center for aging valvular disease, improve the diagnosis and treatment rate of patients, reduce the prevalence and mortality rate, and strive to move forward the window of disease prevention and treatment. Through the establishment of a life-cycle data collection and management system, we will develop the most suitable treatment methods for patients to save their lives and improve their quality of life to the greatest extent.

References

[1] Cary T, Pearce J. Aortic stenosis: pathophysiology, diagnosis, and medical management of nonsurgical patients [J]. Crit Care Nurse,2013,33(2):58-72.

[2] Carita P, Coppola G, Novo G, et al. Aortic stenosis: insights on pathogenesis and clinical implications [J]. J Geriatr Cardiol,2016, 13(6):489-498.

[3] Dweck M R, Boon N A, Newby D E. Calcific aortic stenosis: a disease of the valve and the myocardium [J]. J Am Coll Cardiol,2012,60(19):1854- 1863.

[4] Sathyamurthy I, Alex S. Calcific aortic valve disease: is it another face of atherosclerosis?[J]. Indian Heart J,2015,67(5):503-506. 21/44101205167077.

[5] Soler-Soler J, Galve E. Worldwide perspective of valve disease. Heart[J], 2000, 83:721-725.

[6] Mrsic Z, Hopkins SP, Antevil JL, Mullenix PS. Valvular Heart Disease. Prim Care 2018;45:81-94.

4. Study purpose

1. Study purpose.

To establish different cohort populations of valvular heart disease, to clarify the etiology and pathogenesis, and to control valvular heart disease from the source, we will rely on the all-information big data platform and cohort construction, and take the population characteristics and key technology of disease assessment as the important foothold of the platform and cohort construction. Through large real-world cohort studies, we will examine the current incidence of valvular heart disease and the influence of related risk factors on its occurrence, development, treatment, prognosis and control; establish appropriate technologies for effective prevention and treatment of valvular heart disease and its risk factors, focus on building a diagnosis and treatment center for aging valvular disease, improve the diagnosis and treatment rate of patients, reduce the prevalence and mortality rate, and strive to move forward the window of disease prevention and treatment. Through the establishment of a life-cycle data collection and management system, we will develop the most suitable treatment methods for patients to save their lives and improve their quality of life to the greatest extent.

2. Study endpoints

(1) Primary endpoints and definitions: all-cause mortality, disabling stroke, and incidence of cardiogenic stroke, permanent pacemaker implantation rate, and moderate or greater valve regurgitation at 1 year after surgery or discharge from treatment.

(2) Secondary endpoints and definitions.

(a) All-cause mortality at 30 days postoperative or post-treatment discharge (all-cause mortality includes: cardiac death, non-cardiac death).

(b) Incidence of stroke at 30 days after surgery or discharge from hospital after treatment.

(c) The rate of permanent pacemaker implantation 30 days after surgery or hospital discharge after treatment.

(d) Postoperative or treated discharges with moderate or greater valvular regurgitation.

(e) Readmission rates for complications related to aortic stenosis and/or valve implantation at 30 days and 1 year after discharge from the hospital after surgery or treatment.

(f) The incidence of temporary intraoperative valve size changes (including increasing or decreasing valve size).

(g) The incidence of abnormal intraoperative valve position (abnormal valve position includes: valve displacement, valve embolism, and valve ectopic release).

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(i) The incidence and number of intraoperative valve recoveries (recoveries include partial and complete recoveries).

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(m) Incidence of major vascular complications associated with surgery.

(n) Health status of subjects 30 days after surgery or discharge from hospital after treatment and at 1 year: evaluation using the Barthel index.

(o) 30 days postoperative or post-treatment discharge and 1-year NYHA classification.

5. Study Design

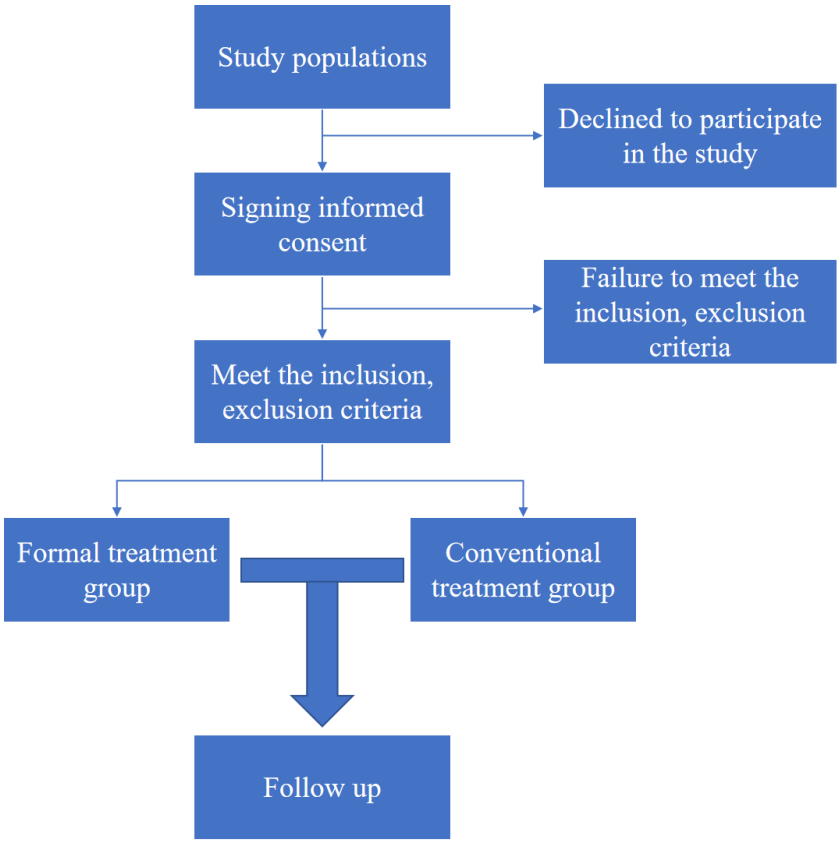
1. Study site and study population

All patients with moderate to severe heart valve disease in the Second Affiliated Hospital of Nanchang University and hospitals at all levels in Jiangxi Province from September 2022 to September 2023 were collected

Inclusion criteria: ① All moderate-to-severe heart valve disease, including aortic, mitral, and tricuspid valves; ② Comply with the ESC/EACTS uidelines for the Management of Valvular Heart Disease (2021) indications for surgery for valvular heart disease; ③ Understand and voluntarily sign the informed consent form

Exclusion criteria: (i) those with severe mental disorders and unable to express their will; (ii) those with obvious other abnormal signs, laboratory tests and clinical diseases that, in the judgment of the investigator, make them unsuitable for participation in the study; (iii) those who, in the judgment of the investigator, are unable to complete long-term follow-up.

2. Research Design Flow Chart



3. Methodology for determining the sample size required for the study

Through a real-world cohort study, this study relies on an all-information big data platform to examine the incidence of valvular heart disease and the influence of related risk factors on its occurrence, development, treatment, prognosis and control; to establish appropriate technologies for effective

prevention and treatment of valvular heart disease and its risk factors, and to focus on building a treatment center for geriatric valvular disease; and to develop the most suitable treatment modalities by establishing a whole-life data collection and management system. By establishing a life-cycle data collection and management system, we will develop the most suitable treatment method for patients. The expected incidence of the primary study endpoint is 30%, β=0.1, certainty (test efficacy) 1- β=90%, requiring a two-sided test with α of 0.05 and certainty (1- β) of 90%, requiring a total sample size of 947 cases, and assuming a 10% loss of follow-up rate, a total of 1052 cases.

6. Safety evaluation (including definition and assessment of adverse events, serious adverse events, etc.)

1. Definition of adverse event: An adverse medical event, whether device related or not, that occurs in a subject during the use of an experimental medical device.

2. Abnormal laboratory and instrumental findings.

3. Serious Adverse Events: The main adverse events after the relevant procedures may be related to the operation, anesthesia and other procedures, including but not limited to the following:

(a) Abnormal laboratory indicators (including electrolyte disturbances) (b) Allergic reactions to anesthesia, contrast media or device materials

(c) Cardiovascular injury, including perforation of a blood vessel, ventricle or vascular entrapment, myocardial or valvular structures that may require intervention

(d) Impaired conduction system, such as new postoperative left bundle branch, high atrioventricular block, permanent pacemaker may be required

(e) Cardiac arrest

(f) Embolism, including air, calcified/thrombotic valve material, or thrombus (g) Decreased exercise tolerance or weakness

(h) Arteriovenous fistula or pseudoaneurysm of the femoral artery (i) Infections, including sepsis and endocarditis

(j) Pericardial effusion

(k) Peripheral ischemia or nerve injury

(l) Stroke/transient ischemic attack or neurological deficit

(m) Coronary artery flow obstruction/valvular flow disorder

(n) Valve Failure

(o) Emergency heart surgery

(p) Mitral valve injury

(q) Perivalvular or mid-valve leaks

(r) Release the valve in an unexpected position

(s) Valvular Stenosis

4. Severity assessment

Light: does not interfere with daily activities.

Medium: affects daily activities.

Severe: loss of ability to perform daily activities.

7. Data Collection and Management

1. Survey Content (CRF Form)

Variables.

(a) Basic patient information: name, gender, age, education level, co-morbidities, past medical history, etc.

(b) Patient admission: chief complaint symptoms, general condition, vital signs, cardiac function classification, STS score, etc.

(c) Preoperative laboratory and instrumentation tests: biochemical indexes, cardiac ultrasound, CTA examination, etc.

(d) Information related to the surgical procedure (if any): surgical access, valve selection, etc.

(e) Intraoperative complications, if any: death, ring rupture, permanent pacemaker implantation, etc.

(f) Postoperative laboratory and instrumentation tests (if any): biochemical indicators, cardiac ultrasound, etc.

(g) Postoperative medication (if any).

(h) The occurrence of adverse events during hospitalization.

(i) Status at follow-up: chief complaint symptoms, general condition, vital signs, cardiac function classification, etc.

(j) Laboratory and instrumental tests at follow-up: biochemical indicators, cardiac ultrasound, etc.

(k) Occurrence of adverse events at follow-up visits.

2. Data Management and Statistical Analysis

For all subjects who have signed the informed consent form and qualified for enrollment, all items in the electronic medical record report form must be recorded carefully and in detail, with no empty items or omissions.

The investigator followed the original medical record and the inpatient major medical record to enter the data into the electronic medical record report form, and the investigator ensured that the completed data were true and accurate.

Data that are significantly high or outside the clinically acceptable range must be verified and the investigator must provide the necessary explanation.

When the investigator makes changes to the data for filling reasons, a dialog box will would appear on the electronic medical record report form and the investigator will need to

indicate the reason for the changes. Any modification made by the investigator will all leave a trace to ensure the authenticity of the data.

After the investigator has completed the data, the monitor has performed the monitoring, and the investigator has resolved all data queries to ensure the data are accurate, the data manager locks the database. The data is reviewed by the data manager, principal investigator, statistical analyst, implementer and monitor manager, and the final definition and judgment of the analyzed population is completed, after which the database is finally locked by the data manager.

Locked databases or files may not normally be changed again.

8. Quality management program (please introduce the relevant measures to ensure the qual ity and progress of the project)

Monitoring of observational cohort studies

Supervisors will visit the study center periodically during the study to ensure that all elements of the study protocol are strictly adhered to and that the original data are checked to ensure that the data are true, complete and correct.

1. Measurement method

(1) CTA.

(2) Electrocardiogram: 12-lead conventional electrocardiogram.

(3) Blood routine, urine routine, liver and kidney function, blood biochemical index: determined by automatic biochemical instrument.

(4) Ultrasound of the heart.

(5) Adverse event records.

2. Completion of electronic case report form

An electronic case report form (CRF) was used for this trial. For all subjects who have signed the informed consent form and qualified for enrollment, all items in the electronic medical record report form shall be carefully and thoroughly recorded, and no empty items or omissions shall be allowed. All data in the electronic medical record report form should be checked against the subject's original medical record data to ensure that they are error-free. The investigator ensures that these data are true and accurate.

3. Preservation of original information

The original data of this trial, including the signed informed consent form, records of the test product distribution, relevant laboratory test reports, case records and other relevant records, should be kept in the national drug clinical trial institution of the hospital where the research center is located. Medical institutions should keep clinical trial information until five years after the termination of the trial. Implementers should save clinical trial information until ten years after the final production of the product into use.

9. Pre-assessment of project risks and benefits and risk control plan (Please describe the risks and benefits that may be assumed by the investigator, the subject and the medical institution during the implementation of the project; if there are risks, please describe the measures and feasibility of risk control.)

1. Benefit/risk evaluation

(1) Benefit: Through real-world cohort studies and relying on the all-information big data platform, we examine the incidence of valvular heart disease and the influence of related risk factors on its occurrence, development, treatment, prognosis and control; establish appropriate technologies for effective prevention and treatment of valvular heart disease and its risk factors, and focus on building a treatment center for geriatric valve disease; through the establishment of a whole-life data collection and management system, we develop the most suitable The treatment method that is most suitable for the patients will be developed through the establishment of the whole life cycle data collection and management system.

(2) Surgical risks (if surgery is performed).

1) Cardiac conduction block

This is by far the most common complication of TAVR. This complication can be reduced by avoiding placing the valve stent too deep (>6 mm), choosing a valve with too large a diameter, selecting a balloon-expandable valve for patients with right bundle-branch block, and choosing a dilating balloon with a small internal diameter. For patients with no postoperative ECG changes and no preoperative right bundle branch block, the temporary pacing electrodes can be removed immediately after surgery, and postoperative ECG monitoring should be continued for 24 h. For patients with preoperative right bundle branch block or postoperative ECG changes, the temporary pacing electrodes should be left in place for 24 h and further evaluated. In patients with high or complete intra- or postoperative AV block that does not recover within 48 h after surgery, a permanent pacemaker should be implanted.

2) Perivalvular leakage

Most patients have a mild to mild perivalvular leak, and self-expanding valves may be reduced over time. Studies have shown a correlation between moderate or greater perivalvular leakage and long-term mortality in patients. Small valve selection, excessive calcification or large calcified masses, and shallow or deep valve placement are risk factors for the development of perivalvular leaks. Evaluation of perivalvular leak and its extent should be performed after valve placement, using means including aortic root angiography, hemodynamic measurements (aortic regurgitation index may be used), and Doppler ultrasound to provide a comprehensive assessment of the extent, location, and hemodynamic impact of perivalvular leak; for moderate or greater perivalvular leak, aggressive intervention should be attempted. Techniques such as post-balloon dilation (when valve expansion is incomplete or the apposition is poor), repositioning of valve stents (when the valve is too high or too low), and blockers to seal perivalvular leaks can be used. Severe patients require surgical intervention. Avoidance of selection of patients with excessive valve calcification, selection of the

appropriate type of valve, and accurate positioning of valve depth can reduce the incidence of perivalvular leaks.

3) Coronary artery occlusion

Coronary artery obstruction is a rare (0.66%) but fatal complication of TAVR and is one of the main reasons for preoperative imaging screening and exclusion of patients from TAVR. The main mechanism of coronary artery obstruction in TAVR is autologous valve upstaging blocking the coronary artery opening. In addition, coronary artery obstruction can be caused by a valve stent placed too high with the skirt blocking the coronary artery opening. The preoperative CT evaluation should be a combination of three aspects: valve leaflet condition, aortic sinus anatomy, and characteristics of the valve to be placed. TAVR should be avoided in patients with inappropriate anatomy, and intraoperative selection of an appropriate balloon and aortic root imaging with balloon dilation to observe coronary artery visualization can help to further assess the risk of coronary artery occlusion. Prevention and treatment strategies for patients at high risk of coronary artery occlusion: (1) selection of a smaller valve and moderately deeper placement, if allowed, may reduce the risk of coronary artery occlusion, but the occurrence of perivalvular leakage may increase; (2) feasible coronary artery protection strategies, including prepositioning of guidewires, balloons, or stents in the coronary arteries; (3) if acute or delayed coronary artery occlusion occurs, emergency coronary intervention or surgery is feasible (3) In case of acute or delayed coronary occlusion, emergency coronary intervention or open-heart surgery with coronary artery bypass grafting is indicated.

4) Stroke

Stroke may be associated with the detachment of calcified material from the valve. The incidence of clinically symptomatic stroke is 2% to 3%, and cranial magnetic resonance imaging shows that ischemic brain injury is common after TAVR (80% to 90%). risk factors for stroke associated with TAVR include surgical factors such as balloon pre-expansion, time in the body of the delivery system, rapid pacing, and valve recovery reset, in addition to the patient's own characteristics. Repeated operations should be avoided intraoperatively and the number of operations should be reduced, which may reduce the incidence of stroke. Cerebral protection devices may be considered in high-risk patients. Clinical studies have shown that brain protection devices may reduce brain injury on MRI monitoring, but whether they reduce clinical events requires further study. If a stroke occurs, a neurologist should be consulted for collaborative management.

5) Local vascular complications

Mainly the inlet vessels, femoral, iliac, and abdominal aorta, develop entrapment, occlusion, and rupture bleeding, with a previous incidence of up to 16.7%. With the use of delivery systems of 18 F and below, the incidence of this complication has decreased to 4.2%. Elderly patients, especially those with many

comorbidities such as hypertension, chronic renal insufficiency, diabetes mellitus, and hereditary hypercholesterolemia, are prone to stenosis, atheromatous plaque, calcification, and excessive tortuosity, which can lead to vascular complications. Preoperatively, MSCT should be used to comprehensively and carefully evaluate the vascular access diameter, select the access diameter with good vascular conditions, avoid selecting access vessels with too small internal diameter and too much distortion, and avoid rough operation. In case of vascular complications, peripheral vascular balloons, peripheral overlapping stents, and vascular surgery if necessary, can be used to deal with them.

6) Cardiac tamponade

The incidence is 1% to 2%. To reduce the occurrence of this complication, the head end of the stiffened guidewire should be shaped into a circle, and the stiffened guidewire should be secured during balloon dilation and into the delivery sheath. When entering the left ventricle with a straight tip guidewire, excessive force should be avoided, causing perforation of the aortic sinus or the left ventricle.

7) Aortic dissection and laceration

A fatal complication of TAVR. Accurate measurement of the aortic annulus size and not using oversized dilating balloons may reduce this complication.

2. Moral Ethics

(1) Ethics committee (should describe how the plan was approved by the research ethics committee/ institutional review board)

1) In conclusion, the Second Affiliated Hospital of Nanchang University has completed many heart valve disease surgeries since the establishment of the valvular heart disease treatment team in 2015. Under the leadership of our center, the current cause of heart valve disease related treatment in Jiangxi province is developing well, however, so far, we have not yet established the key technology research of valvular heart disease assessment in our province and the construction of all-information big data platform and cohort construction. Therefore, we intend to establish a cohort population of valvular heart disease, clarify the etiology and pathogenesis, and control valvular heart disease from the source, which will rely on the construction of the all-information big data platform and cohort, with the population characteristics and key technologies of disease assessment as the important foothold of the platform and cohort construction. Through large real-world cohort studies, we will examine the current incidence of valvular heart disease and the influence of related risk factors on its occurrence, development, treatment, prognosis and control; establish appropriate technologies for effective prevention and treatment of valvular heart disease and its risk factors, focus on building a diagnosis and treatment center for aging valvular disease, improve the diagnosis and treatment rate of patients, reduce the prevalence and mortality rate, and strive to move forward the window of disease prevention and treatment. Through

the establishment of a life-cycle data collection and management system, we will develop the most suitable treatment methods for patients to save their lives and improve their quality of life to the greatest extent.

2) Overview of the undertaking unit (personnel, assets, business and management status).

The Department of Cardiology of the Second Affiliated Hospital of Nanchang University is the excellent innovation team of the Ministry of Education, the national clinical key specialty, the leading medical discipline of Jiangxi Province, the key discipline of the 11th Five-Year Plan of Jiangxi Province, the leading discipline of Nanchang University in granting the doctoral degree of internal medicine, the affiliated unit of the Cardiovascular Special Committee of Jiangxi Medical Association, the Pacemaker and Electrophysiology Special Committee of Jiangxi Biological Engineering Society and Jiangxi Cardiac Association, the Institute of Cardiovascular Tuberculosis of Nanchang University, and the Institute of Genetic Diseases and Genes of Jiangxi Province. The Department of Cardiovascular Diseases of Nanchang University, the Institute of Cardiovascular Diseases of Nanchang University, and the Institute of Genetic Diseases and Genetics of Jiangxi Province. The Department has a GCP platform of the major new drug innovation project of the Ministry of Science and Technology of China, a platform of the Cardiovascular Interventional Therapy and Devices Research Engineering Center of the Ministry of Education, a research platform for genetic gene screening for cardiovascular diseases of the Provincial Education Department, an innovation team of Changjiang scholars of the Ministry of Education, a superior science and technology innovation team of Jiangxi Province, a "311 project" of the Provincial Education Department, a cardiovascular engineering research center, and a cardiovascular research center of Jiangxi Province. Cardiovascular Engineering Research Center, Jiangxi Provincial Molecular Medicine Key Laboratory Sharing Platform, Nanchang University Institute of Cardiovascular Diseases, Jiangxi Provincial Institute of Medical Genetics, Jiangxi Provincial Key Laboratory of Cardiovascular Diseases and a series of experimental platforms. The department has a strong echelon of talents. There are 238 medical and nursing staff, 65 physicians (including 39 doctors, accounting for 60.0% of physician positions); 36 people have overseas study experience, accounting for 55.38%. There are 7 second-level professors, 11 doctoral supervisors, 24 master's supervisors, 32 senior titles, 7 special allowances from the State Council, 2 national outstanding science and technology workers, 1 national outstanding educator, 1 national "May Day" Labor Medal, 1 expert directly under the control of the Central Organization Department, 1 national hundred million talents, 2 young experts with outstanding contributions from the Ministry of Health. In addition, there are also Jiangxi provincial government allowances,

Jiangxi talents with outstanding contribution and "Gan Pao Talent 555" leading talents, and one advanced individual of national health and family planning system. In addition, there are more than 20 people including Jiangxi provincial government allowance, Jiangxi outstanding talents and "GANPOW Talent 555" leading talents and 100 million talents.

3) Advantages of participating units.

1. The Second Affiliated Hospital of Nanchang University is one of the few units in Jiangxi province that can independently perform TAVR surgery, and has completed most of the TAVR surgeries in the province and accumulated rich surgical experience; at the same time, it has participated in many provincial and national clinical studies on TAVR surgery, and has the technical and staff management advantages to complete the surgery.

2. Ltd. has been dedicated to the research, development, production and sales of high-end medical devices since its establishment, and now has a complete and sound R&D and manufacturing capability, as well as a perfect research laboratory and a 10,000-class purification workshop. The company has 35 R&D personnel, specializing in structural design, electronics, materials and other fields. The company has undertaken the projects of National Innovation Fund, Shanghai Torch Plan, Shanghai High-tech Achievement Transformation Project, Shanghai Innovation Fund, Shanghai Talent Development Fund, Shanghai Science and Technology Small Giant Cultivation, etc., and won the awards of National Innovation and Entrepreneurship Competition Outstanding Enterprise, Shanghai Patent Pilot Enterprise and Jiading District Science and Technology Progress Award. At present, the company has 26 patents, among which 7 are authorized invention patents, establishing the brand image of "leading technology and independent innovation". As a high-tech enterprise and Shanghai Small Giant Cultivation Enterprise, the company has successfully developed and transformed three series of products: 1) Intra-cardiac interventional products for angiography and stent placement; 2) Minimally invasive vertebral interventional products for vertebral compression fractures and bone tumors caused by osteoporosis; 3) Intestinal balloon catheters for intestinal imaging, CT and MRI examination and treatment.

(2) Patient Information and Informed Consent

This cohort study was conducted in compliance with the current version of the Declaration of Helsinki, medical device clinical trial regulations, GCP and relevant national regulations.

Prior to the start of the study, the investigator must submit the study protocol, informed consent form and other relevant documents to the medical ethics

committee of the hospital where the clinical trial is conducted. The clinical trial can only be started after the approval of the ethics committee is obtained. Any modification of the study protocol must be approved by the ethics committee before implementation. Serious adverse events during the clinical trial should be submitted to the Ethics Committee in writing in a timely manner.

Prior to enrollment in this study, the investigator must provide subjects and their relatives with details of the clinical trial, including the content of the trial, its purpose, expected efficacy, possible adverse events, and countermeasures. Subjects will not be enrolled until they fully understand the trial, accept the informed process, and sign the informed consent form.

The informed consent form is signed in duplicate by the study physician and the subject or his or her legal representative, and one copy is kept by each party.