



FUWAI HOSPITAL, CAMS
NATIONAL CENTER FOR CARDIOVASCULAR
DISEASES, CHINA

CARDIOVASCULAR SURGERY

OUTCOMES

2020

国家心血管病中心
中国医学科学院阜外医院

外科年度报告

连续11年位居
“中国医院最佳专科声誉排行榜”
心外科第一！

Ranked #1 in **Cardiovascular Surgery**
on “China Best Hospital Leaderboard”

BEIJING, P. R. CHINA

FUWAI HOSPITAL, CAMS
NATIONAL CENTER FOR CARDIOVASCULAR
DISEASES, CHINA

CARDIOVASCULAR SURGERY

OUTCOMES 2020



国家心血管病中心
中国医学科学院阜外医院

外科年度报告

目 录 Table of Contents

2	序 言 PRESIDENT'S ADDRESS
4	2020年数读阜外 SERVICE CAPACITY OF FUWAI
6	概 述 OVERVIEW
14	先天性心脏病 CONGENITAL HEART DISEASE
23	冠状动脉粥样硬化性心脏病 CORONARY DISEASE
30	瓣膜性心脏病 VALVE DISEASE
36	主动脉外科 AORTIC SURGERY
43	周围血管疾病 PERIPHERAL VASCULAR DISEASES

44 微创心脏外科
MINIMALLY INVASIVE CARDIAC
SURGERY

47 肥厚梗阻心肌病
HYPERTROPHIC OBSTRUCTIVE
CARDIOMYOPATHY

48 肺动脉内膜剥脱术
PULMONARY ENDARTERECTOMY
SURGERY

49 心力衰竭的外科治疗
SURGICAL TREATMENT FOR
HEART FAILURE

53 分院建设
SUBCENTERS

56 技术协作
DOMESTIC COLLABORATION
NETWORK

58 积极融入“一带一路”战略
INTEGRATION OF THE BELT AND
ROAD INITIATIVE

60 交 流
COMMUNICATION

70 教育与培训
EDUCATION AND TRAINING

72 科 研
RESEARCH

77 专家简介
SPECIALISTS

80 发展历程
HISTORY

82 致 谢
ACKNOWLEDGEMENTS

序 言

President's Address

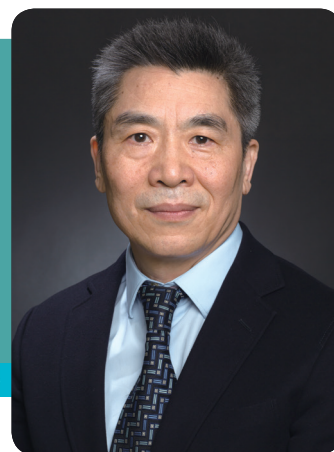
"Quality and Innovation" is the eternal philosophy of our surgical team. Since 2007, the surgical department of Fuwai Hospital has released outcomes reports to public annually. These reports not only enable patients to obtain information on the quality of our team's medical care, but also attract the attention of peers and health workers.

The year of 2020 is extremely special for Fuwai Hospital. Facing the sudden outbreak of Covid-19 Pandemic, under the guidance of national pandemic control strategies, we prevent and control this disease precisely and routinely. In the meanwhile, we've modified the treatment mode for patients with cardiovascular diseases. We have provided more convenient online services, more efficient and high-quality hospitalization treatment. We are making every effort to meet the medical service needs of routine patients.

At the same time, under the national policy of building regional medical centers, the National Center of Cardiovascular Diseases continued to promote the network system building with Beijing Fuwai Hospital as the core center, and three regional medical centers in Yunnan, Henan and Shenzhen as the hub and radiation points, to improve the national cardiovascular surgery service capacity. Generations of Fuwai people, adhering to the unrelenting pursuit of the goal of "protecting health with heart", are dedicated and willing to contribute. We have created the "Fuwai Spirit" of "Dedication, Benevolence, Pragmatism and Promotion". While promoting the development and quality of Fuwai Hospital of ourselves, we have also made great efforts to undertake the responsibilities of the "National Team" and provided great enthusiasm and efforts to local medical capability enhancement. Many experts and scholars at Fuwai Hospital went to the grass-roots community and rural areas in China and implemented the policy of "focusing on the Primary healthcare and giving priority to prevention", to improve the incidence rates of cardiovascular diseases in China.

Fuwai Hospital will continue to follow the concept of "Quality and Innovation", optimize the medical process, innovate medical technologies, and strive to provide better services for patients, to build a world-class cardiovascular medical center.

Thanks again to all members of Fuwai team for their hard work in the past year, and thanks to all colleagues and friends who have helped and supported the development of Fuwai hospital.



Shengshou Hu, MD, FACC

Academician of Chinese Academy of Engineering

Director of National Center for Cardiovascular Disease

President of Fuwai Hospital, CAMS

Director of State Key Laboratory of Cardiovascular Disease

Director of National Center for Clinical Medicine Research of Cardiovascular Disease

胡盛寿 教授

中国工程院 院士

国家心血管病中心 主任

中国医学科学院阜外医院 院长

心血管疾病国家重点实验室 主任

心血管疾病国家临床医学研究中心 主任

“品质与创新”一直是阜外外科团队为患者提供医疗服务永恒的主题和追求。自2007年起，阜外医院外科每年都对大众公布年度业绩报告。年度报告的回顾总结，不仅能使患者获得我们团队医疗质量的信息，也受到同行和卫生工作者们的关注，成为医院督促自身提升高效和优质医疗服务的途径。

2020年对阜外医院来讲是极为特殊的一年。面对突如其来的新冠疫情冲击，在国家整体疫情防控策略的指引下，一方面坚持按卫生主管部门要求，精准、高质量地做好疫情的常态化防控，一方面调整心血管疾病患者的就诊模式，提供更加便捷的互联网线上服务，更加高效优质的住院治疗，尽一切努力满足常规患者的医疗服务需求。

同时，在国家建设区域性医疗中心政策规划下，国家心血管病中心持续推进以北京阜外医院为中心，以云南阜外、阜外华中及深圳阜外三家区域医疗中心为枢纽辐射点的网络体系，努力提升全国心血管外科服务能力。一代代阜外人秉承着对“用心守护健康”这一目标的不懈追求，兢兢业业，甘于奉献，铸就了“敬业、仁爱、求实、攀登”的“阜外”精神，在推进阜外医院自身高质量发展的同时，努力承担“国家队”的职责与担当，投入极大的热情与努力，很多阜外医院的专家学者及医护人员深入全国基层社区，践行“以基层为重点、以预防为主”的方针，努力完善我国的心血管疾病防控体系，控制心血管疾病发病的危险因素，降低心血管疾病的发病率。

阜外医院将继续遵循践行以“品质与创新”的理念，优化医疗流程，创新医疗技术，努力为患者提供更好的服务，为打造国际一流的心血管医学中心而努力奋斗！

再次感谢阜外团队的每位成员在过去一年的辛勤付出，感谢所有帮助阜外发展的同行与朋友的支持！

2020年数读阜外
SERVICE CAPACITY OF FUWAI

中国最大的
心血管疾病诊疗中心

THE BIGGEST CARDIOVASCULAR CENTER
IN CHINA



36



病房
Wards

1,291



床位
Beds

26



手术室
Operation Room

17



导管室
Catheter Lab

9,660



2020外科手术量
Surgical Volume
in 2020

31,989



2020介入诊疗量
Intervention
Procedures in 2020

504,051



门诊量
Outpatient visits

45,557



住院人数
Admissions

概述 Overview

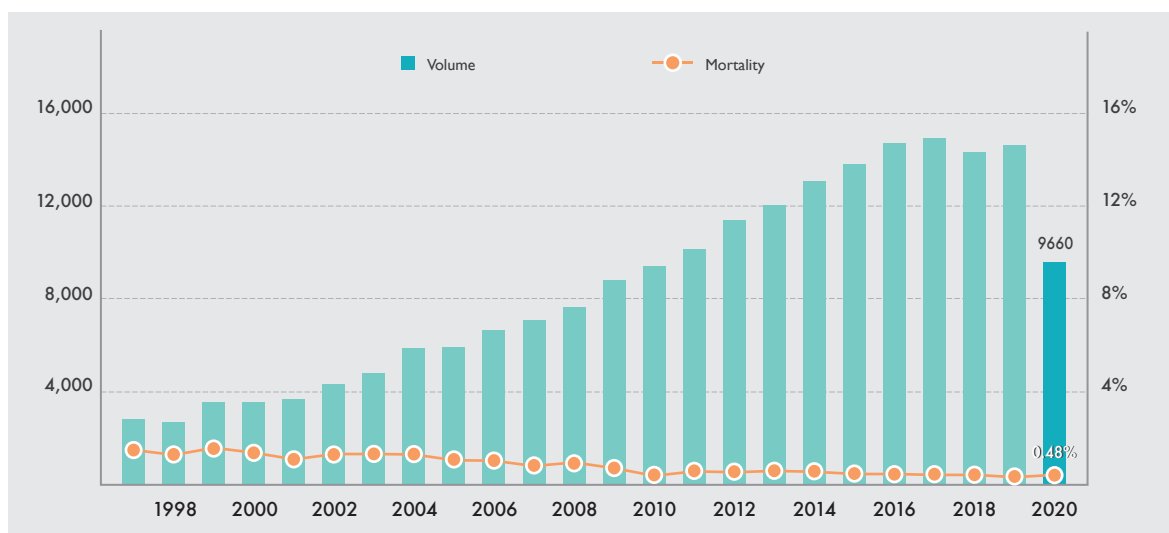
9660

CASE NO. OF CARDIOVASCULAR SURGERY 2020

■ 心血管外科手术量 SURGICAL VOLUME

In 2020, under the circumstance of COVID-19 pandemic, the surgical volume of Fuwai Hospital was 9,660. Thirty-day mortality, which has been below 1% for the past twelve years, remained stable.

由于新冠疫情的影响，2020年阜外医院外科手术量为9660例（不含分院及协作点手术量），居世界各心脏中心前列。30天死亡率连续12年低于1%。



■ 分中心手术量

SURGICAL VOLUME OF SUBCENTERS

In 2020, surgeons at Fuwai Yunnan Cardiovascular Hospital performed 1698 cardiovascular surgeries, while 3963 cases of cardiovascular surgeries were completed at Fuwai Central China Cardiovascular Hospital, 1171 cases were performed at Fuwai Hospital Chinese Academy of Medical Sciences, Shenzhen.

2020年，云南省阜外心血管病医院共完成1698例心血管外科手术，阜外华中心血管病医院共完成心血管外科手术3963例，中国医学科学院阜外医院深圳医院完成各类心血管外科手术1171例。



云南省阜外心血管病医院



国家心血管病中心华中分中心
阜外华中心血管病医院



中国医学科学院阜外医院
深圳医院

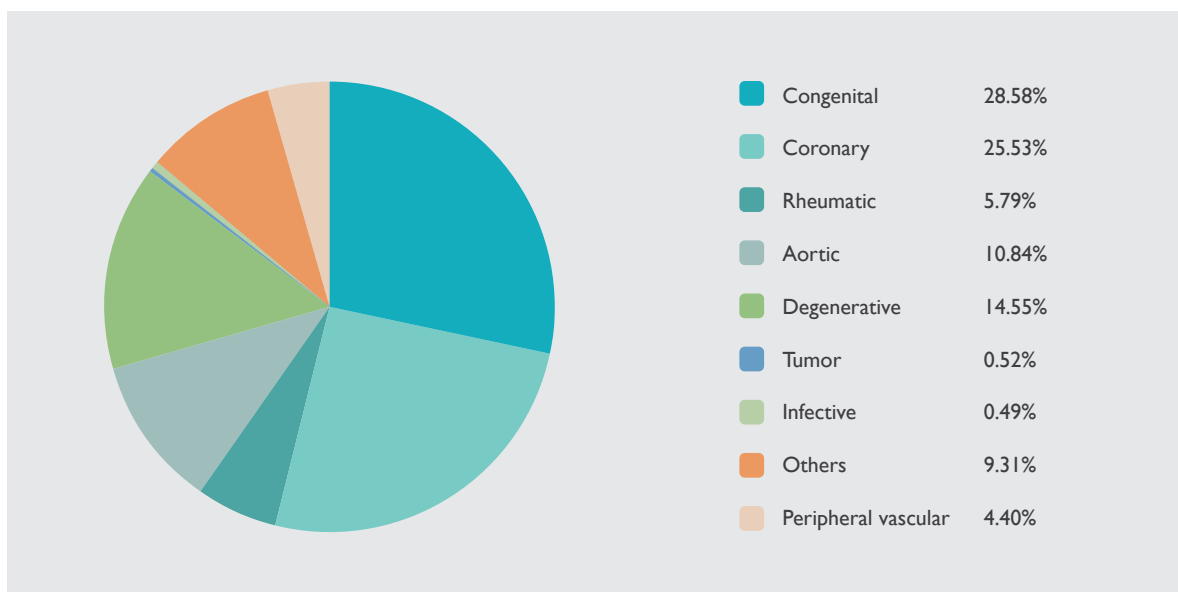


■ 病因分布

ETIOLOGIC DISTRIBUTION

Fuwai Hospital treated a large number of patients with a variety of cardiovascular diseases, demonstrating the etiologic distribution of cardiovascular surgery in mainland China. Although congenital heart diseases and coronary heart disease have remained the most commonly treated disorders at the hospital for years, the number of patients with aortic diseases or degenerative diseases has increased.

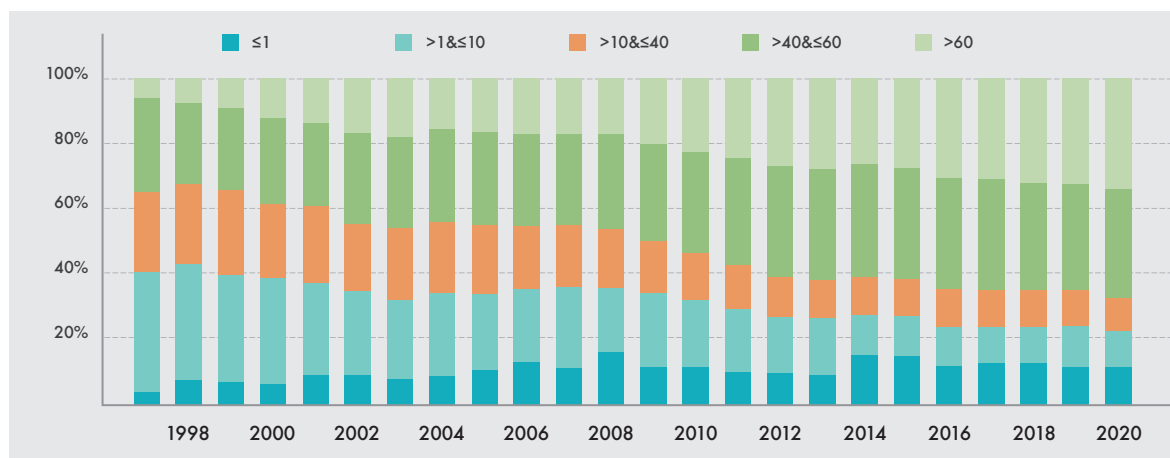
阜外医院心血管外科是全国收治心血管疾病种类最齐全的中心。医院收治患者的病因学分类基本反映出我国大陆地区心血管外科疾病治疗谱。先天性心脏病、冠心病仍为外科手术中主要病种，主动脉疾病和退行性病变所占比重呈上升趋势。



■ 患者年龄分布 AGE DISTRIBUTION

With the improved healthcare conditions and longer life expectancy in China, there has been an increase in the percentage of patients who are either very young or elderly. The Fuwai surgical team has been dedicated to improving surgical techniques and achieving better clinical outcomes for these patients at increased operative risks.

随着我国居民健康水平的不断提高和平均寿命的延长，低龄患者的早期诊治和高龄患者就医条件的改善促使患者年龄分布呈现两极分化的趋势，患者手术风险的增高对手术技术水平提出了更高的要求。



质量控制

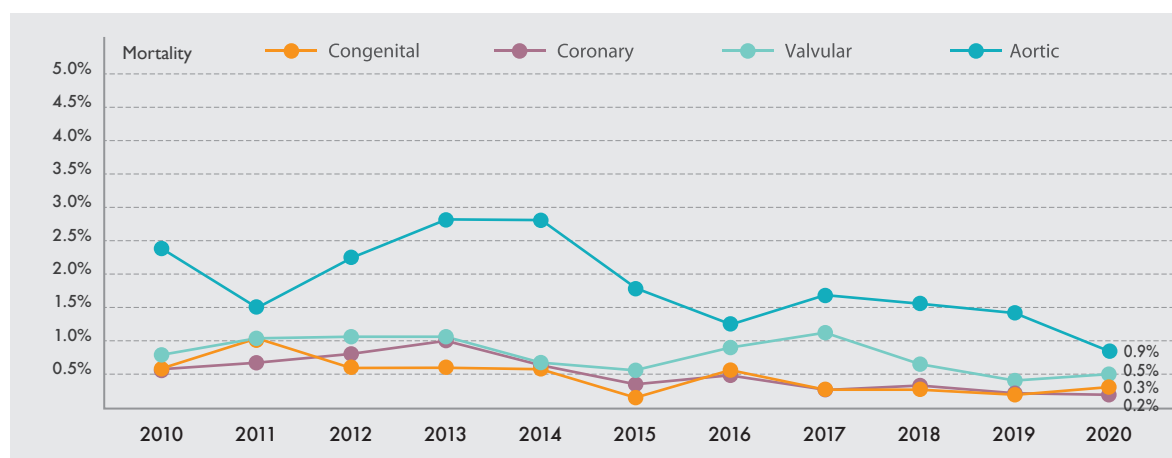
Quality & Safety

■ 术种分组死亡率

MORTALITY RATE

With an increased focus on surgical quality control and adjustment of individualized surgical strategies for high risk patients, Fuwai Hospital has achieved relatively low 30-day mortality.

医院加强外科质量控制，努力实现高风险患者的个体化手术策略管理，不同种类心血管手术术后30天死亡率均得到有效控制。

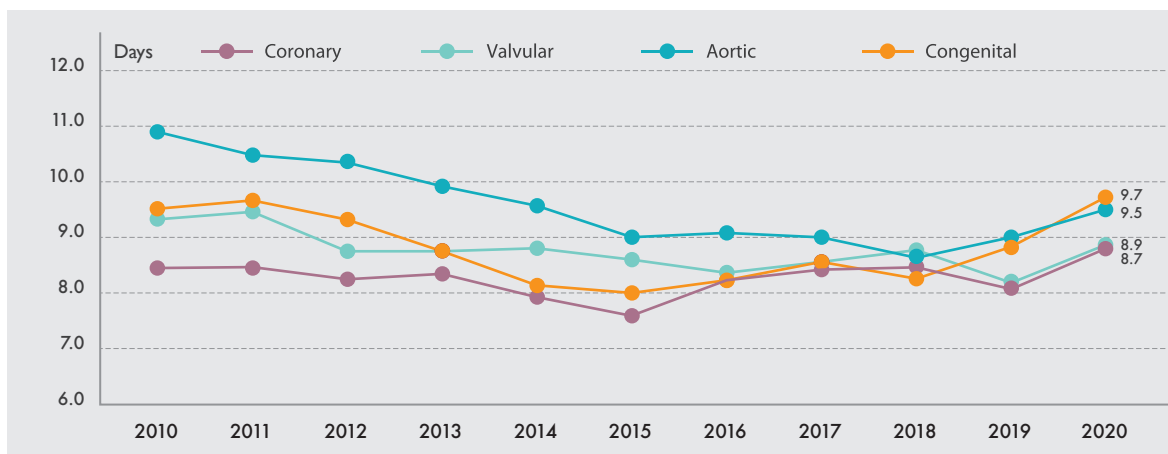


■ 术后住院时长

LENGTH OF POST-OPERATIVE STAY

In 2020, the post-operative hospital length of stay for our patients has mildly increased, reaching an average of 9.0 days in 2020.

2020年，我院外科各术种的术后住院时长有所增加，但仍然维持在极低水平，保证了医疗资源的合理使用。各类心脏手术术后平均住院时长约为9.0天。

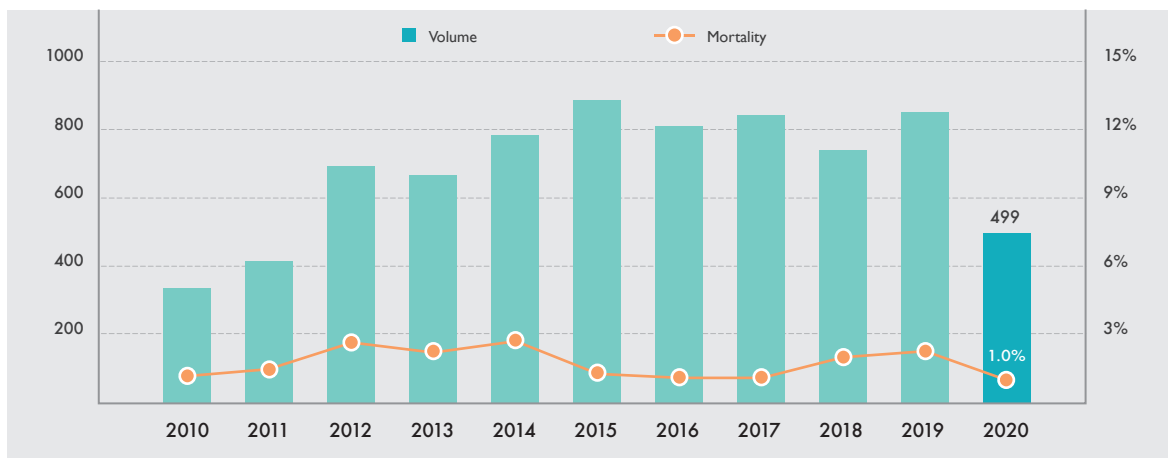


■ 急诊手术

EMERGENCY SURGERY

With serious prevention and control of the pandemic, we improved the fast track system for emergency surgery, and provided emergent surgical treatment for 499 patients. The operative mortality was only 1.0%.

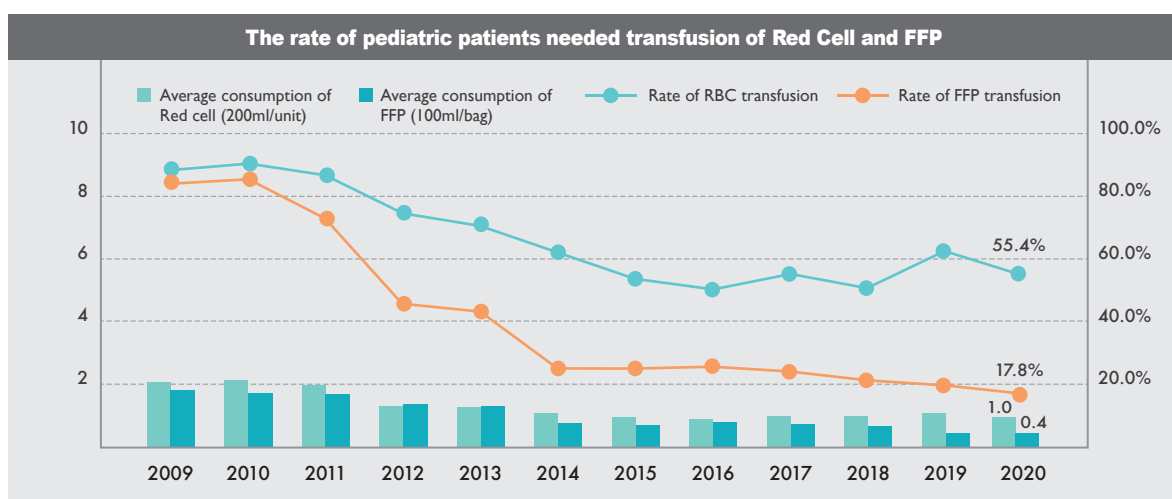
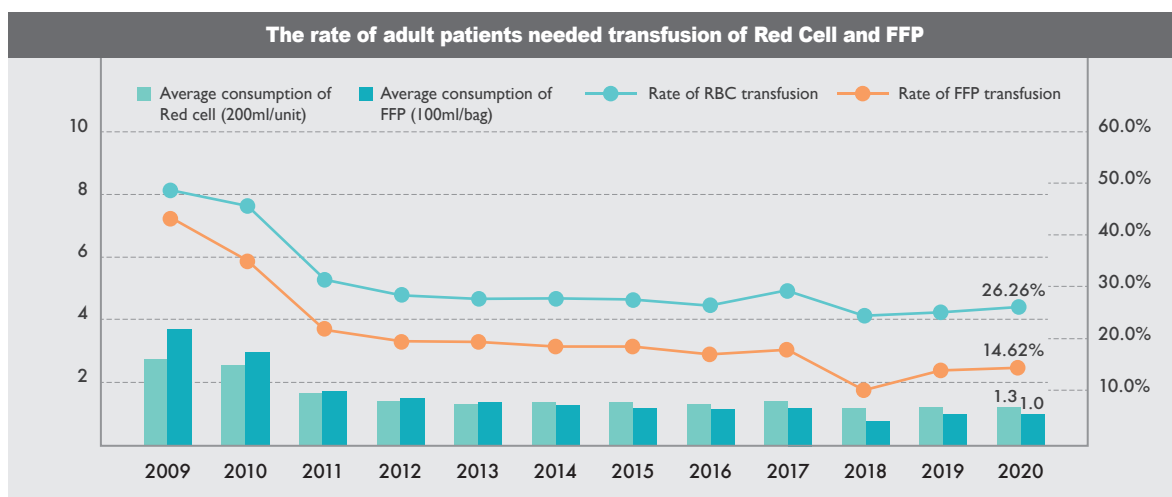
在确保疫情防控工作不松懈的前提下，医院优化急诊手术诊疗流程，为499位患者提供了急诊外科手术治疗，手术死亡率仅为1.0%。



■ 手术用血比率及用量 BLOOD PRODUCT USAGE

The average consumption of blood product has noticeably decreased over time in the past decade. In 2020, facing the serious difficulty in blood products supply, our precious experience in blood conservation ensured the smooth running of regular surgical procedures.

过去十年，医院严格把控用血指征，血制品使用比例、人均红细胞及血浆用量呈持续下降趋势。2020年，面对血制品供应不足的严峻形势，外科团队在血液保护方面的珍贵经验使得疫情期间的骨科工作得以顺利开展。



■ 打造电子病历2.0系统，全面提高医疗质量管理水平

THE ESTABLISHMENT OF ELECTRONIC MEDICAL RECORD 2.0 TO IMPROVE THE MANAGEMENT OF MEDICAL CARE QUALITY

Guided by intelligent technology, we have built a highly information-integrated application platform with fully structured electronic medical record system, and deepened the intelligent application of electronic medical record 2.0, with the aim to improve the quality of medical services.

On the basis of structured electronic medical records, we have achieved the whole process closed-loop management of drugs, laboratory tests, imaging examinations, consultations, operations, blood transfusion, critical values, summons, etc. The real-time supervision and automatic early warning of clinical behaviors have been carried out, to strengthen the management and control of each medical process.

We have established the automatic system for complications reporting, which integrated the data of various clinical information. We have established the big data algorithms on the basis of clinical judgement, which are able to improve consecutively.

以智能化为引领，打造以全结构化电子病历为核心、信息高度集成的智慧应用平台，深化电子病历2.0智能应用，提升医疗质量水平。

1、在结构化电子病历基础上，实现药品、检验、检查、会诊、手术、输血、危急值、传票等全流程闭环管理，对临床行为进行实时监管、自动预警，提高各医疗环节管控力度。

2、建立并发症自动上报系统，集成临床各业务信息系统数据，根据临床提供的条件或判断，利用大数据构造数据模型，持续完善知识规则引擎。

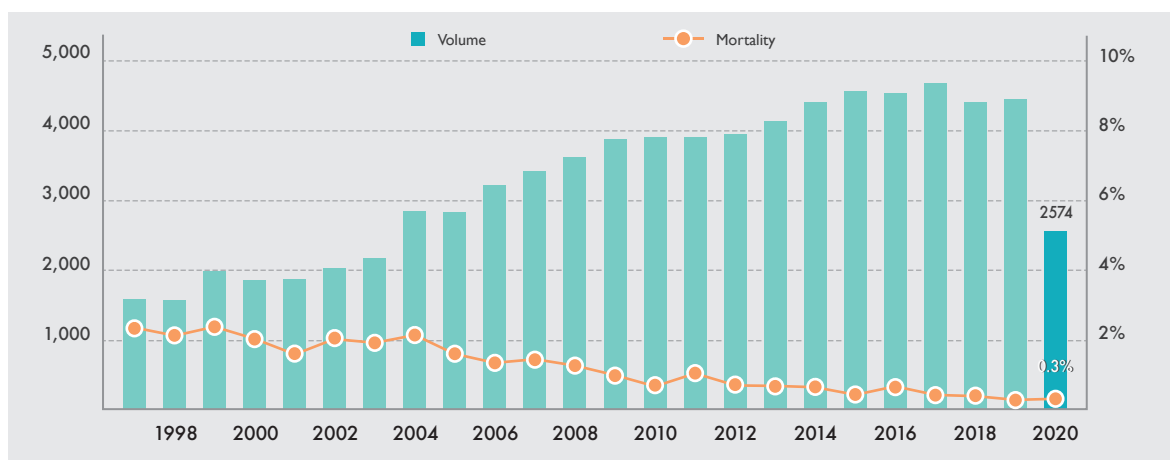


先天性心脏病 Congenital Heart Disease

先天性心脏病手术 CONGENITAL HEART SURGERY

Congenital heart defect remains the most common anomaly of the neonates in mainland China. There are 150,000 to 180,000 newborns diagnosed with congenital heart defects every year in the nation. In 2020, due to the coronavirus pandemic, the number of congenital heart surgeries declined to 2574, with an extremely low mortality of 0.3%.

先天性心脏病是中国大陆新生儿最常见的先天性缺陷，全国每年约出生15-18万先天性心脏病患儿。在2020年，受新冠疫情影响，手术量有所下降。阜外医院先天性心脏病手术量2574例，而死亡率仅为0.3%。



2574

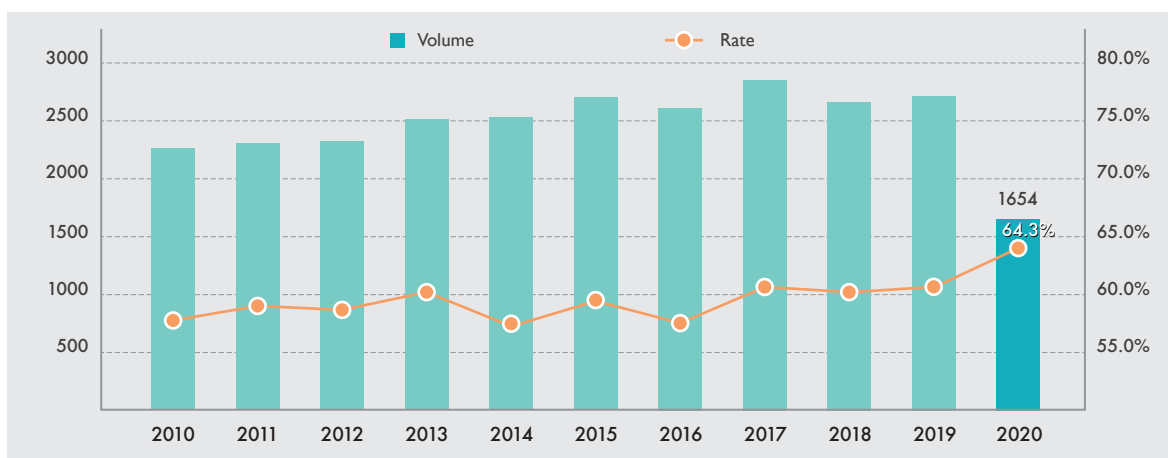
CASE NO. OF CONGENITAL HEART SURGERY 2020

■ 危重复杂先心病手术数量

SURGICAL VOLUME OF CRITICAL AND COMPLEX CONGENITAL HEART DISEASE

With the improvement of surgical technique and perioperative management, the complexity of congenital cardiac surgeries is continuously increasing. Recently, more than 60% cases in Fuwai hospital were critical or complex congenital heart defects.

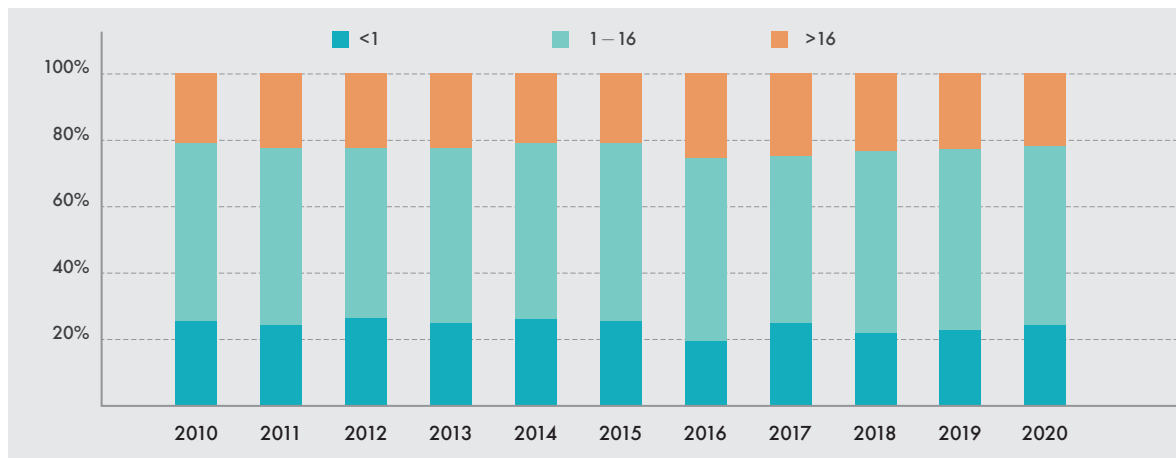
随着外科技术和围术期处理理念进步，阜外医院危重或复杂先心病手术（法洛四联症及以上的复杂先天性心脏病手术或体重 $\leq 5\text{kg}$ 患儿的先心病手术）所占比例逐年增加，近年危重或复杂先心病手术所占比例超过60%。



■ 手术患者年龄分布 AGE DISTRIBUTION

Adult congenital heart surgery has become a new trend in congenital heart therapy. The rate of adult congenital heart surgery at Fuwai hospital has been over 20 percent for years.

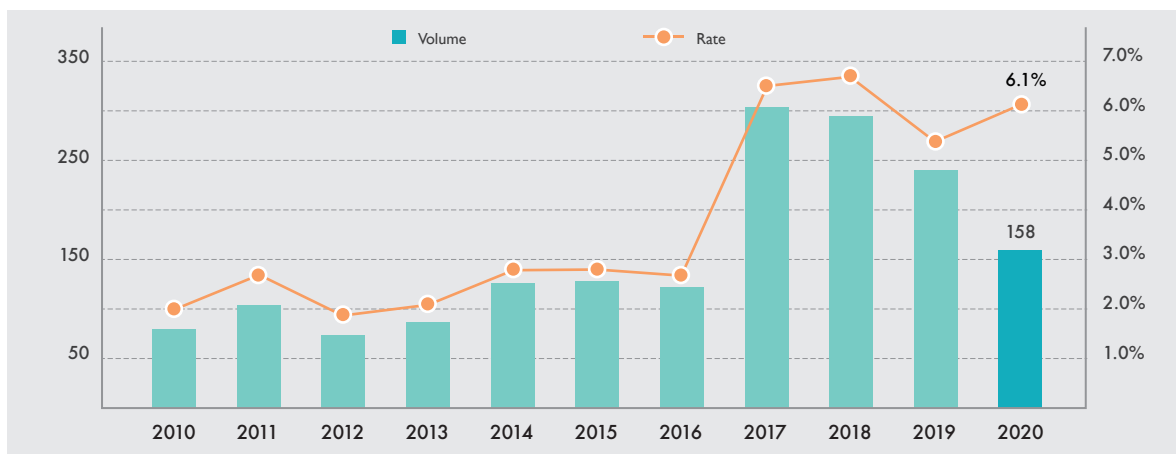
阜外医院成人先天性心脏病手术所占比例近年一直维持在超过20%的水平，反映了先心病外科治疗的新趋势。



■ 二次或多次手术比例 SURGICAL VOLUME OF REDO-CARDIAC SURGERY

As more patients who experienced congenital heart surgeries grown up, much more redo-cardiac surgeries were required. In 2020, the percentage of redo-cardiac surgery was 6.1%.

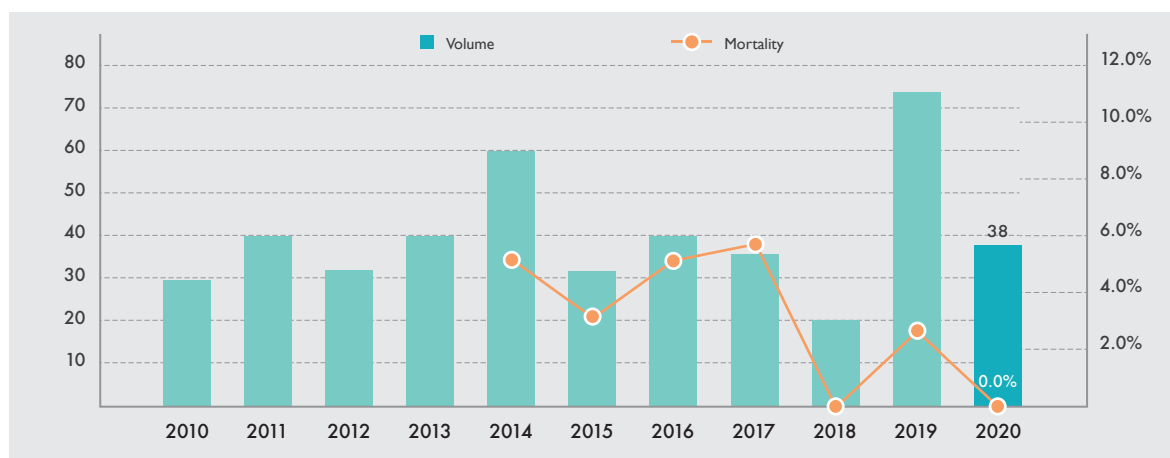
随着越来越多经历过先心病手术的患儿长期存活，近年二次手术的比例显著增加。2020年，6.1%的先心病手术为二次或多次心脏手术。



■ 新生儿手术量患儿手术数量 SURGICAL VOLUME OF NEONATES (≤28 DAYS)

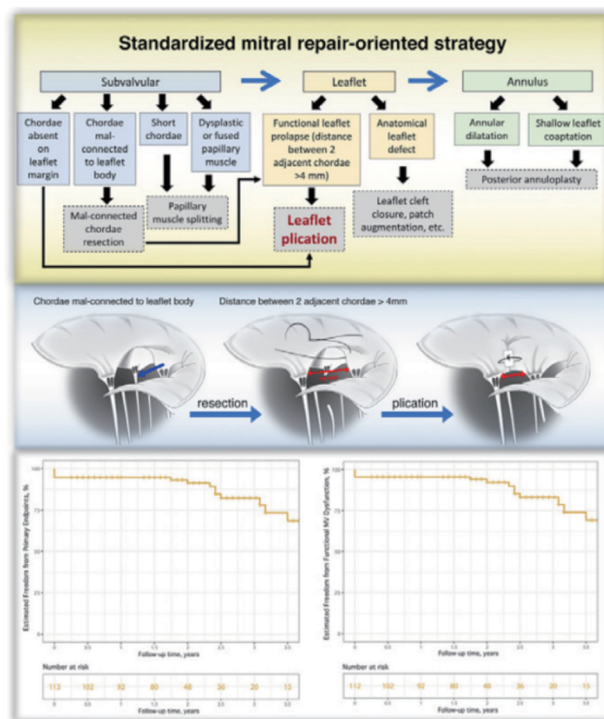
Corrective surgery for neonates with complex congenital heart disease presents a major challenge. The surgical volume remained in relatively high level in 2020 with the development of “Green Channel”, while the mortality was 0% during the whole year.

新生儿复杂先天性心脏病矫治术无疑是极富挑战性的工作，新生儿就诊绿色通道得到积极开展，阜外医院外科团队2020年新生儿手术数量达到近年较高水平，并实现新生儿手术“零死亡”。



■ 先天性心脏瓣膜手术 CONGENITAL VALVULAR SURGERY

The rate of congenital valve disease has increased obviously in recent years. The Department of Cardiac Surgery has completed 1233 cases of congenital aortic valve surgery and 1250 cases of congenital mitral valve surgery in recent five years. Fuwai hospital is the first to perform congenital neocuspidization for severe aortic insufficiency with the valve repair invalid in China. The standardized mitral repair with a standardized strategy and reproducible procedures was invented by surgeons at Fuwai Hospital for congenital mitral insufficiency, and 231 patients have undergone the surgery until 2020.

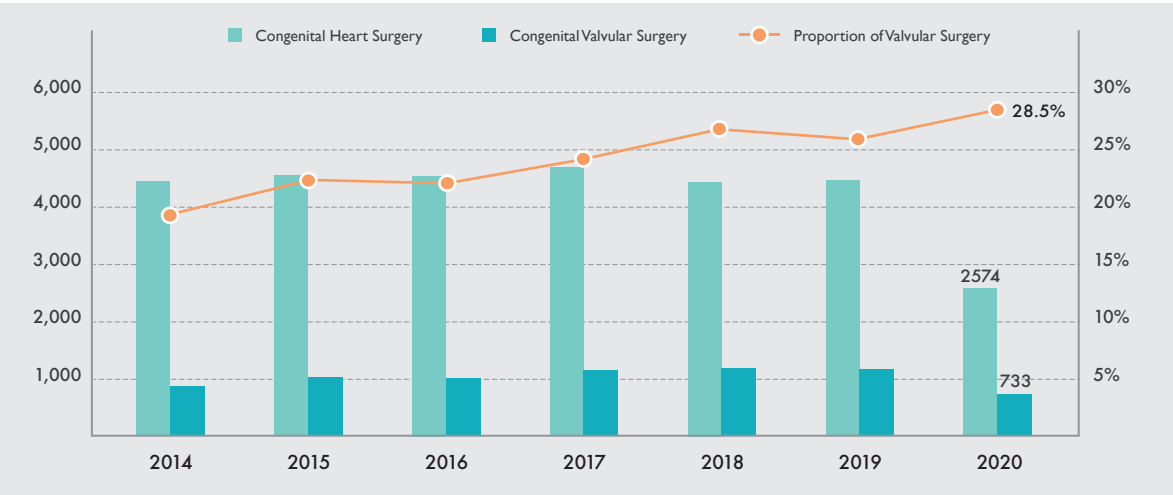


该图引自Qi L, Ma K, Zhang B, et al. Semin Thorac Cardiovasc Surg. 2020;32(4):1002-1012.

The results showed that the 3-year freedom from mitral valve failure was 83.1% for patients with moderate or more mitral insufficiency; among the patients with non-ischemic mitral valve disease, the 3-year freedom from mitral valve failure was 93.3%, which was reported in the journal of Seminars in Thoracic and Cardiovascular Surgery.

我国先心病患儿疾病谱逐步变化，小儿心脏瓣膜手术在先心病外科手术中占比越来越大。近五年阜外医院外科团队完成小儿主动脉瓣手术和二尖瓣手术分别达到1233例和1250例。在国内率先开展Ozaki手术治疗复杂先天性主动脉瓣关闭不全。开创二尖瓣标准化外科成形手术治疗先天性二尖瓣关闭不全，截至2020年共完成231例。

阜外医院研究结果显示，对于先天性二尖瓣中度及重度关闭不全患者，标准化成形术后3年的二尖瓣反流中量以下维持率达到83.1%。其中非缺血性二尖瓣病变患者，标准化成形术后3年的二尖瓣反流中量以下维持率达到93.3%。该技术结果已在Seminars in Thoracic and Cardiovascular Surgery杂志发表。

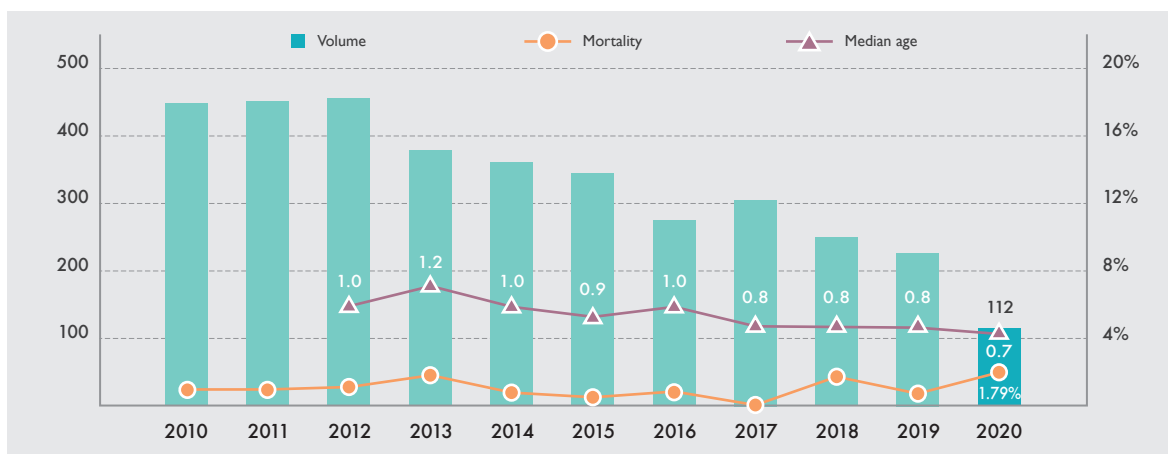


■ 法洛四联症手术

SURGERY OF TETRALOGY OF FALLOT

Tetralogy of Fallot is the most common cyanotic congenital heart disease. The Department of Cardiac Surgery at Fuwai Hospital has broad experience with treating this condition and has achieved excellent outcomes. In 2019, the median age of anatomical repair was below 1 year, and in-hospital mortality was lower than 2%.

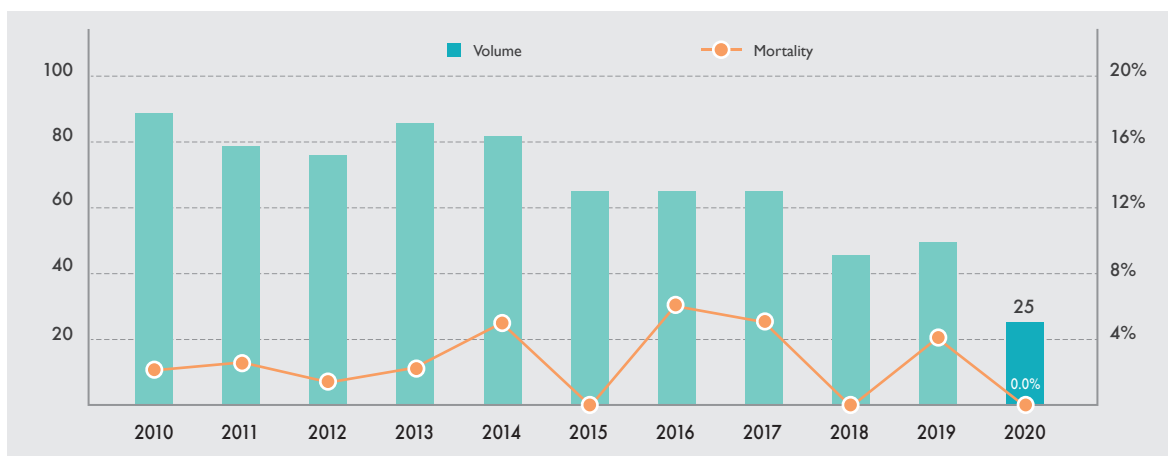
法洛四联症是紫绀类先天性心脏病发病率最高的疾病。阜外医院外科在根治法洛四联症方面积累了丰富的经验，并取得了居国际先进水平的治疗结果。2020年接受根治术患者年龄中位数已小于1岁，住院死亡率低于2%。



■ 动脉调转手术 ARTERIAL SWITCH OPERATIONS

Arterial switch operation for transposition of the great arteries/double outlet right ventricle is considered as one of the most successful landmark congenital heart surgeries. The Fuwai team has achieved great success with this procedure and is recognized as one of the best centers performing arterial switch in the world.

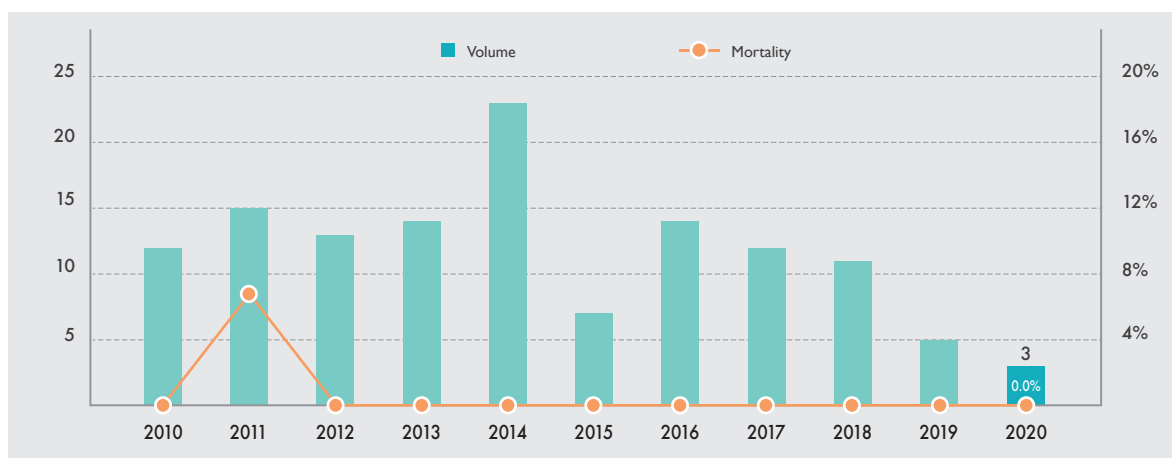
动脉调转手术治疗完全性大动脉转位、右室双出口等畸形是先心病外科诊治中心成熟的重要标志。阜外医院在这方面成绩斐然，目前手术效果已居全球领先水平。



■ 双根部调转手术 DOUBLE ROOT TRANSLOCATION

The results of double root translocation (DRT) procedure arised by Fuwai Hospital for anatomical correction of complex complete transposition of great arteries (TGA; combined with left ventricular outflow tract obstruction [LVOTO]) and double outlet of right ventricle (DORV; TGA type combined with right ventricular outflow tract obstruction) were significantly better than conventional Rastelli procedure. More than 170 patients have undergone DRT procedure until 2020 with excellent follow-up results. With the development of cardiac protection and experience of the learning curve, it seems always an optimized alternative for treating those anomalies.

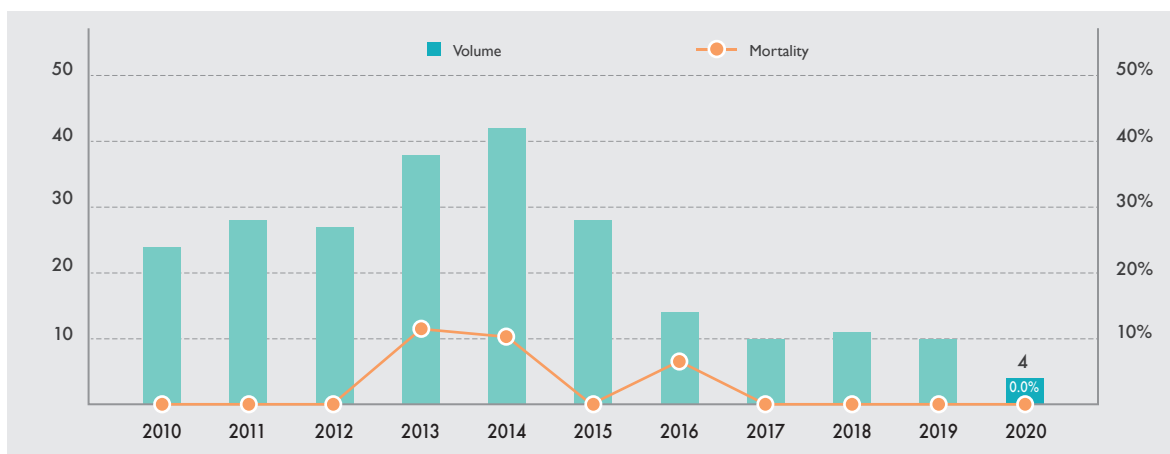
阜外医院外科团队原创的双根部调转手术在合并左室流出道狭窄的大动脉转位以及大动脉转位型右室双出口（合并右室流出道狭窄）解剖矫治的术后中远期结果明显优于传统rastelli手术。截止至2020年，已经完成超过170例双根部调转手术，远期随访结果令人满意。



■ 室间隔完整肺动脉闭锁经胸球囊扩张手术量及死亡率 VOLUME AND MORTALITY TRANS-STERNOTOMY BALLON PULMONARY VOVULOPLASTY FOR PA/IVS

Pulmonary atresia with intact ventricular septal defect (PA/IVS) is one of the most critical congenital heart abnormalities with high surgical mortality. Excellect outcome has been achieved by the utilization of trans-sternotomy ballon pulmonary valvuloplasty in Fuwai hospital. The majority of patients can receive biventricular repair instead of single ventricular palliation by trans-sternotomy ballon pulmonary valvuloplasty with individually customized shunt.

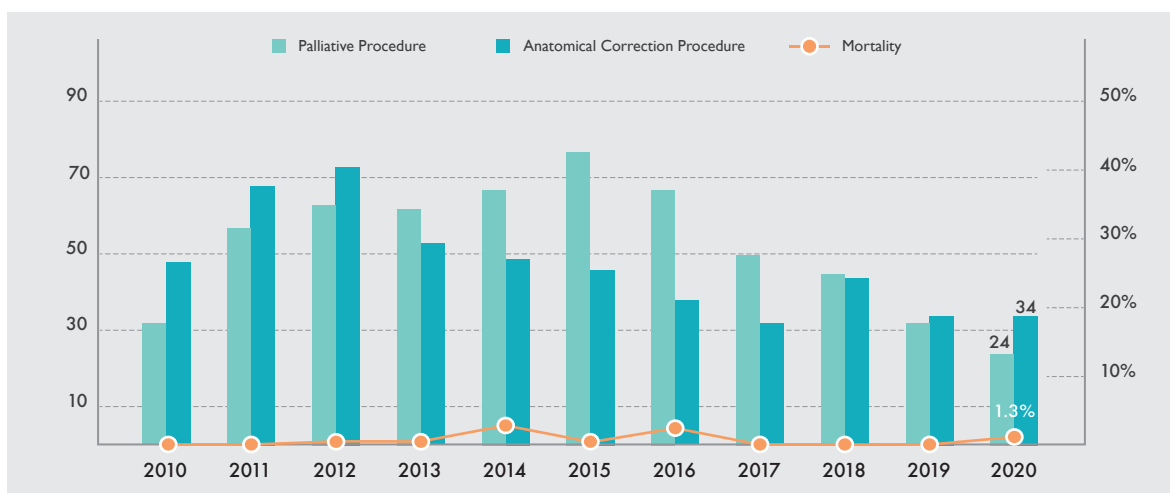
室间隔完整的肺动脉闭锁病情危重，以往手术方式死亡率高。阜外医院通过经胸球囊扩张术，使得该畸形死亡率显著下降，该技术目前已经在全国各大医院推广。研究结果表明，通过经胸球囊扩张手术联合个体化分流手术策略治疗PA/IVS是安全、有效的，大多数患儿可达到双心室矫治，避免单心室姑息治疗。



肺动脉闭锁/室间隔缺损手术量及死亡率 SURGICAL VOLUME AND MORTALITY FOR PA/VSD

Pulmonary atresia with ventricular septal defect (PA/VSD) is a cyanotic congenital heart defect with high prevalence in China. Surgical strategies are quite difficult, while the outcomes are limited with the pulmonary development. Staged approaches are widely used in Fuwai hospital to accomplish anatomical correction.

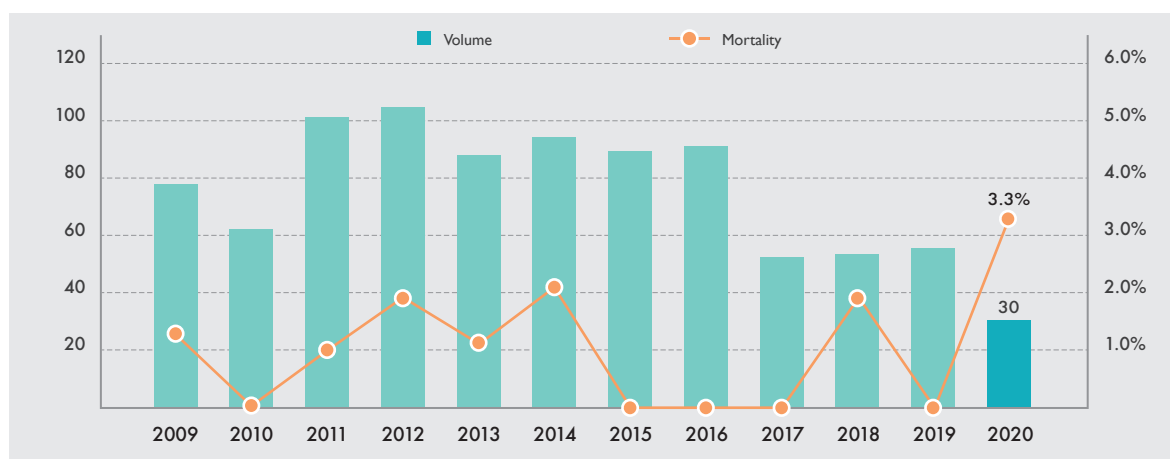
肺动脉闭锁合并室间隔缺损在中国发病率明显高于西方国家。其治疗效果受限于肺动脉发育等情况。近年来，阜外医院通过分期手术为众多患儿完成了解剖根治。



■ 双向Glenn手术 BIDIRECTIONAL GLENN SHUNT

The Glenn shunt has been regularly used in Fuwai Hospital for certain types of congenital heart disease. However, the indication for single ventricular palliation has changed over time, leading to more anatomical repairs. Hence, the number of Glenn shunts decreased in recent years.

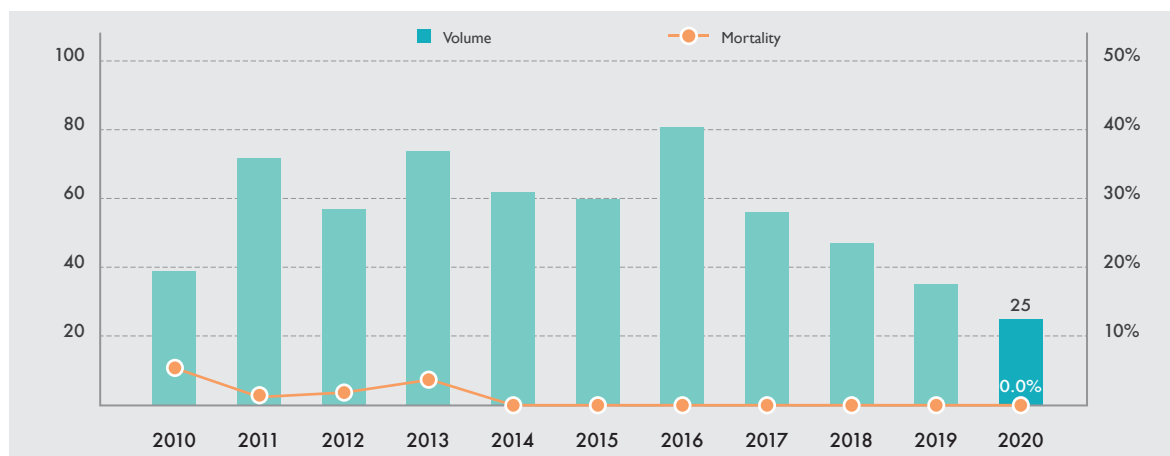
作为复杂先心病姑息手术治疗的重要术式，Glenn手术在阜外一直常规开展，但阜外医院近年来一直致力于严格把控姑息手术适应症，尽力对患儿进行解剖根治，避免Glenn及全腔手术，近年阜外医院Glenn手术例数较前下降。



■ 全腔静脉肺动脉连接术 TOTAL CAVOPULMONARY CONNECTION

As the most popular procedure for single ventricular palliation, the total cavopulmonary connection has been regularly used for several decades. In 2020, the volume of the total cavopulmonary connection decreased while more patients received anatomical repairs.

作为通用的单心室类姑息手术，全腔静脉肺动脉连接术已经在阜外医院常规开展多年。2020年全腔静脉肺动脉连接手术结果满意，同时数量较前下降，更多的患儿得到了解剖矫治。



冠状动脉 粥样硬化性心脏病 Coronary Disease

2831

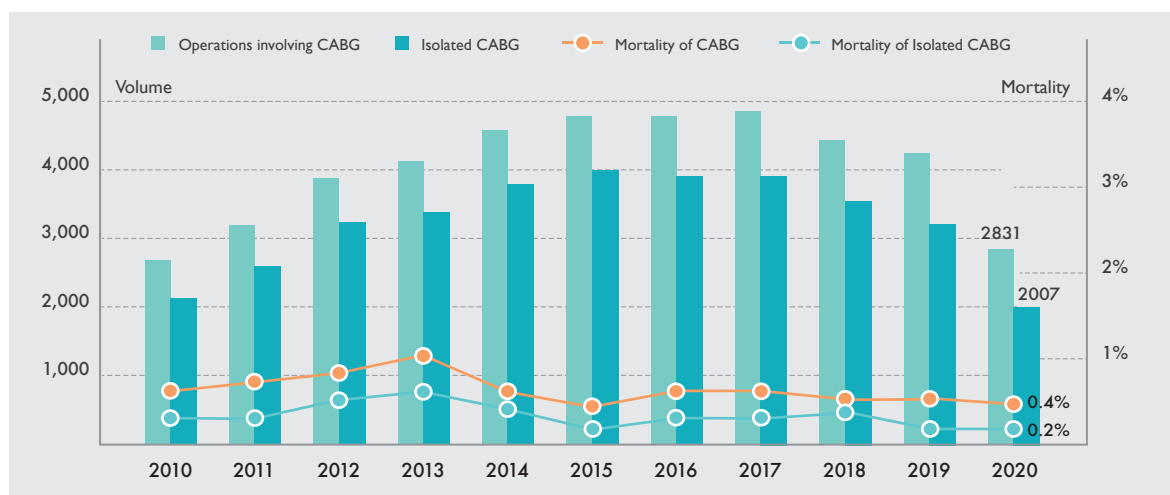
CASE No. OF CABG 2020

OUTCOMES 2020

■ 冠状动脉旁路移植术 CORONARY ARTERY BYPASS GRAFTING

In mainland China, Fuwai Hospital is the pioneer of the CABG operation. In 1974, Fuwai surgeons performed the first CABG in the mainland. Beating heart bypass surgery (Off-pump CABG) through sternotomy was also first performed in China at Fuwai Hospital in 1996. The first case of hybrid CABG in China was successfully completed in 1999 at our hospital as well. In 2020, 2,831 patients received CABG at Fuwai Hospital, with 2,007 receiving isolated CABG. Thirty-day mortality has remained stable over the past 7 years at a level of less than 0.5%.

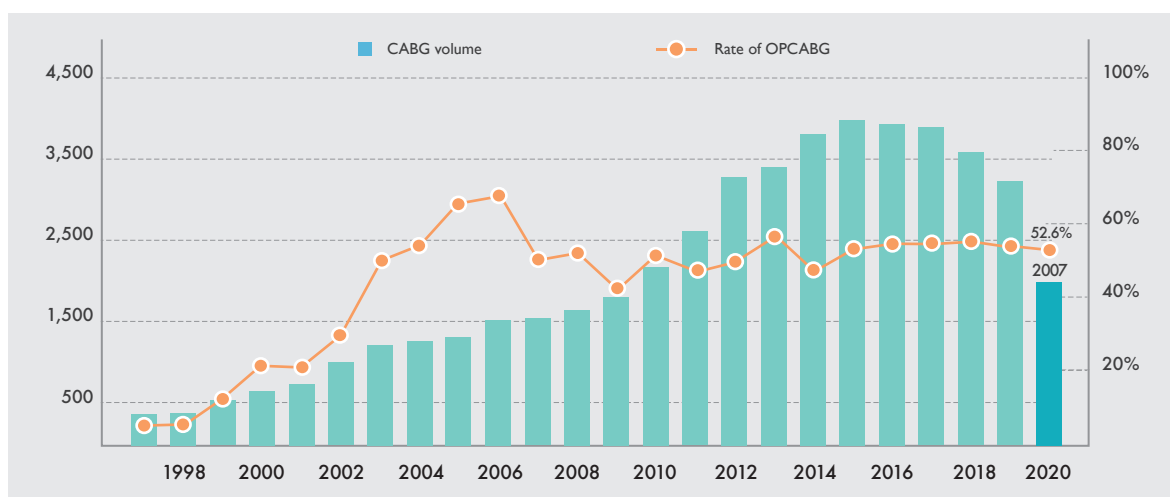
1974年阜外医院心血管外科实施了中国大陆首例冠状动脉旁路移植术。1996年在国内最早开展胸骨正中切口非体外循环下冠状动脉旁路移植术。1999年完成中国大陆首例杂交冠状动脉旁路移植术。2020年全院完成冠状动脉旁路移植术2831例，其中单纯冠状动脉旁路移植术2007例。单纯冠状动脉旁路移植术后30天死亡率连续7年低于0.5%。



■ 非体外循环冠状动脉旁路移植术 OFF-PUMP CABG

As the progress of research on off-pump coronary artery bypass grafting, we have deeply understood the characteristics, advantages as well as limitations of off-pump technique. From the perspectives of patients' interests, the surgical team of Fuwai Hospital is using this technique carefully and rationally, to provide optimal treatment strategy for every individual patient. In 2020, the proportion of off-pump CABG in our hospital was 52.6%.

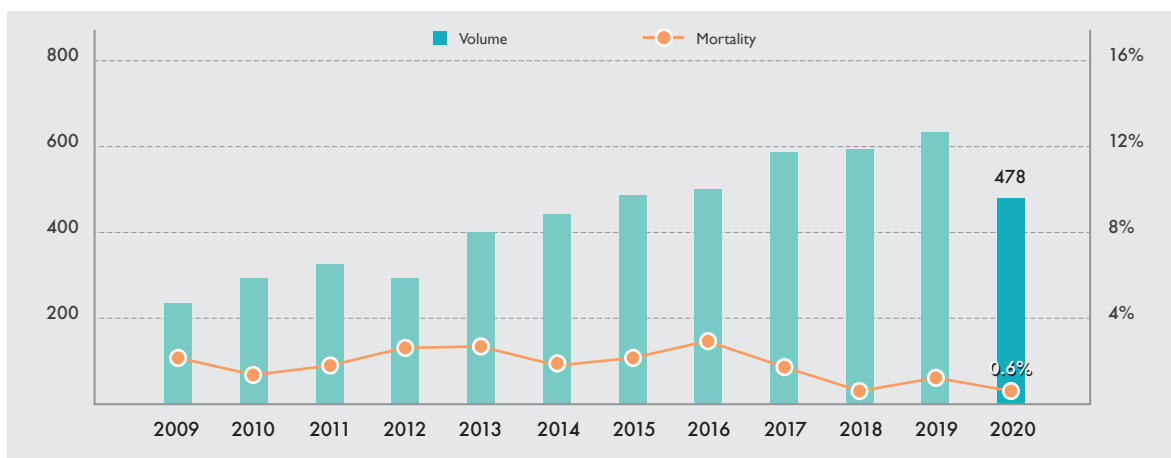
随着对非体外搭桥技术研究的不断深入，我们更加清楚该技术的特点、优势和不足。我院外科团队从患者获益的角度出发，理性把握非体外技术的适应症，为患者提供最佳的手术策略。2020年，我院非停跳技术的使用率为52.6%。



■ 冠状动脉旁路移植术合并瓣膜类手术 CABG COMBINED WITH VALVULAR SURGERY

In Fuwai Hospital, coronary CT or angiogram is routinely performed for patients over 50 years old to increase the perioperative safety of cardiovascular surgery. Performing coronary surgery simultaneously with valvular surgery increases complexity. In recent years, perioperative mortality for this combined surgery has stabilized at a relatively low level and volume has increased dramatically. In 2020, the perioperative mortality rate of this type of surgery was 0.6%.

阜外医院对于50岁以上患者，术前均常规行冠状动脉CT或造影，明确是否合并冠脉疾病，最大程度提高患者行心血管手术的安全性。同期施行冠状动脉搭桥和心脏瓣膜手术，手术难度及复杂性显著增加。阜外医院在该类手术量逐年增加的情况下，始终将围术期死亡率控制在较低水准。2020年，该类手术围术期死亡率仅为0.6%。

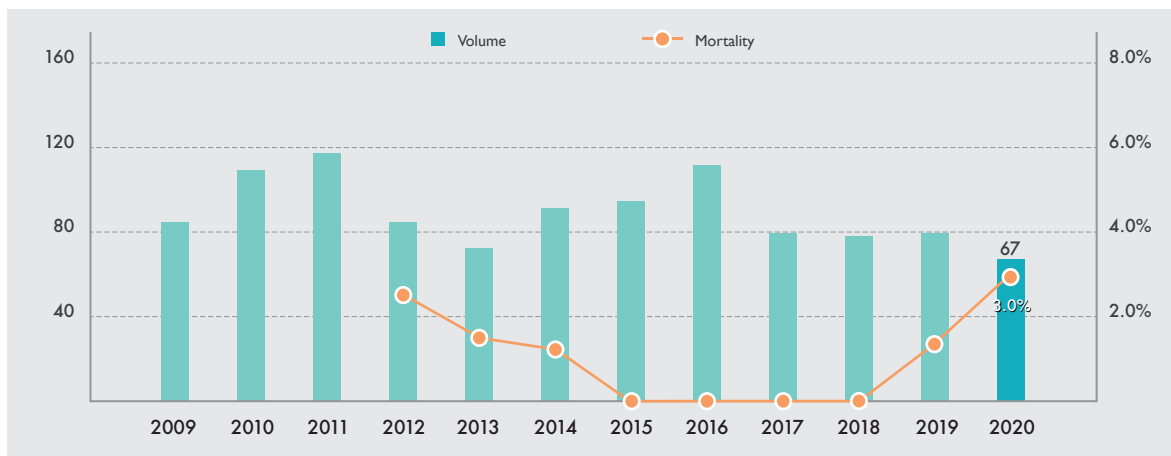


■ 室壁瘤手术

SURGERY FOR VENTRICULAR ANEURYSM

Surgical approaches could significantly improve the long-term outcomes for patients with ventricular aneurysm. However, the complexity and risk of such surgeries are higher than those of surgeries for other cardiac conditions, requiring higher standards for the surgeons and the heart team. In 2020, we performed 67 cases of surgical procedure for ventricular aneurysm, the perioperative mortality rate was only 3.0%.

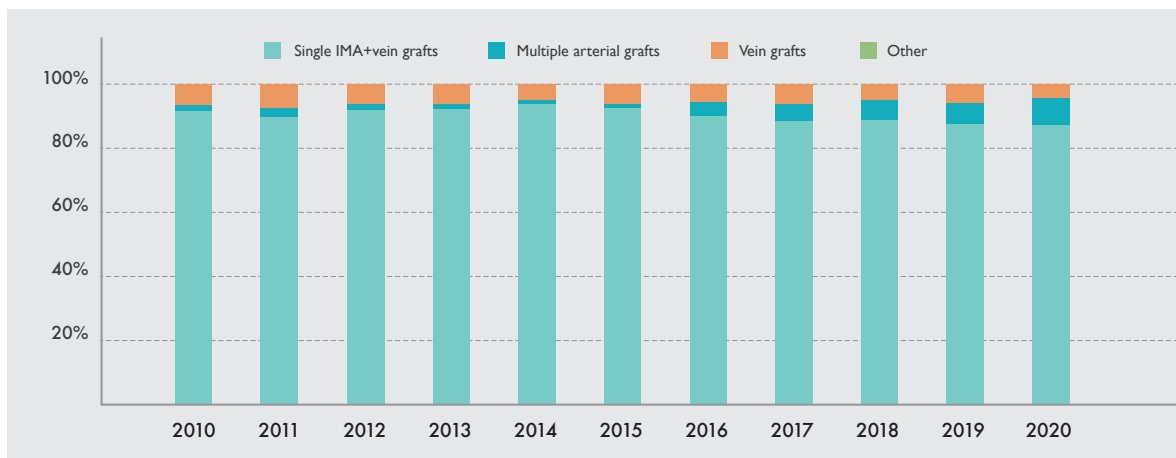
外科手术可显著改善室壁瘤患者远期预后，但该手术难度及风险均较高，对术者及其心脏团队水平提出了更高的要求。阜外医院团队2020年共完成67例室壁瘤手术，死亡率仅为3.0%。



■ 旁路材料选择 CONDUITS IN CABG

Left internal thoracic artery plus great saphenous vein graft is the standard in current clinical practice. The surgical team of Fuwai Hospital intended to provide individualized optimal revascularization strategies for patients. Newer approaches, such as bilateral internal thoracic artery, radial artery, total arterial graft, “No-touch” technique for great saphenous vein harvest, are also routinely performed at our institution.

当前，左胸廓内动脉+大隐静脉仍是外科搭桥手术的主流选择。近年来，阜外医院外科团队致力于通过优化治疗策略，提高搭桥患者远期预后。在常规开展“No-touch”获取大隐静脉等技术的同时，双侧胸廓内动脉和桡动脉的应用、全动脉化技术应用比例也有显著提高，为不同患者提供个性化的再血管化治疗策略。



■ No-Touch技术获取静脉移植血管 CHINA NO-TOUCH STUDY FOR VEIN GRAFT HARVESTING

The No-Touch study is a multi-center randomized clinical trial aiming to evaluate the short- and long-term efficacy of the No-Touch saphenous vein harvesting technique after CABG, compared with that of the conventional approach. From April, 2017 to June, 2019, 2655 participants were enrolled from 7 hospitals in China. Until the end of 2020, more than 95% of the participants received 3-month CT angiography, and over 92% completed 12-month CT evaluation. Results of the primary outcome showed that the No-Touch technique significantly reduced vein graft occlusion. Results of the interim analyses and preliminary analysis was presented by professor Shengshou Hu et al. at CHC2020. Design of the study had been published in American Heart Journal. The No-Touch study is by far the largest clinical trial focusing on surgical technique in China.

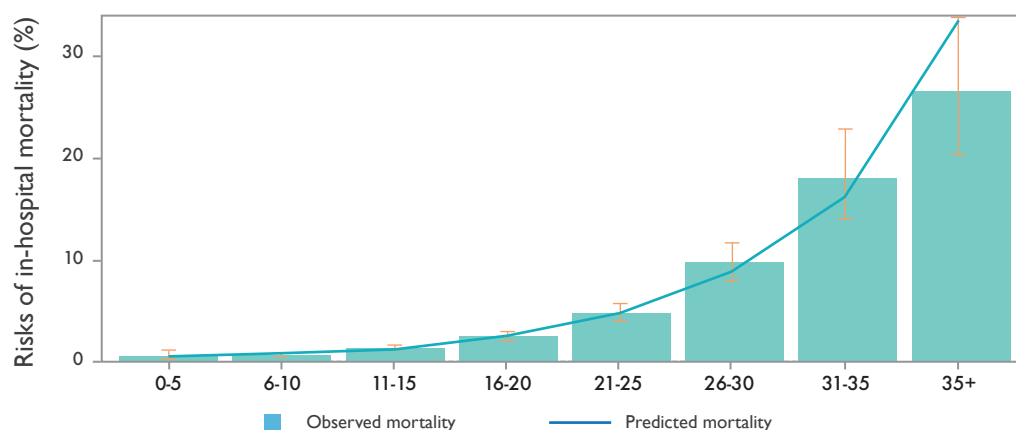
“No-Touch技术获取静脉移植血管效果评价研究”是一项由阜外医院牵头的多中心前瞻性随机对照临床试验（RCT），旨在探索No-Touch技术获取静脉移植血管在国内冠状动脉旁路移植术患者中的安全性及近、远期效果，共有7家心脏中心参与，通过术后3月及12月冠状动脉CT检查、主要心脑血管不良事件（MACCE）评估No-Touch技术对桥血管通畅率的改善效果。研究自2017年4月至2019年6月共入组2655例患者（静脉桥血管4594支），截至2020年末，研究主要终点（3月冠脉CT结果评估）随访率超过95%，12月CT随访率超过92%。主要终点结果显示：No-Touch

技术静脉桥血管3月堵塞率2.8%，传统技术组为4.8%，显示出No-Touch技术显著减低了静脉桥血管的术后短期堵塞率。研究中期结果在中国心脏大会2020等国际、国内主流学术会议交流分享。No-Touch研究是中国冠脉外科迄今最大规模的以外科技术为研究对象的随机对照临床试验，对于我国心血管外科的质量改善有重要参考价值。

■ 新版中国冠状动脉旁路移植手术风险评估模型的发表和应用 THE PUBLICATION AND APPLICATION OF SINOSCORE II RISK MODEL IN CHINA

To adjust to the changing demographics of surgical candidates and quality of clinical practice of CABG in China over the last decade, based on the largest nationwide surgical database (CCSR) in China, Prof. Zhe Zheng and his team from Fuwai hospital modified and updated the operative risk evaluation system (SinoSCORE II) and published it on The Annals of Thoracic Surgery in 2020. Comparing prior risk assessment tools, SinoSCORE II showed a better discrimination and calibration performance. In Fuwai hospital, SinoSCORE II has been integrated into the hospital information system. The operative risk will be automatically evaluated based on preoperative information and presented as the exact number of estimated surgical mortality for every single patient undergoing CABG. The estimated surgical mortality has also been used as important reference for quality control and performance appraisal in hospital.

为适应过去十年间我国心外科手术人群特点和医疗质量变化对手术安全性带来的影响，基于我国最大心外科手术数据库（中国心外科注册登记数据库），阜外医院郑哲教授团队研发了新版中国冠状动脉旁路移植手术风险评估模型（SinoSCORE II），并将模型结果于2020年在美国胸外科年鉴杂志（The Annals of Thoracic Surgery）发表。相比既往风险评估工具，新研发的SinoSCORE II风险评估模型有更好的辨别度和准确度。为了提高其使用便捷性，团队同时开发了相对应的信息化实用工具，并于国家心血管病质控信息平台（www.nccqi.org.cn/Center/SurgicalRiskCalc）上线，提供给广大医疗工作者使用。在阜外医院内部，SinoSCORE II也已整合入医院的电子病历系统。每位接受CABG手术的患者，系统会根据术前信息自动评估并以预计死亡率的形式反馈出患者的手术风险。患者的预计手术风险也同时被作为医院质量控制和考核的重要参考指标。



SinoSCORE II评分与预测院内死亡率的对应关系，该图引自：Hu Z, Chen S, Du J, et al. Ann Thorac Surg. 2020;109(4):1234-1242.

SinoSCORE II 在线版风险评估实用工具 (www.nccqi.org.cn/Center/SurgicalRiskCalc)
 The Online surgical risk assessment tool of SinoSCORE II (www.nccqi.org.cn/Center/SurgicalRiskCalc)

■ 中国冠状动脉旁路移植术质量控制指标的建立 THE ESTABLISHMENT OF CHINA CABG QUALITY INDICATOR SYSTEM

Quality improvement of has always been an important task for CABG. In recent years, the overall volume of CABG in China has been increasing, while the surgical quality has continued to improve. However, the overall quality is far behind that of Western countries. In addition, there are significant regional differences in the quality of CABG surgery across the nation. There is a lack of effective monitoring methods for CABG, and there is an urgent need to establish an in-depth and effective quality improvement system.

In order to objectively and comprehensively evaluate the overall quality of CABG in China, to evaluate obstacles to improving quality, and to find potential targets for improvement, the National Center for Cardiovascular Diseases (NCCD) established a committee of national clinical experts to reach consensus through discussions based on the best clinical research evidence, and developed the Chinese quality measure for CABG, which provided an important theoretical basis for the clinical practice and quality evaluation in China.

These quality measures evaluate the performance on the perioperative management and short-term outcomes of CABG in China, and comprehensively incorporates multi-dimensional content such as outcome indicators, process indicators, and structural indicators, aiming to discover problems in the diagnosis and treatment process of cardiovascular surgery, and to promote the standardization of medical practice and improve the prognosis of patients. The NCCD also completed detailed description of each measure, including name, type, dimension, definition, evidence basis, applicable population, calculation method, data source, and presentation method.

The quality measure system has the following characteristics: (1) It has sufficient and clear evidence basis with support from expert consensus, which confirmed its necessity; (2) After optimization, the

measures are especially suitable for monitoring and improving the quality of CABG in China; (3) Quality measurement uses data generated by routine clinical work and existing databases, without additional data collection work, which can reduce the cost of quality evaluation and promote quality improvement work; (4) The results of quality measurement can objectively reflect the performance of each center and are suitable for peer comparison and exposing quality problems.

In February 2021, the National Health Commission of the People's Republic of China officially published the quality measurement system for CABG surgery, which laid the important foundation for future national quality improvement initiatives.

CABG手术的质量改善一直是专业领域内的重要工作内容。近年来，我国CABG手术量逐年攀升，手术质量不断提升，但整体质量与欧美国家存在差距。此外，我国CABG手术水平存在显著的地域及单位差异。由于目前缺乏外科技术操作与实施的有效监察手段，亟待建立深入有效的质量改善机制。

为客观全面评价我国CABG整体水平，揭露质量问题，找到改善靶点，启动质量改善机制，国家心血管病中心组织全国临床专家，基于最佳临床研究证据，通过讨论达成共识，建立中国CABG质量评价指标体系，为我国CABG术规范化临床实践和标准化质量评价提供重要理论依据。

该指标体系针对我国CABG诊疗单位的围手术期医疗实践及短期预后进行质量评价，全面纳入结局指标、过程指标和结构指标等多维度内容，旨在发现诊疗过程中的问题，促进医疗实践规范化，改善患者预后。每一个指标的详细说明，包括：指标名称、指标种类、指标维度、指标定义、证据基础、适用人群、指标达成、计算方法、观察时间、数据来源和呈现方式。

指标体系有以下特点：（1）具有充分和明确的证据支持，经过专家论证，具有质量改善的必要性；（2）经过设计和优化，适用于我国临床诊疗现状的监测和改善，具有可操作性；（3）质量评价利用临床常规工作产生的数据和现有数据库，不需额外的数据采集工作，能降低质量评价的成本，促进质量改善工作推广；（4）质量评价包括风险校正方案，其结果能客观反映各诊疗单位医疗质量，适宜进行同行对比和揭露质量问题。

2021年2月，国家卫生健康委正式发布CABG质量控制指标，为后续的国家医疗质量控制工作奠定基础。

	冠状动脉旁路移植术	主动脉瓣手术	二尖瓣手术
结局指标	风险校正手术死亡率 机械通气时间延长发生率 胸骨深部感染发生率 脑卒中/脑血管事件发生率 再次开胸探查发生率 术后肾功能不全发生率 围术期血制品使用量 患者术后住院天数	风险校正手术死亡率 机械通气时间延长发生率 胸骨深部感染发生率 脑卒中/脑血管事件发生率 再次开胸探查发生率 术后肾功能不全发生率 患者术后住院天数	风险校正手术死亡率 机械通气时间延长发生率 胸骨深部感染发生率 脑卒中/脑血管事件发生率 再次开胸探查发生率 术后肾功能不全发生率 患者术后住院天数
过程指标	术前β受体阻滞剂使用率 术中乳内动脉使用率 术中桥血管流量监测使用率 术后早期抗血小板药物使用率 出院医嘱降脂药带药率 出院医嘱阿司匹林带药率 出院医嘱β受体阻滞剂带药率	主动脉瓣有效瓣膜面积指数 出院医嘱华法林带药率 术中经食道超声使用率	术中经食道超声使用率 退行性病变二尖瓣反流修复率 出院医嘱华法林带药率
结构指标	参加医疗质控工作	参加医疗质控工作	参加医疗质控工作

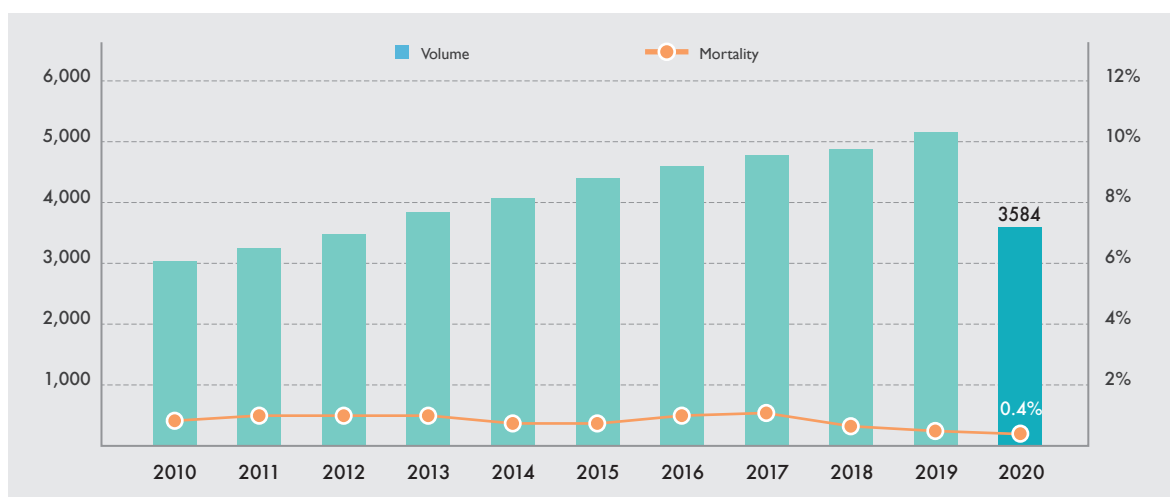
瓣膜性心脏病 Valve Disease



心脏瓣膜手术量及死亡率 VALVULAR SURGERY

Fuwai Hospital performs the largest number of valvular procedures in China. In 2020, 3,584 patients received valvular operation at our institution with a thirty-day mortality of 0.4%.

阜外医院是中国最大的瓣膜外科中心，2020年完成心脏瓣膜手术3584例，在手术量持续增长的同时，死亡率始终保持在较低水平，2020年术后30天死亡率为0.4%。



3584

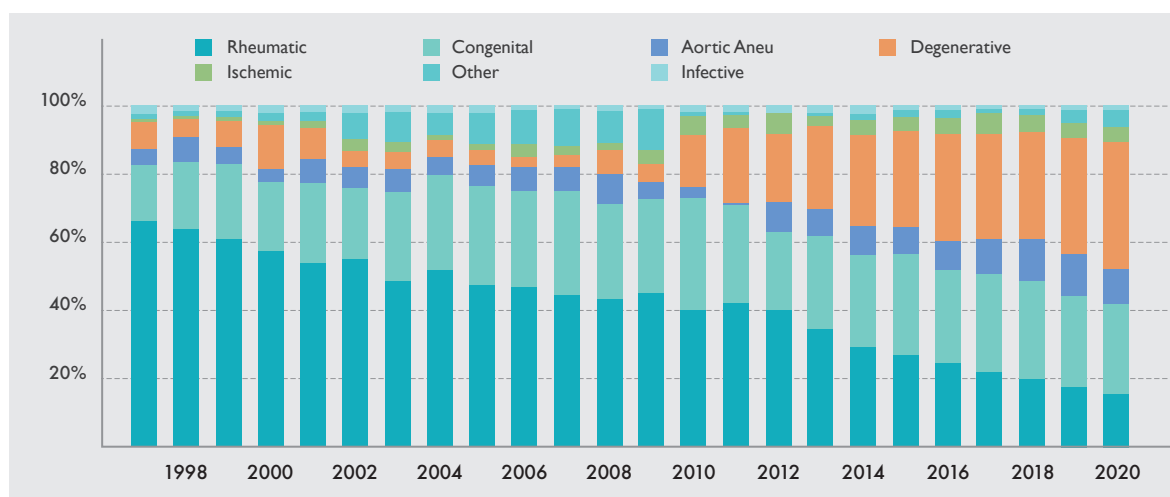
CASE NO. OF VALVULAR SURGERY 2020

■ 心脏瓣膜手术病因构成

ETIOLOGIC DISTRIBUTION OF VALVULAR DISEASE

Rheumatic disease was the major cause of valve disease in China, though the number of cases has been declining. In recent years, degenerative valvular disease has increased dramatically. Analysis of the Fuwai surgical database demonstrated that the percentage of valvular disease patients with degenerative valvular disease exceeded the percentage with rheumatic valvular disease in 2020.

阜外医院收治患者的病因分类基本反映出我国瓣膜病外科的疾病变化谱。一直以来，风湿性病变是我国瓣膜类疾病的主要病因，同时退行性病变比例呈现逐年上升趋势。我院数据显示，当前退行性病变比例已超过风湿性病变，成为目前瓣膜类疾病的主要病因。

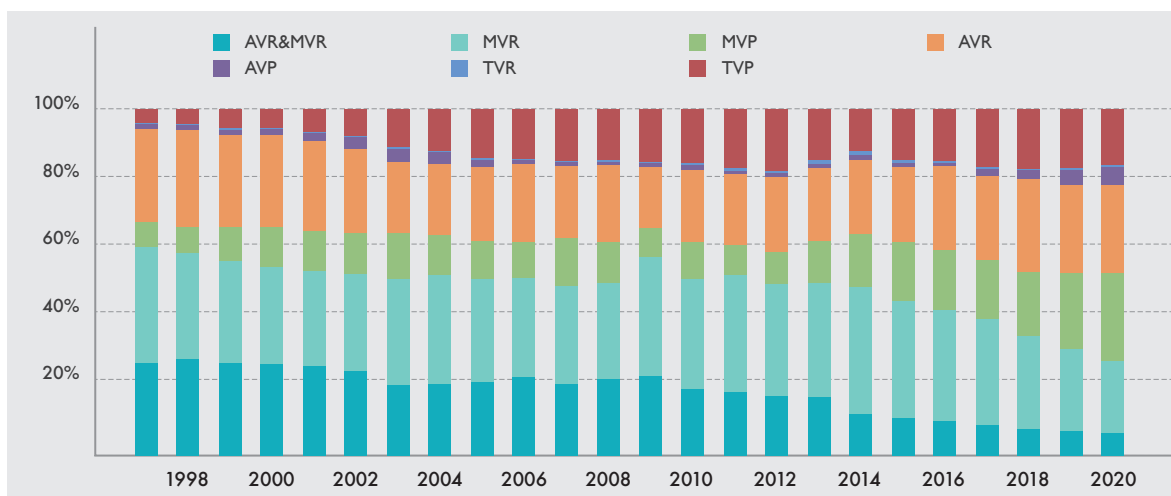


■ 手术种类构成

COMPOSITION OF VALVULAR SURGERIES

In this year, mitral valve repairment represented the major proportion of all valvar surgeries for the first time. The aortic valve repairment technic improved a lot as well. The rate of aortic and mitral valve replacement continued to decline.

今年，二尖瓣成形手术首次在心脏瓣膜手术中占据首位，主动脉瓣成形技术也取得长足进步。主动脉瓣联合二尖瓣置换术的比例呈下降趋势。

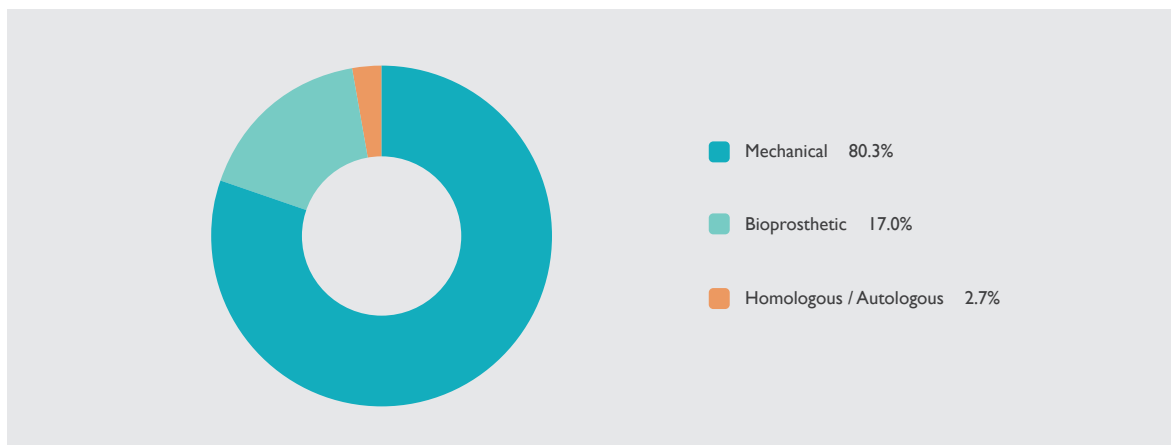


■ 人工瓣膜种类

COMPOSITION OF VALVE PROSTHESES

Mechanical valve accounted for the major type of artificial valve. However, in recent years, the proportion of bioprosthetic aortic valve increased significantly.

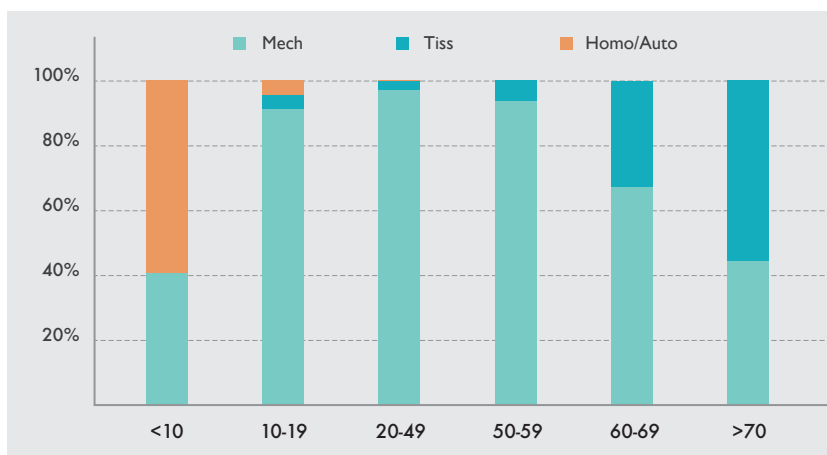
人工机械瓣膜始终占据主导地位。



不同年龄患者所用人工瓣膜种类 DISTRIBUTION OF VALVE PROSTHESES BY AGE

Despite of the overall predominance of mechanical valves, elderly patients tended to receive bioprosthetic valves.

接受心脏瓣膜手术的成年患者，年龄越大使用生物瓣膜的比例越高。



瓣膜成形技术 VALVE REPAIR

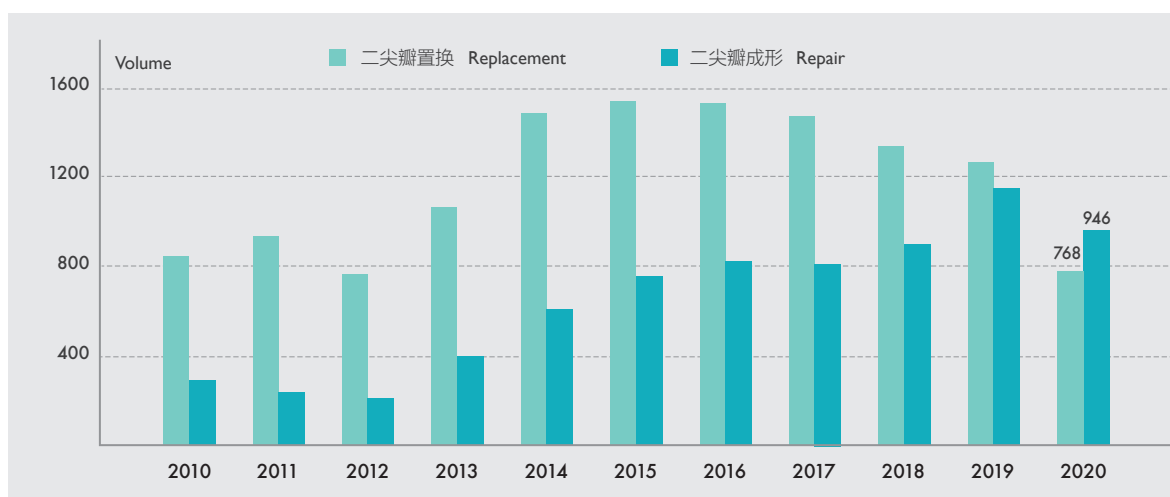
With the development of imaging examination technique, and the improved understanding of heart valvular structure and function, the methods and outcomes of valvular repairment are improving. The surgical team of Fuwai has carried out comprehensive and standardized heart valvular repairment procedures, and achieved outstanding outcomes. Aortic valve repairment and mitral valve repairment performed by pediatric surgical team has been mentioned earlier, now we are describing the achievement by adult cardiac surgical team.

随着影像学的进步和对瓣膜结构、功能的认识加深，瓣膜成形手术的技术手段越来越多，远期预后逐步提高。阜外医院外科团队开展全面、规范的瓣膜成形手术，疗效显著。前文已介绍小儿心脏外科团队的主动脉瓣成形、二尖瓣成形技术，下面着重介绍成人心脏外科团队的成形手术工作进展。

■ 二尖瓣瓣膜成形术 MITRAL VALVE REPAIR

For the Fuwai surgical team, the mitral valve repair technique has become the main treatment for patients with mitral valve insufficiency. In 2020, we performed 946 mitral valve repairment procedures, which surpassed the volume of mitral valve replacement.

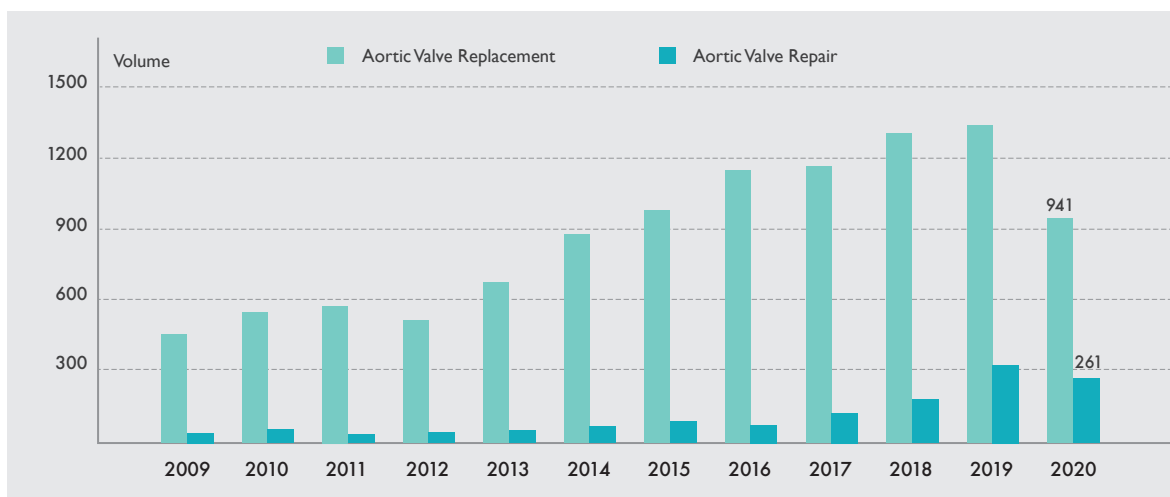
在阜外医院，二尖瓣瓣膜成形术已成为治疗二尖瓣瓣膜关闭不全的主要术式。2020年，阜外医院共完成946例二尖瓣成形手术，其手术量首次超过二尖瓣置换术。78.8%的单纯二尖瓣关闭不全患者成功接受了二尖瓣成形手术，且比例仍在逐年提高。



■ 主动脉瓣瓣膜成形术 COMPREHENSIVE AORTIC VALVE REPAIR

Comprehensive aortic valve repair is mainly used in patients with aortic regurgitation and aortic root aneurysm. By retaining the natural valve, the potential risks associated with lifetime anticoagulation and prosthetic valve replacement can be avoided. Comprehensive aortic valve repair is associated with better long-term survival and improved quality of life. Since 2017, Fuwai Hospital has systematically carried out comprehensive aortic valve repair surgery, and adopted different surgical approaches according to different reflux mechanisms, including annuloplasty, valvuloplasty, reimplantation, remodeling and modified remodeling. In 2020, 261 aortic valve repair operations have been completed in Fuwai Hospital, including 28 isolated aortic valve repair, 99 reimplantation and 3 remodelling operations.

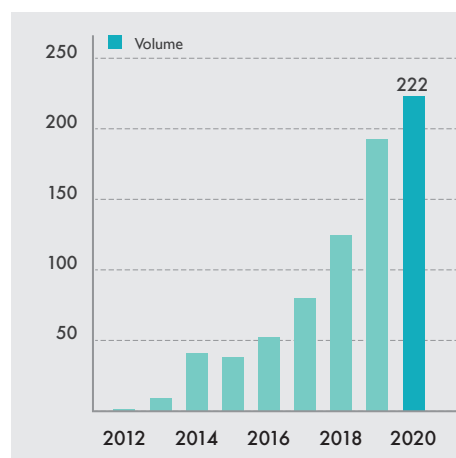
主动脉瓣综合修复手术主要应用于主动脉瓣关闭不全及根部瘤的患者，保留自身瓣膜避免了终身抗凝和人工瓣膜相关的潜在风险，可以获得更高的生存率和生活质量。阜外医院自2017年系统性开展主动脉瓣综合修复手术，根据不同的返流机制采用不同的手术方式，主要包括瓣环成形、瓣叶成形、根部再植、根部重建及改良根部重建手术等。2020年阜外医院共完成主动脉瓣综合修复手术261台，其中单纯主动脉瓣成形术28台，根部再植手术99台，根部重建手术3台。



■ 经导管主动脉瓣置入术

TRANSCATHETER AORTIC VALVE IMPLANTATION

In September 2012, the first transcatheter aortic valve implantation (TAVI) procedure with a domestic valve was successfully performed. Fuwai Hospital has been committed to promoting the first clinical trial for TAVI in China. In July 2014, the Fuwai surgical team pioneered the use of the domestically-produced J-Valve™ to perform transapical aortic valve implantation. Because of the unique design of J-Valve™, our team was the first in the world to successfully apply the TAVI technique on a patient with aortic insufficiency alone. The annual volume of TAVI improved rapidly. In 2020, 222 patients with aortic valve disease successfully received this minimally invasive procedure.



2012年9月，中国第一例国产经导管主动脉瓣在中国医学科学院阜外医院置入成功。阜外医院也首先开展了我国第一个TAVI临床试验。2014年7月，阜外外科团队运用我国自主研发的J-Valve™瓣膜，在国内率先开展了经心尖入路的TAVI手术，不同于国际上TAVI技术仅用于主动脉瓣狭窄患者，阜外外科团队还在国际上首次为单纯主动脉瓣关闭不全患者成功实施了介入瓣膜的植入。我院TAVI手术量继续稳步增长，2020年共完成该类手术222例。



主动脉外科 Aortic Surgery

Despite the impact of the COVID-19 epidemic in 2020, the Fuwai vascular team still performed 1063 aortic procedures and 1161 peripheral vascular procedures.

2020年，尽管受“新冠”疫情影响，阜外医院血管外科中心仍完成各类主动脉手术1063台，各类外周血管手术1161台，在手术数量和质量上都达到了国际先进水平。

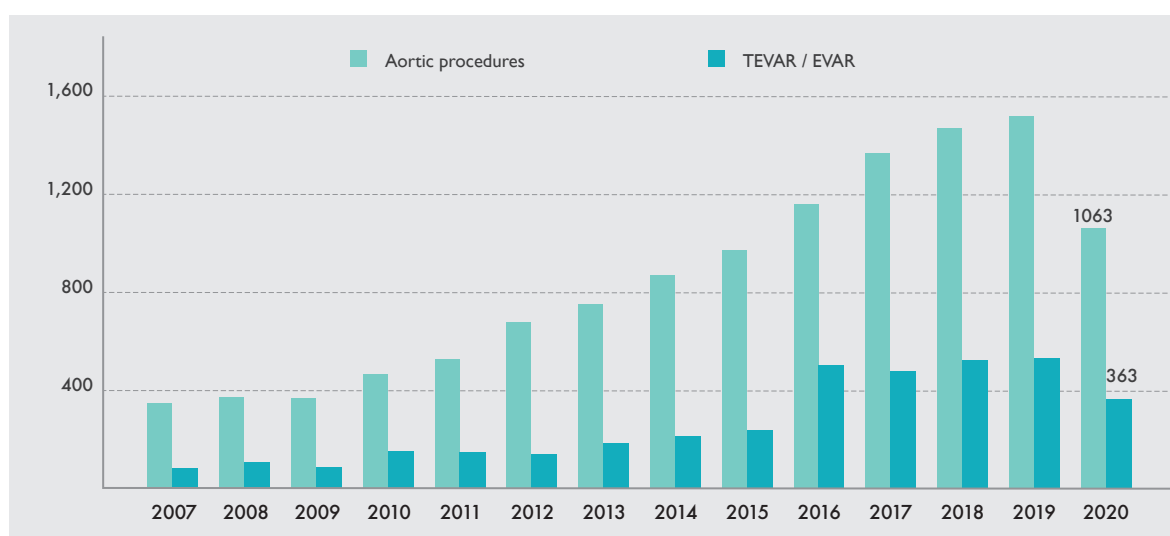
■ 主动脉疾病手术量 VOLUME OF AORTIC SURGERIES

The Vascular Surgery Center of Fuwai Hospital is considered the first choice for patients with aortic aneurysms and dissections throughout China. In 2020, there were 1,063 aortic procedures performed at the center. Among these procedures, 650 were open surgery, 363 were endovascular aortic repairs and 50 were one-stop hybrid procedures. Our data do not include the aortic operations for infant and children performed at the Pediatric Cardiac Surgical Center.

2020年完成主动脉病变的手术治疗1063例，其中开放手术650例，主动脉覆膜支架腔内修复术363例，各型主动脉杂交手术50例。本数据不包括小儿外科中心专家完成的小儿主动脉手术。

1063

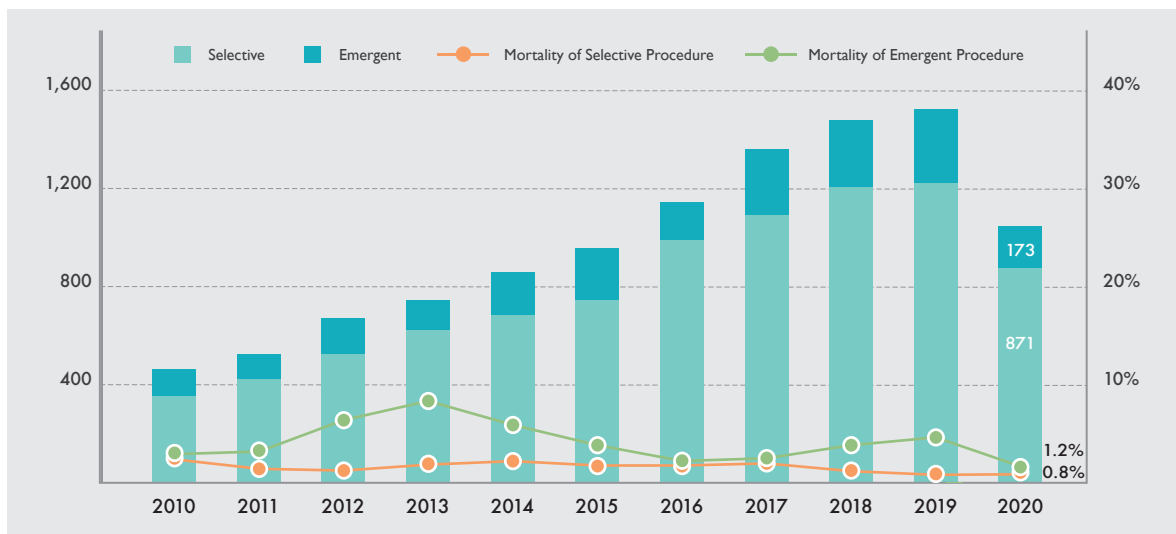
CASE NO. OF AORTIC PROCEDURE 2020



■ 主动脉急诊和择期手术的比例和术后30天死亡率 SELECTIVE AND EMERGENCY AORTIC SURGERY

Aortic emergencies, including acute aortic syndrome and aortic rupture, are usually life-threatening, sudden onset catastrophes of the aorta that present immense surgical technique challenges and have high associated risk. The Aortic Emergency Green Channel policy of Fuwai Hospital has been in place for several years and has helped ensure that the majority of emergent aortic patients are treated in an efficient manner. The hospital continues to have one of the highest technical success rates for emergent aortic operations in the world. In 2020, surgeons at the Vascular Surgery Center performed 871 scheduled surgeries and 173 emergent aortic surgeries, with thirty-day mortality of 0.8% and 1.2%, respectively.

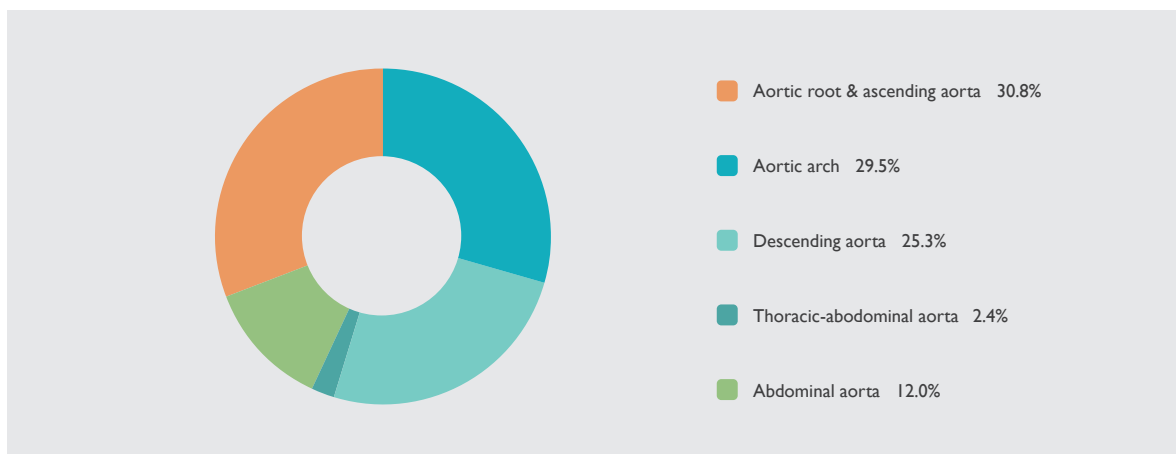
以急性主动脉综合征、主动脉破裂为代表的主动脉急症往往需要紧急手术，技术难度大，手术风险高。阜外医院集全院优势力量，从制度层面入手，建立了“胸痛中心”和“主动脉急诊绿色通道”，在主动脉急诊患者的救治效率和救治成功率方面，均已成为中国医院救治主动脉疾病的典范。2020年，阜外医院血管外科中心为871例主动脉疾病患者实施了择期手术，为173例患者实施了急诊手术，术后30天死亡率分别低至0.8%和1.2%。



主动脉手术治疗部位构成图 COMPOSITION OF AORTIC SURGERIES

These figures show the composition of open, endovascular, and hybrid aortic procedures at Fuwai Hospital. In 2020, 30.8% of procedures were on the aortic root and ascending aorta, 29.5% aortic arch, 25.3% descending aorta, and 12.0% abdominal aorta.

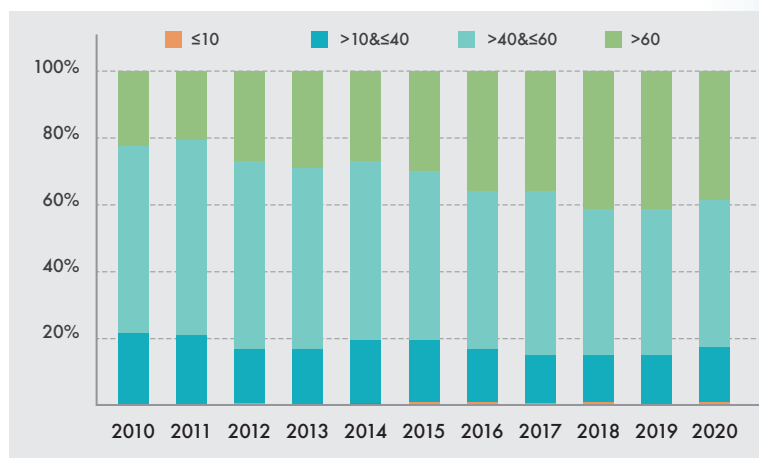
这张图显示了阜外医院血管外科2020年主动脉手术部位的构成情况。2020年患者构成比为，主动脉根部和升主动脉病变占30.8%，主动脉弓病变占29.5%，降主动脉病变占25.3%，腹主动脉病变占12.0%。



■ 主动脉手术患者的年龄分布 AGE DISTRIBUTION

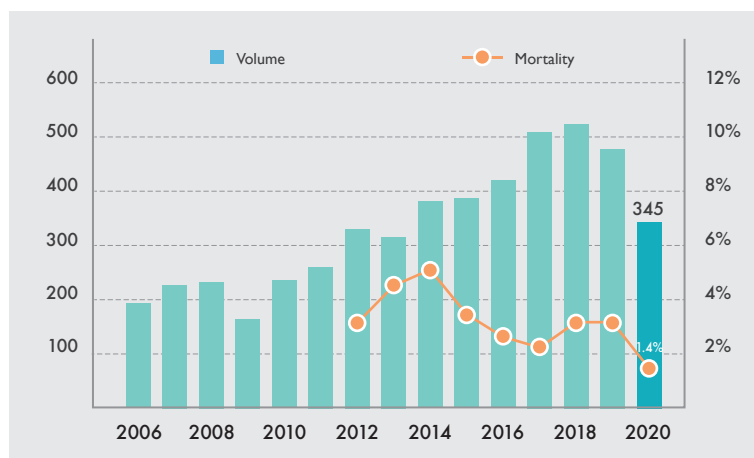
In recent 10 years, the proportion of patients over 60 years of age who underwent open, endovascular, or hybrid aortic procedures at Fuwai Hospital increased significantly.

近十年来，接受主动脉外科、腔内和杂交手术的患者中，60岁以上患者比例呈现总体增长的趋势。



■ 主动脉夹层 AORTIC DISSECTION

In mainland China, there is a relatively high incidence of aortic dissection in young and middle-aged men with hypertension; the average age is lower than that of the USA and European countries. Lifesaving emergency surgery to repair the dissected aorta is frequently performed by the Fuwai vascular team. In 2020, we performed a total of 345 open, endovascular, and hybrid aortic procedures with a 30-day postoperative mortality of 1.4%.



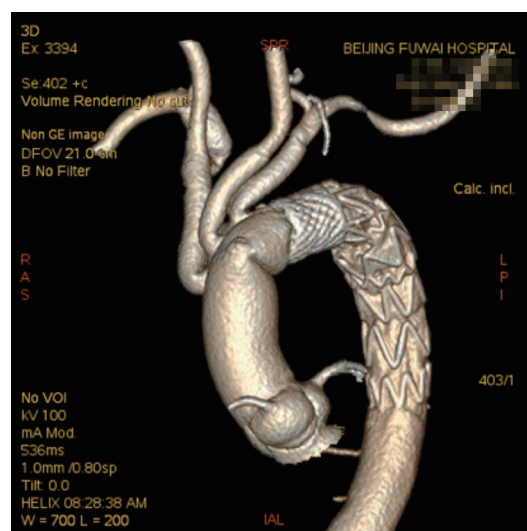
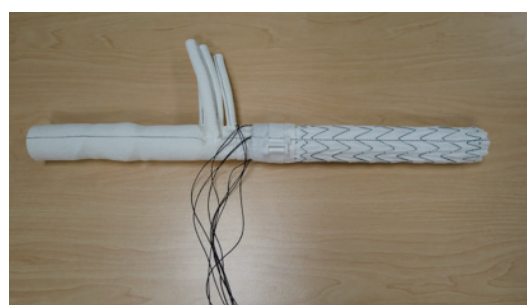
中国高血压病人群约有2.6亿，但由于控制率偏低等原因，主动脉夹层发病率偏高，而且患者的平均年龄低于欧美发达国家。阜外医院血管外科团队每年为许多这样的患者实施紧急手术治疗，以挽救他们的生命。2020年，完成主动脉夹层手术345例，术后30天死亡率降至1.4%，达世界顶级水平。

■ 用于主动脉夹层治疗的一体化免缝合人工血管

SUTURELESS INTEGRATED STENTED GRAFT PROSTHESIS FOR THE TREATMENT OF AORTIC DISSECTION

The first integrated sutureless vascular prosthesis for the treatment of aortic dissection has been used in Fuwai Hospital. The integrated design makes it unnecessary to complete the device implantation step by step. The suture free design simplifies the operation difficulty of the distal aortic arch, greatly shortens the circulatory arrest time, eliminates the need for surgery under deep hypothermia, reduces the adverse effects of deep hypothermia circulatory arrest technology, and improves the surgical prognosis of patients with aortic dissection. As a entirely self-developed artificial blood vessel (Patent No. ZL201821299910.4; Patent No. ZL200920279581.1). The product has been completely tested in the preclinical trial in 2019 and approved by the Food and Drug Administration in April 2020. It has entered the special approval procedure for innovative medical devices and accelerated the speed for product registration and listing. On July 31, 2020, the product was approved by the GCP office of China National Clinical Research Center for Cardiovascular Diseases, and the medical device clinical registration trial (Registration No. ChiCTR2000032264) was initiated to evaluate its efficacy and safety. The product has also won the attention of CCTV media and carried out special reports in Oriental Horizon of CCTV news channel.

全球首款治疗应用于主动脉夹层治疗的一体化免缝合人工血管。一体化设计使器械植入无需分步完成，免缝合设计简化了主动脉弓远端操作难度，大幅缩短停循环时间，无需在深低温下进行手术，减少深低温停循环技术的不良影响，改善主动脉夹层患者手术预后。作为完全由我国自主研发的人造血管（专利号：ZL201821299910.4；专利号：ZL200920279581.1），该产品已于2019年完善临床前试验，并于2020年4月通过国家药监局批准，进入创新医疗器械特别审批程序，加快推进产品注册上市速度。2020年7月31日，该产品通过国家心血管疾病临床医学研究中心临床研究机构办公室审核，正式开启医疗器械临床注册试验（注册号ChiCTR2000032264），探究其临床有效性和安全性。该产品还获央视媒体关注，于央视新闻频道东方时空栏目开展专题报道。

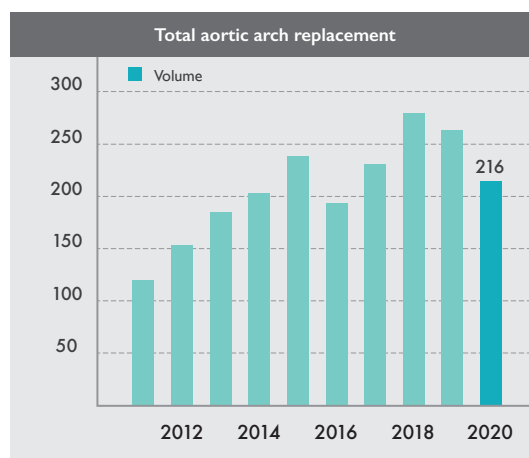


■ 主动脉弓开放手术 OPEN AORTIC ARCH OPERATIONS

In 2020, surgeons at the Vascular Surgery Center performed 327 open aortic arch operations, including 216 total aortic arch replacement, 15 subtotal aortic arch replacement, and 96 partial aortic arch replacement procedures. This data do not include hybrid arch replacement operations.

The proportion of open aortic arch replacement procedures has decreased since 2016. The primary reason for this change is the increase in the number of patients with arch pathologies managed by total endovascular procedures such as chimney or fenestration assisted TEVAR, and hybrid procedures.

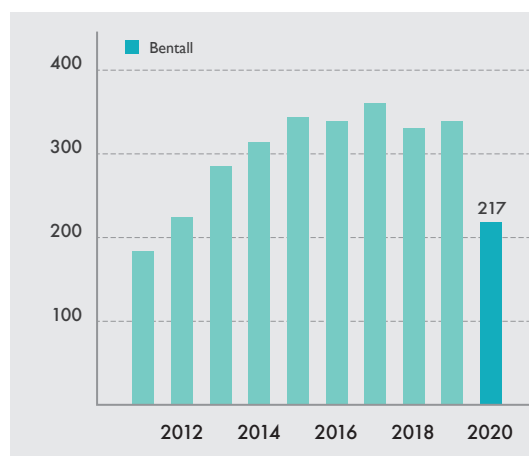
2020年，阜外医院血管外科中心完成主动脉弓部外科手术327例（同时进行了主动脉根部或升主动脉手术的患者也计算在内），其中深低温停循环下的全主动脉弓替换手术216例（不包括杂交手术），次全弓替换手术15例，部分弓替换手术96例。2016年来，主动脉弓外科手术在主动脉手术总量中所占权重有所下降，这与更大比例的主动脉弓部病变患者接受了全腔内修复手术和杂交手术有关，其中包括“烟囱”技术、“预开窗”技术、“原位开窗”技术、“一体式分支支架”技术等腔内微创技术在锚定区不足的患者群中的运用。



■ 主动脉根部手术 AORTIC ROOT SURGERIES

In 2020, surgeons at the Vascular Surgery Center performed 339 aortic root operations, including 217 Bentall's procedures, 20 Wheat's procedures and 102 David's procedures.

2020年，阜外医院血管外科中心完成主动脉根部手术共计339例，其中Bentall's手术217例，Wheat's手术20例，David's手术102例，同时实施了其他心血管手术的患者也计算在内（如Bentall's+全主动脉弓替换术）。

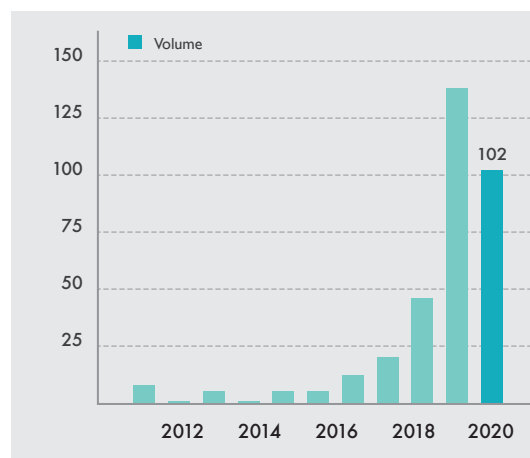


■ 保留主动脉瓣的主动脉根部替换术 VALVE SPARING AORTIC ROOT REPLACEMENT (DAVID PROCEDURE)

David procedure preserves its own healthy aortic valve, avoiding lifelong anticoagulation and the potential risks associated with prosthetic valves. In 2020, surgeons at the Vascular Surgery Center performed 102 David Procedures, including 99 cases of David I, 3 cases of David II.

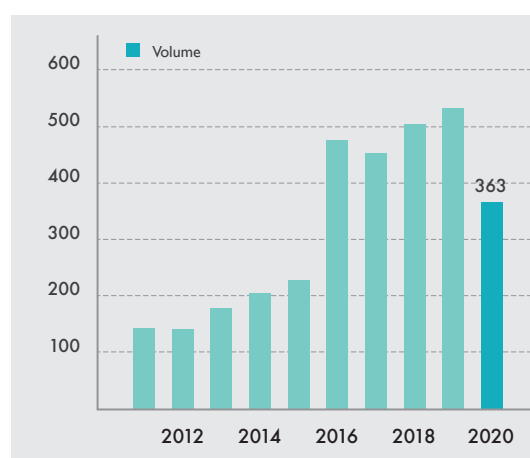
Aortic valvuloplasty was performed in 45 cases at the same time.

David手术保留了自身健康的主动脉瓣膜，避免了终身抗凝和与人工瓣膜相关的潜在风险。2020年，阜外医院血管外科中心完成David手术102例，其中David I 99例，David II 3例。同期主动脉瓣成形45例。



■ 主动脉微创腔内修复术 ENDOVASCULAR AORTIC REPAIR

In 2020, surgeons at the Vascular Surgery Center performed 363 endovascular operations, including 249 TEVAR, 108 EVAR, 3 TEVAR+EVAR simultaneously, and 3 balloon-expandable stent implantations for coarctation of the aorta. Among these cases, 100 patients without enough landing zones for endografts were treated successfully by usage of the chimney, double/triple chimney, snorkel, and fenestration techniques.



2020年，阜外医院血管外科中心完成主动脉覆膜支架腔内修复术363例，其中胸主动脉覆膜支架腔内修复术249例，腹主动脉覆膜支架腔内修复术108例，同期进行胸主动脉和腹主动脉腔内修复手术3例，主动脉缩窄介入支架（球扩式）植入术3例。其中，采取烟囱技术、潜望镜技术、开窗技术等辅助技术为100名锚定区不足的主动脉病变患者实施了腔内修复（大部分患者为主动脉弓部病变）。

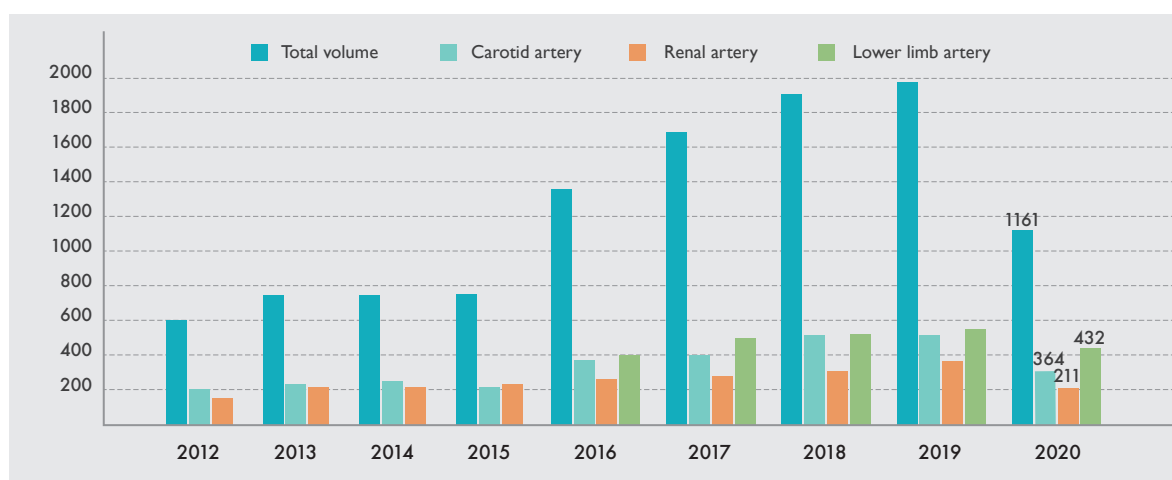
周围血管疾病 Peripheral Vascular Diseases

1161

CASE No. OF PERIPHERAL VASCULAR
PROCEDURE 2020

OUTCOMES 2020

A dedicated peripheral vascular ward was established at Fuwai Hospital in November 2015. Ward staff include Team A vascular surgeons and Team B interventional cardiologists. In 2020, the two teams performed 1,161 interventional and open procedures on patients with peripheral vascular diseases, including 603 cases of these procedures performed by interventional cardiologists and 558 opening and interventional procedures performed by vascular surgeons. The procedures performed by Team B (603 cases) were not included in the annual surgical volume of Fuwai Hospital.



2015年底，阜外医院新设外周血管疾病治疗团队，由血管外科中心一病区（血管外科医师和内科介入医师）、二病区（血管外科医师）组成，主要以外周动脉疾病和各类静脉疾病的介入和外科治疗作为主攻方向。2020年共实施手术1161例，其中一病区、二病区的血管外科医师实施各类外周血管开放及介入手术558例，内科介入医师实施外周血管介入手术603例。内科介入医师实施的外周动脉疾病和各类静脉疾病的介入手术量（603例）在阜外医院内科年报中体现，而不计入阜外医院外科年报的手术总量。

微创心脏外科

Minimally Invasive Cardiac Surgery

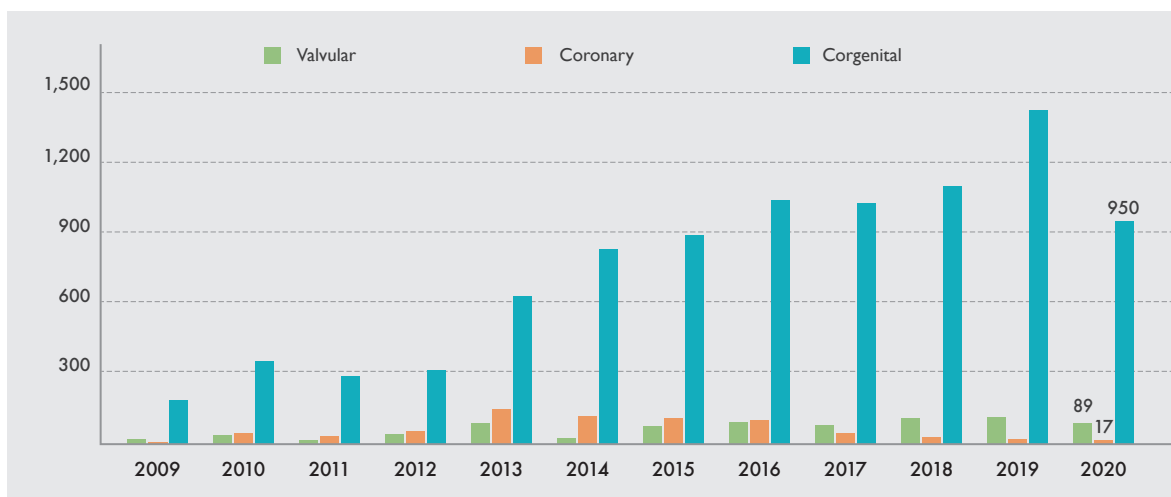


■ 小切口心脏手术

MINIMALLY INVASIVE SURGERIES

The Fuwai surgical team is devoted to reducing surgical trauma for patients by using minimally invasive surgical techniques. The volume of these techniques, which include limited sternotomy, right subaxillary minithoractomy, and the parasternal approach, has steadily increased in recent years.

小切口心脏手术是减少患者手术创伤的微创手术技术手段，包括部分胸骨切口、右侧腋下小切口、胸骨旁切口及胸腔镜手术等，手术量持续、稳定增长。

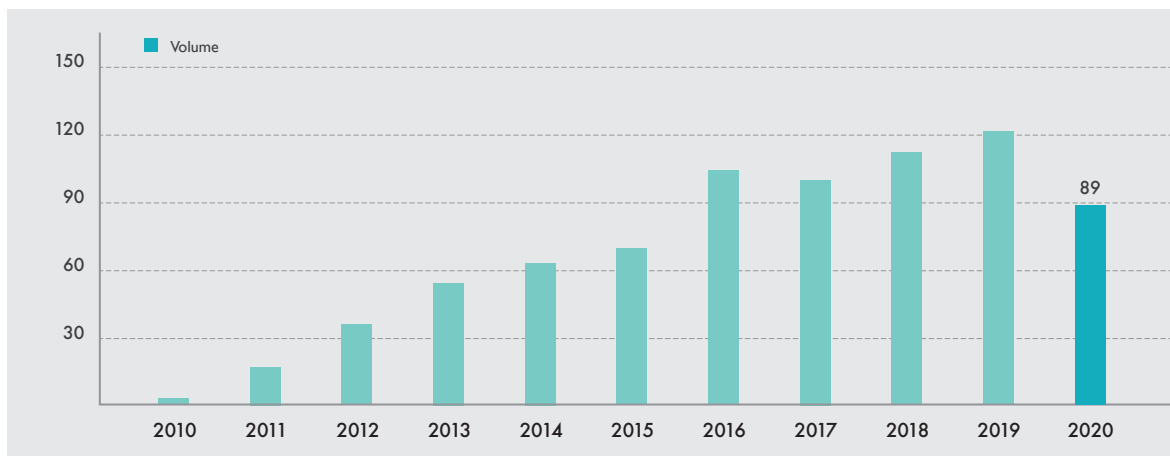


■ 胸腔镜辅助心脏手术

VIDEO-ASSISTED THORACOSCOPIC CARDIAC SURGERIES

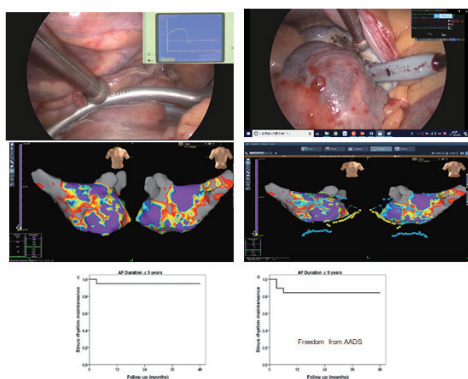
Video thoracoscope-assisted cardiac surgeries are routinely performed at Fuwai Hospital for congenital heart disease, mitral valve repair or replacement, and minimally invasive coronary artery bypass surgeries. Favorable outcomes were achieved for persistent atrial fibrillation by using hybrid thoracoscopic and catheter ablation.

阜外医院常规开展胸腔镜辅助的系列心脏手术，其领域涵盖常见的先天性心脏病矫治、二尖瓣成形、置换及微创搭桥等。尤其是针对持续性房颤，开展了全胸腔镜下心外膜消融+心内膜联合消融的复合治疗技术。



■ 心律失常的外科治疗

SURGICAL TREATMENT FOR HEART ARRHYTHMIA



290 cases of thoracoscopic epicardial ablation for atrial ablation have been successfully performed at Fuwai Hospital since 2010. Pulmonary vein isolation or box-lesion set was introduced to treat atrial fibrillation in the early stage. After years of experience, modified bi-atrial maze lesion set was introduced to treat persistent or long-standing persistent atrial fibrillation. Resection of the left atrial appendage, the left atrial posterior wall ablation, the left fibrous trigone ablation, the ablation line between the superior and inferior vena cava, the right atrial free wall ablation and the right atrial appendage ablation can be performed simultaneously.

The left atrial lesion set was used to treat paroxysmal atrial fibrillation. For patients with intractable atrial fibrillation with significantly dilated left atrium, one-stage hybrid ablation was adopted, which could increase the transmural of the ablation lesion set. For patients with long-standing persistent atrial fibrillation with significantly dilated left atrium who underwent one-stage hybrid ablation, one-year sinus rhythm maintenance was 74.1% (Zheng Z, Yao Y, Li H et al. Simultaneous hybrid maze procedure for long-standing persistent atrial fibrillation with dilated atrium. JTCVS Techniques 2021;5:34-42).

阜外医院外科团队自2010年开展胸腔镜房颤治疗，至2020年共完成290例。早期采取肺静脉隔离或盒状消融治疗房颤。经过多年的经验总结，目前主要采取双房改良迷宫消融线路治疗持续性或长程持续性房颤，可同时完成左心耳切除、左房后壁消融、左纤维三角消融、上下腔静脉间连线的消融线、右房游离壁和右心耳消融；采用双房改良迷宫消融线路的左房线路治疗阵发性房颤。对于左房明显增大的难治性房颤患者，采用外科同期联合介入消融的治疗方式，介入强化消融或修饰消融可增加消融线路的透壁性。阜外医院研究结果显示：对于左房增大的长程持续性房颤患者，同期复合消融术后1年窦性心律维持率为74.1% (Zheng Z, Yao Y, Li H et al. JTCVS Techniques 2021;5:34-42.)。

■ 超声引导专用导丝 (Panna™)

ULTRASOUND-SPECIFIC GUIDEWIRE – PANNA™

The ultrasound-specific guidewire --- Panna™ is independently developed and manufactured by the surgical team of Fuwai Hospital. It is the world's first and only guidance system for ultrasound-guided interventional therapy. The guidewire is composed of a main body made of steel wire and a spindle shaped head with high elastic nickel titanium alloy wire. Its unique spindle shaped head design perfectly solves the technical bottleneck of difficult positioning of conventional guiding instruments under ultrasound guidance, greatly reduces the learning curve of ultrasound-guided interventional technology in the treatment of heart diseases, significantly improves the success rate of operations, and makes the intervention of heart disease enter the "Environmental protection era" with non-radiation, and non-contrast agent. In September 2020, the results of prospective, multicenter, randomized controlled trials of guidewire Panna™ was published in journal---Circulation: Cardiovascular Interventions, which showed that with the help of guidewire Panna™, less experienced and young doctors can achieve 100% success rates for transcatheter closure of atrial septal defect. Comparing with traditional guidewire, the Panna™ guidewire can improve success rates, reduces time duration of surgery and complication rates. This is of great significance for promotion of ultrasound-guided interventional technology. This research has been highly praised by foreign counterparts, and been regarded as one undoubted role in promotion of Chinese experience and technological innovation in the field of non radiation intervention technology.

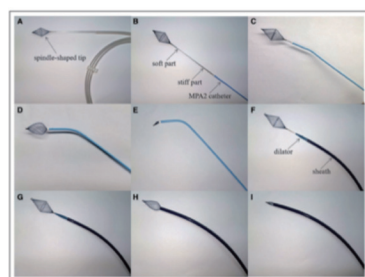


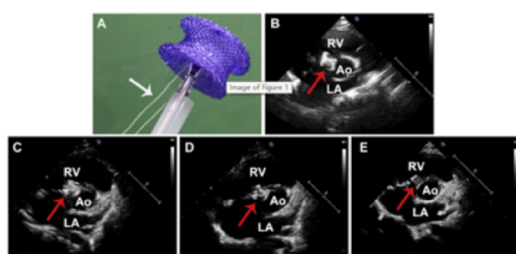
Figure 1. The Panna wire. A, Overall display of the wire with its spindle-shaped tip. B, The body of the wire consists of a soft part (S) and a stiff part (SS). C-E, The wire can be withdrawn into a MPAA catheter. F, The wire is in the delivery sheath. G, The tip of the wire cannot be pulled into the sheath. H and I, The tip of the wire can be withdrawn into the sheath (MPAA) indicates multipurpose catheter.

超声引导专用导丝Panna™导丝由阜外医院外科团队自主研发制造，是全球第一款也是唯一一款用于超声引导介入治疗的引导系统。该导丝由钢丝制成的主体和高弹性镍钛合金丝编织的纺锤形头部组成，其独特的纺锤形头部设计完美解决了常规引导器械在超声引导下难以定位的技术瓶颈，大大降低超声引导介入治疗心脏疾病的学习曲线，显著提高手术成功率，使心脏疾病介入进入无射线、无造影剂的“环保时代”。2020年9月，《Circulation Cardiovascular Interventions》全文刊登了Panna™导丝前瞻、多中心、随机对照研究临床试验的研究结果，结果显示经验不足年轻医生使用Panna™导丝在超声引导下进行房间隔缺损封堵成功率达到100%，与传统导丝相比，Panna™导丝显著提高手术成功率，大大减少了手术时间和术中并发症，对推广超声引导介入技术具有重大意义。该研究获得国外同行的高度评价，被誉为中国经验和技术创新对无放射线介入技术推广毋庸置疑的作用。

■ 完全可降解室间隔缺损封堵器

FULLY BIOABSORBABLE VENTRICULAR SEPTAL DEFECT OCCUDER

The surgical team of Fuwai Hospital has developed the world's only fully degradable ventricular septal defect occluder. This occluder was implanted into the ventricular septal defect under the guidance of only ultrasound, without metal markers. This solved the problem that the traditional occluder could not be entirely degradable; PDO (poly p-dioxanone and PLLA (poly L-lactic acid) were used to solve the problem of degradation rate; The unique molding line design solves the problem of poor elasticity of degradable materials. In 2020, the world's first fully degradable occluder implantation was reported in the the journal "JACC: Cardiovascular Interventions", which marks the entering of a new era in the interventional treatment of congenital heart diseases.



142 The fully bioabsorbable ventricular septal defect occluder device has a bioabsorbable polydioxanone fiber braided framework with a poly-L-lactic acid nonwoven fabric. The device is shown during implantation. B, C, D, Echocardiographic parasternal short-axis views of the occluder at 1 day and 1, 3, and 6 months post-procedure showed gradual degradation of the occluder (red arrows). Ao = aorta, LA = left atrium, LV = left ventricle, RV = right ventricle.

阜外医院外科团队研制全球唯一的完全可降解室间隔缺损封堵器，这款封堵器通过完全超声引导植入到室间隔缺损处，无金属标记物，解决了传统封堵器无法做到完全可降解的问题；利用PDO（聚对二氧环己酮）及PLLA（聚左旋乳酸）混合构造解决了降解速度的问题；独特成型线设计解决了可降解材料弹性差的问题。2020年，《JACC: Cardiovascular Interventions》报道了全球首例完全可降解封堵器植入术，标志着先心病介入治疗进入无残留的新时代。

肥厚梗阻性心肌病

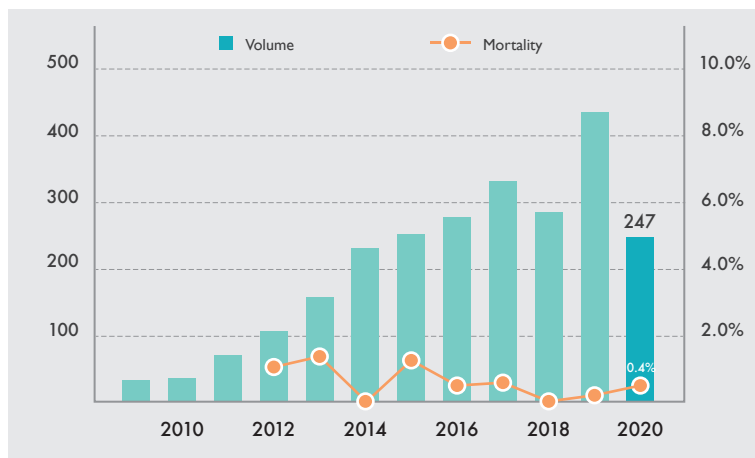
Hypertrophic Obstructive Cardiomyopathy

■ 改良Morrow手术

MODIFIED MORROW PROCEDURE

In 2020, 247 patients with hypertrophic obstructive cardiomyopathy have been operated by Fuwai surgical team. The 30-day mortality rate is 0.4%. The mean peak pressure difference of left ventricular outflow tract in adult patients decreased from 84.1 ± 7 mmHg to 14.6 ± 11.0 mmHg; and decreased from 74.8 ± 21.3 mmHg to 13.0 ± 7.7 mmHg in children and adolescents. In this year, we reported the surgical results of 117 cases of HCM in children and adolescents, which is the largest cohort in the world. Only one patient died in 30 days after operation (mortality rate: 0.9%), and the 3-year survival rate was 96.5%. In addition, 31 patients with middle left ventricular obstruction and apical occlusion were treated by apical combining with ascending aorta incision. The short-term results were excellent.

2020年累计完成肥厚梗阻性心肌病外科手术247例，术后30天死亡率0.4%。成年人患者平均左室流出道峰值压差从术前的 84.1 ± 28.7 mm Hg 降至术后的 14.6 ± 11.0 mmHg；儿童及青少年患者平均左室流出道峰值压差从术前的 74.8 ± 21.3 mm Hg降至术后的 13.0 ± 7.7 mmHg。本年度我们报道了迄今全球最大一组儿童及青少年HOCM117例的外科结果（Zhu C, Wang S, Ma Y, et al. Ann Thorac Surg. 2020;110(1):207-213.），术后30天死亡1例（死亡率0.9%），3年生存率为96.5%。此外，本年度采用心尖联合升主动脉切口治疗左室中部梗阻和心尖闭塞的患者31例，近期结果良好。



肺动脉内膜剥脱术

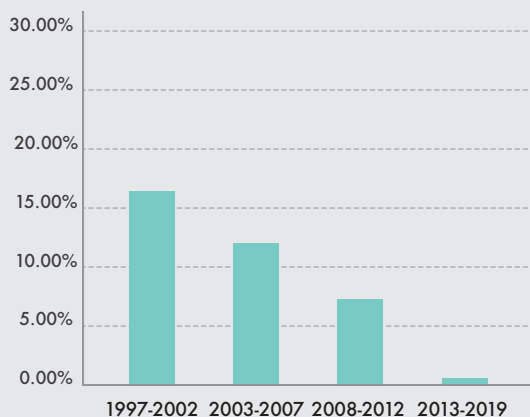
Pulmonary Endarterectomy Surgery



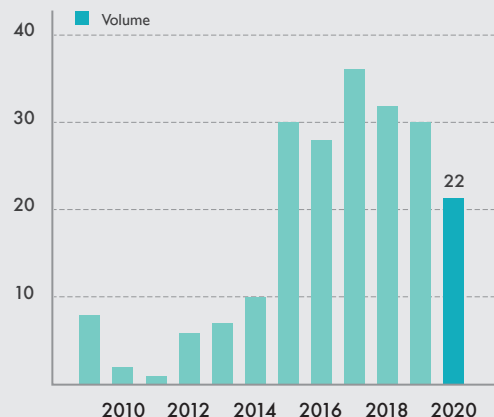
From 1997 to 2020, a total of 263 cases of pulmonary endarterectomy had been accomplished at Fuwai Hospital. In the last 5 years, the 173 patients had a peri-operative mortality rate under 1%, which ranks the top in the world. Meanwhile, our center firstly carried out pulmonary endarterectomy + sequential pulmonary balloon angiography hybrid therapy strategy as the treatment of chronic thromboembolic pulmonary hypertension in mainland China, which is one of the largest centers in the world.

阜外医院自1997年至2020年共开展肺动脉内膜剥脱术（PEA）263例（亚洲单中心最大组），近5年共完成173例PEA手术，围术期死亡率低于1%，手术疗效跻身全球第一梯队行列。并在国际上率先开展“肺动脉内膜剥脱术+序贯式肺动脉球囊扩张”复合技术治疗慢性血栓栓塞性肺动脉高压，为开展此类治疗方案的全球最大中心之一。

分时间段死亡率
MORTALITY IN DIFFERENT PERIODS



阜外医院PEA手术例数
SURGICAL VOLUME OF PEA



心力衰竭的外科治疗

Surgical Treatment for Heart Failure

心脏移植

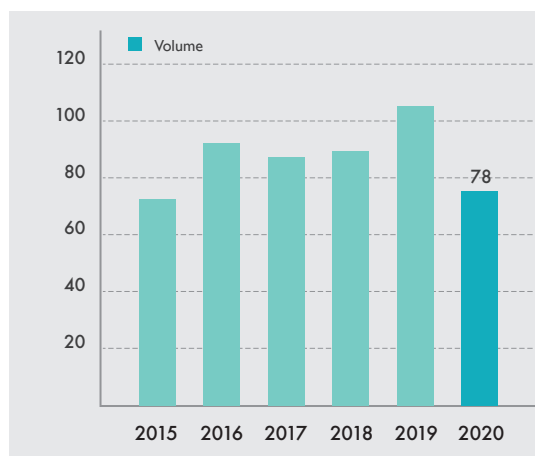
HEART TRANSPLANTATION

心脏移植手术量

HEART TRANSPLANTATION

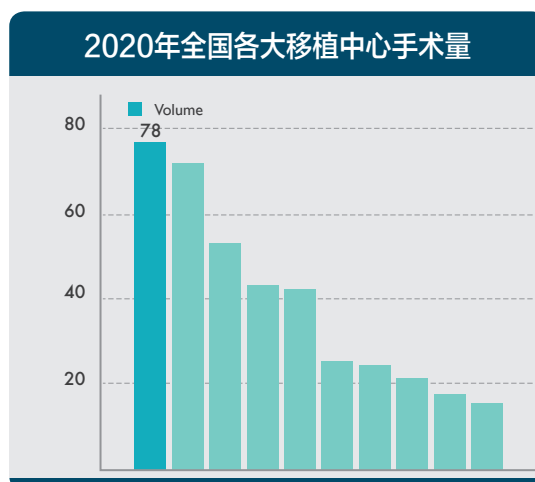
Since June 2004, 1006 patients have undergone heart transplantation at Fuwai Hospital; 78 of these transplantations were in 2020.

自2004年6月至今，阜外医院外科团队在院内完成心脏移植1006例，其中2020年完78例。



According to the report of China Heart Transplantation Registry, from 2015 to 2020, 528 heart transplantation operations were completed in Fuwai Hospital, and the operation volume has always been in the forefront of China's transplantation centers.

根据中国心脏移植注册系统的报告，2015年-2020年，阜外医院共完成心脏移植手术528例，手术规模始终居于我国移植中心前列。

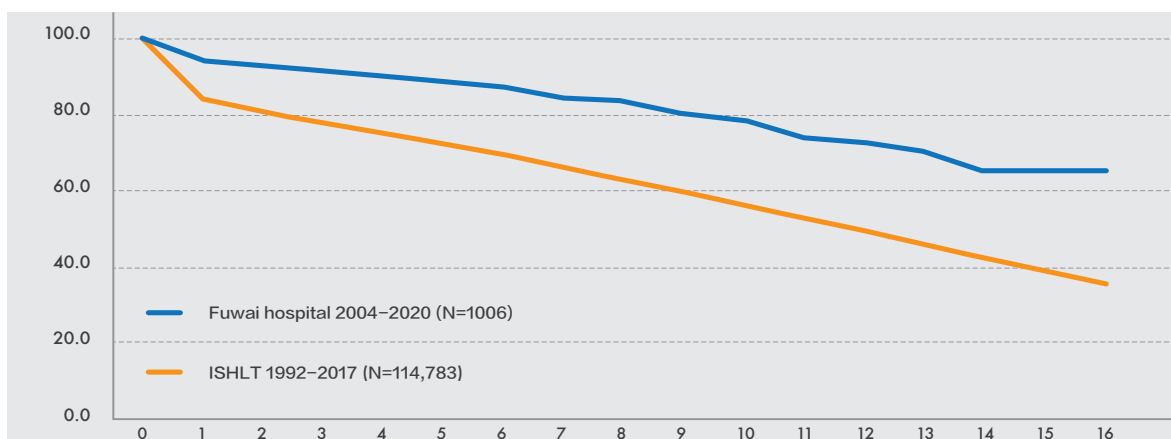


■ 心脏移植生存率图

KAPLAN-MEIER SURVIVAL CURVE FOR HTX PATIENTS IN ISHLT AND FUWAI HOSPITAL

At Fuwai Hospital, the one-year, three-year, five-year and ten-year survival rate after heart transplantation was 94.1%, 91.4%, 88.4% and 78.1%, respectively, which are significantly higher than those of ISHLT.

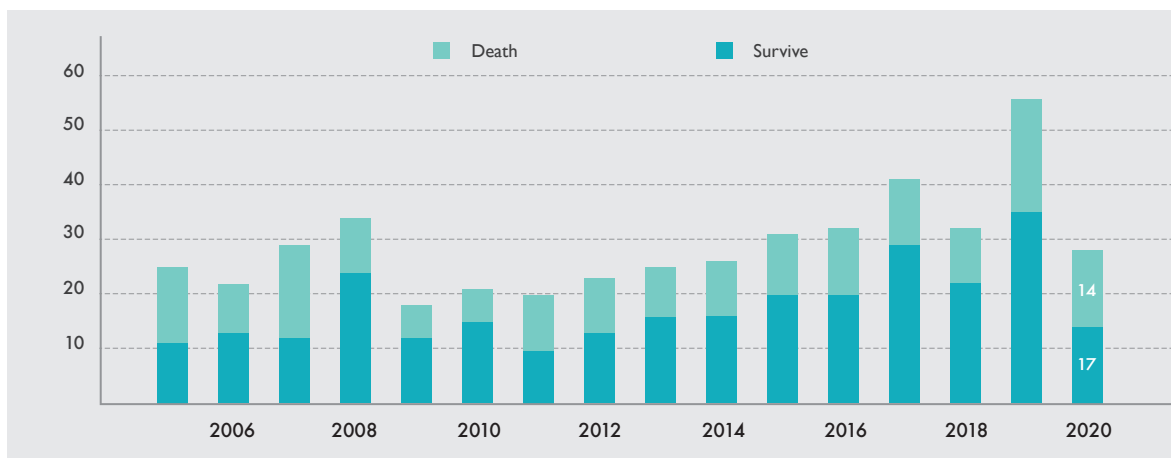
阜外医院移植后患者1年生存率为94.1%，3年生存率91.4%，5年生存率88.4%，10年生存率达78.1%，明显高于国际心肺移植协会（ISHLT）统计的同期生存率。



EXTRACORPOREAL MEMBRANE OXYGENATION (ECMO)

ECMO is regularly used at Fuwai Hospital for patients with acute cardiogenic shock, and ECMO+IABP is routinely used for short-term ventricular assistance. Both applications have achieved excellent outcomes.

在阜外医院，ECMO广泛应用于救治急性心源性休克患者，ECMO+IABP已成为短期心室辅助常规，并取得良好效果。



心室辅助装置

VENTRICULAR ASSIST DEVICE

Ventricular assist system is a mechanical circulatory support device that can replace the natural heart work and ensure the perfusion of systemic organs such as brain, liver, lung and kidney, and has become one of the most effective surgical treatment methods for end-stage heart failure. At present, the second-generation HeartMate II and the third-generation HeartWare ventricular assist system are the most used internationally, with more than 3000 cases applied each year in North America, with a 1-year survival rate of 85% and a 2-year survival rate of 79%, and the long-term treatment effect is approaching that of heart transplantation.

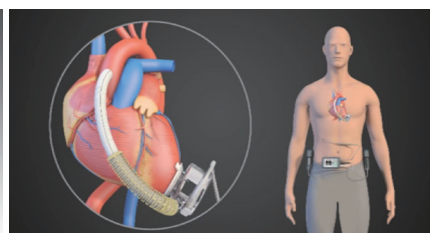
Since June 2017, the artificial heart team of Fuwai Hospital took the lead in completing the first implantation of a long-term left ventricular assist device in China. By the end of December 2020, a total of 13 cases of EVAHEART I implantation and 29 cases of CH-VAD implantation have been performed. A total of 42 cases of this type of surgery have been performed (35 cases in Fuwai, Beijing, 3 cases in Fuwai, Central China, 3 cases in Fuwai, Shenzhen and 1 case in Fuwai, Yunnan). One of these patients has been living with the device for more than 40 months and is the longest in China.

心室辅助系统是代替自然心脏做功并保证脑、肝、肺和肾脏等全身器官灌注的机械循环支持装置，已经成为终末期心脏衰竭的最有效外科治疗手段之一。目前国际上应用最多的是第二代HeartMate II和第三代的HeartWare心室辅助系统，北美地区每年应用超过3000例，1年生存率85%，2年生存率79%，长期治疗效果正接近心脏移植。

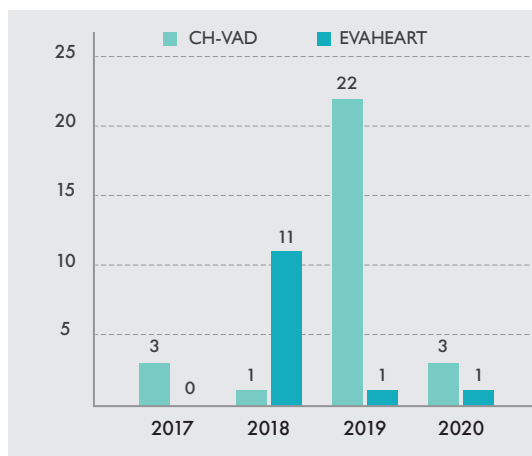
自2017年6月起，阜外医院人工心脏团队率先完成中国第1例可长期携带左心室辅助装置植入术，至2020年12月底已累计完成EVAHEART I植入术13例，CH-VAD植入术29例，共计42例该类手术（北京阜外35例，华中阜外3例，深圳阜外3例，云南阜外1例）。其中1例患者已携带装置生存超过40个月，是中国生存时间最长患者。



Fig 1.(a)EVAHEART I LVAD
左心辅助系统
图1.(a)EVAHEART I左心辅助系统



(b)CH-VAD LVAD
(b)CH-VAD左心辅助系统



(c) Annual implantations of VAD in China
(c) 左心室辅助装置逐年植入患者数

Among 42 patients implanted with left ventricular assist system, 40 patients were male. Causes included dilated cardiomyopathy (22 cases), ischemic heart disease (11 cases), valvular heart disease (6 cases), chemotherapy-induced cardiomyopathy (1 case), mitochondrial cardiomyopathy (1 case) and Kawasaki disease (1 case). Cardiac function of all patients was NYHA IV grade. Preoperative INTERMACS evaluation showed: 22 cases of grade

1, 19 cases of grade 2 and 1 case of grade 3. Among all 42 patients implanted with ventricular assist blood pump, the surgical methods included: simple left ventricular assist device implantation in 17 cases, simultaneous coronary artery bypass grafting in 10 cases, simple mitral valvuloplasty in 9 cases, tricuspid valvuloplasty in 7 cases, aortic valve replacement in 5 cases, congenital heart disease correction in 4 cases, and temporary right ventricular assist device implantation in 2 cases.

Forty patients survived and were discharged with the device, and 2 patients died due to multiple organ failure. All devices had no hemolysis, pump thrombosis and mechanical failure. One patient had cardiac function recovered 166 days after operation and withdrew the device. Three patients received heart transplantation 155 days, 180 days and 962 days after operation, respectively. The remaining 38 patients were followed up for 363-1073 days. The cardiac function classification recovered to NYHAI-II grade 2-3 months after operation, and the 6-minute walk distance recovered to more than 400 meters. The 1-year and 2-year follow-up survival rates were 100% and 85%, respectively, during which no serious adverse events such as pump thrombosis, mechanical failure, and hemolysis occurred, and the incidence of drive cable infection was 13%. According to the current clinical results, in addition to heart transplantation, left ventricular assist device implantation is gradually becoming the most effective surgical treatment for end-stage heart failure in China.

在植入左心室辅助系统42例患者中，男性40例，病因包括：扩张型心肌病22例、缺血性心脏病11例、瓣膜性心脏病6例、化疗药物心肌病1例、线粒体心肌病1例和川崎病1例；所有患者心功能均为NYHA IV级，术前INTERMACS评判：1级22例，2级19例，3级1例。所有植入心室辅助血泵42例患者中，手术方式包括：单纯左心室辅助装置植入术17例，同期冠状动脉旁路移植术10例，单纯二尖瓣成形术9例，三尖瓣成形术7例，主动脉瓣置换术5例，先心病矫治术4例，临时右心室辅助装置植入术2例

带装置存活出院40例，围术期死亡2例，原因为多器官功能衰竭，所有装置无溶血、泵血栓形成和机械故障等。1例患者术后166天心脏功能恢复撤除装置，3例患者分别术后155天、180天和962天接受心脏移植，余38例患者随访363-1073天，术后2-3月心功能分级均恢复至NYHAI- II级，6分钟步行距离恢复至400米以上。随访1年和2年生存率分别为 100%和85%，期间均未发生泵血栓形成、机械故障和溶血等严重不良事件，驱动线缆感染发生率13%。根据目前临床结果，除心脏移植外，左心室辅助装置植入术在中国正逐步成为治疗终末期心脏衰竭的最有效外科治疗手段。

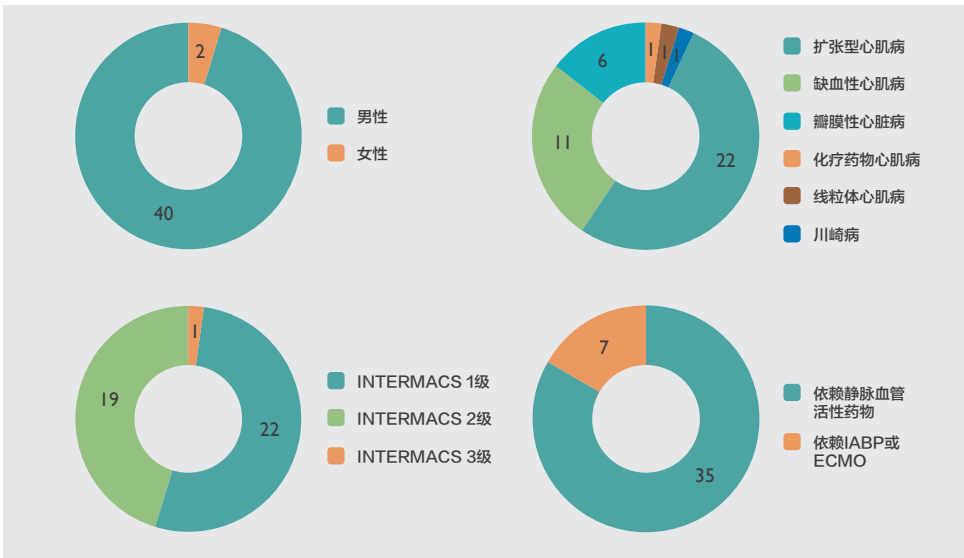


Fig2. Perioperative data of VAD patients
图2. 植入左心室辅助装置患者的围术期资料

分院建设 Subcenters

■ 云南省阜外心血管病医院 FUWAI YUNNAN CARDIOVASCULAR HOSPITAL

Since its formal operation on September 19, 2017, Yunnan Fuwai has opened 504 beds, and opened 31 clinical, medical technology and platform departments. The development direction of each department is clear, forming a scientific and efficient hospital about cardiology and cardiovascular specialty cluster.

In 2020, the number of outpatient and emergency departments in the hospital is 86348, the number of discharged patients is 15428, and 9436 operations were completed, including 7738 interventional operations and 1698 surgical operations. Grade 3 and 4 surgery accounted for 94%, and the average length of stay was 6.17 days, which was 1.77 days shorter than that of the previous year.

In 2020, Fuwai Hospital of Yunnan province carried out 6 new technologies, the first "total aortic stent implantation + three branches of superior arch artery parallel stent endovascular repair", the first "ELCA assisted bridge interventional therapy" and "interventional treatment of vein bridge assisted by molecular laser coronary plaque ablation" in Southwest China, The first "minimally invasive transcatheter aortic replacement with pre-set brain protection device" and "combined operation of transcatheter aortic valve implantation + mitral balloon dilatation" and the first pulse atrial fibrillation ablation (PFA) operation in Asia were performed. In August, 2020, it ranked 10th among the three-level public hospitals in the performance appraisal specialty hospitals. Meanwhile, Yunnan Fuwai actively integrated into the 'the belt and road' initiative and serve the national medical diplomacy. A total of 61588 children were screened and 86 patients with congenital heart disease were operated.



国家区域医疗中心正式挂牌

2017年9月19日正式运营以来，云南省阜外医院已渐次开放床位504张，设置31个临床、医技、平台科室，各科室发展方向明确，形成了科学、高效的心血管内、外科专业集群。

2020年医院门急诊量86348人次，出院人数15428人次，完成手术9436台，其中介入手术7738台次，外科手术1698台次。三、四级手术占比达94%，平均住院日6.17天，同比缩短1.77天。

2020年，云南阜外医院共开展新技术6项，全省首例“全主动脉覆膜支架置入+弓上动脉三分支平行支架腔内修复术”，西南地区首例“ELCA辅助桥血管介入治疗手术”和“分子激光冠状动脉斑块消融术辅助下的静脉桥血管介入治疗手术”，国内首例“预置脑保护装置的微创经导管主动脉置换术”和“经导管主动脉瓣植入+二尖瓣球囊扩张成形联合手术”，以及亚洲首例脉冲房颤消融（PFA）手术。2020年8月，在全国三级公立医院绩效考核专科医院分类中排名第十。同时，医院积极服务和融入国家一带一路倡议，积极服务国家医疗外交。开展“爱心行”先心病儿童筛查、义诊等活动，累计筛查61588人，完成手术治疗86人。



潘湘斌执行院长带领结构病区为重症先心孕妇开展手术治疗

云南阜外医院开业运营1000天
千日砥砺前行 逐梦前行

庚子年閏九月廿三日于北京

胡盛寿总院长题字庆祝医院运营1000天

■ 阜外华中心血管病医院 国家心血管病中心华中分中心

FUWAI CENTRAL CHINA CARDIOVASCULAR HOSPITAL CENTRAL CHINA SUBCENTER OF THE NATIONAL CENTER FOR CARDIOVASCULAR DISEASES



李守军教授实施高难度主动脉转位矫正术

Fuwai Central China Cardiovascular Hospital has 1000 beds, 34 opened wards and 15 clinical specialties.

In 2020, the number of outpatient and emergency departments in the hospital is 265229, the number of discharged patients is 33363, and 6977 operations were completed, including 3014 interventional peri- and vascular operations and 3963 surgical operations. Grade 3 and 4 surgery accounted for 71.29%, and the average length of stay was 9.27 days, which was 0.21 days shorter than that of the previous year.

In the whole year, the first "third generation of all magnetic levitated artificial heart" implantation, minimally invasive mitral valve plasty through catheter, room defect sealing with degradable occluder were successfully implemented in Central China, and the first "bioabsorbable stent" implantation in Henan Province was successfully implemented in Central China, The country's leading application of 2.15 rotary head to complete unprotected left main coronary intervention and other nine leading technologies to fill the gap (30 in total).

阜外华中心血管病医院编制床位1000张，开放病区34个，设有15个临床专科。

2020年，医院门急诊量265229人次，出院人数33363人次。2020年，医院心血管外科手术3963台次，血管介入和外周血管手术3014台次，合计6977台次。三、四级手术占比71.29%，平均住院日9.27天，同比缩短0.21天。

全年成功实施华中地区首例“第三代全磁悬浮人工心脏”植入术、“经导管微创二尖瓣成形术”、“可降解封堵器行房缺封堵术”、成功实施华中首例河南首例“生物可吸收支架”植入手术，全国领先的应用2.15旋磨头完成无保护左主干冠脉介入手术等9项填补空白的领先技术（累计30项）。



2020 C4 华中心血管病大会在郑州成功召开

中国医学科学院阜外医院深圳医院 SHENZHEN HOSPITAL OF FUWAI HOSPITAL

In 2020, 564 beds were opened. The number of outpatient and emergency departments in the hospital is 166489, the number of discharged patients is 13422, and 7816 operations were completed, including 6645 interventional operations and 1171 surgical operations. Grade 3 and 4 surgery accounted for 64.28%, and the average length of stay was 8.72 days, which was 0.57 days longer than that of the previous year.

In 2020, a total of 27 new technologies and new projects have been carried out, including body artery plaque circumcision, laser ablation, ultrasound ablation, carotid angioplasty, stent implantation, aortic angioplasty, endovascular repair of aortic aneurysm, fenestration aortic branch revascularization, non dysmenorrheal esophageal echocardiography, including 9 of them at provincial level, 10 of them at municipal level and 8 at hospital level, involving 6 restrictive technologies. With the guidance of those three teams of Academician Hu Shengshou's artificial heart and extracorporeal life support team, Professor Zheng Zhe's heart transplantation team and Professor Li Shoujun's pediatric heart surgery team, we successfully completed 1 case of artificial heart surgery, 8 cases of heart transplantation, 1 case of pediatric transposition of great arteries and other difficult cardiovascular operations, largely benefits local residents.

2020年医院共开放床位564张，门诊接诊166489人次，出院人数13422人次，开展手术例数7816例，其中介入手术6645台次，外科手术1171台次。三、四级手术占比64.28%，平均住院日8.72天，由于疫情影响平均住院日同比有0.57天的延长。

2020年度共开展包括体动脉斑块旋切、激光消融术、超声消融术、颈动脉成形、支架植入术、主动脉成形术、主动脉瘤腔内修复术、开窗技术主动脉分支血运重建术、无痛经食管超声心动图检查等新技术新项目27项，其中省级9项、市级10项、院级8项，涉及限制类技术6项。依托胡盛寿院士人工心脏及体外生命支持团队和郑哲教授心脏移植团队和李守军教授小儿心脏外科团队的三名工程团队成功完成人工心脏手术1例，心脏移植手术8例，小儿大动脉转位1例等高难度心血管手术，为当地患者带来福音。



胡盛寿院士在阜外医院深圳医院完成一例人工心脏植入术



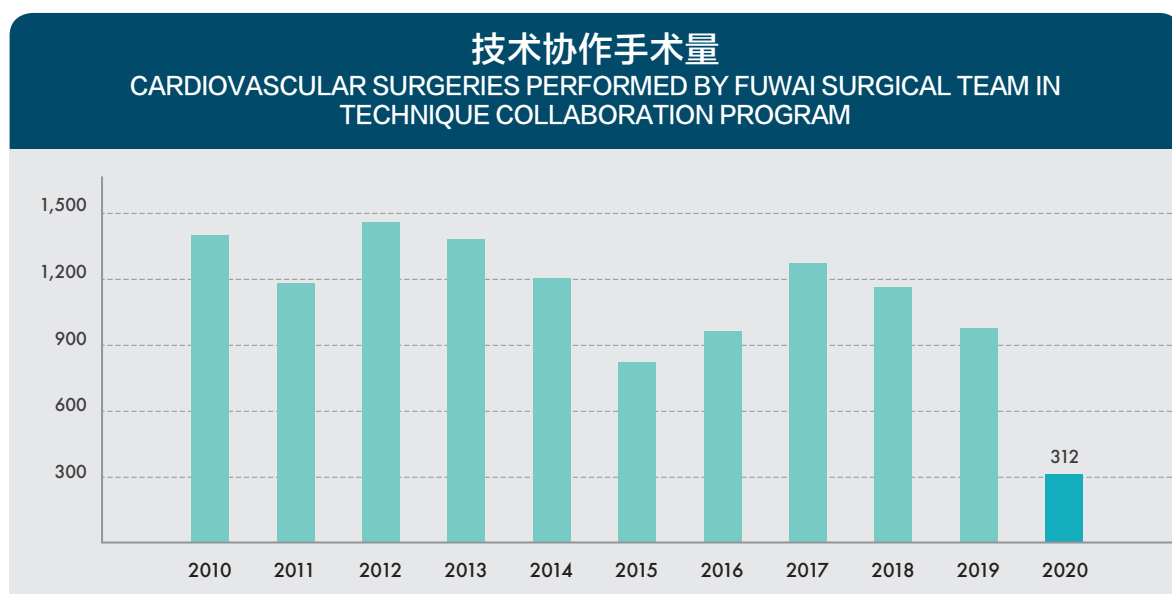
医防融合心血管病项目在深正式启动



技术协作 Domestic Collaboration Network

During 2020, Fuwai Hospital provided guidance and training to 32 training bases, and established 8 training centers. They have completed in total of 1870 cases of cardiovascular surgeries, 312 cases of them were completed under the guidance of Fuwai Hospital. We helped those hospitals to carry out a variety of innovative operations, and played a demonstration and leading role in the operation specification, medical quality, indication control and other aspects.

2020年，阜外医院对32余家培训中心单位给予相应的帮扶和培训工作，新增培训中心8家。全年完成各类心血管外科手术1870例，其中阜外医院指导完成312例。帮助相关医院开展了多种创新手术，在手术规范、医疗质量、适应症把控等方面起到了示范与引领作用。





2020年阜外医院给予帮扶和培训的培训中心

株洲市中心医院
北京大学国际医院
台州恩泽医疗中心
南部县人民医院
南华大学附属第二医院
临汾市中心医院
高平市人民医院
金昌市中西医结合医院
南京医科大学第二附属医院
青岛阜外心血管病医院
四川省宜宾市人民医院
石河子市人民医院

锦州市中心医院
台州市中心医院
河北以岭医院
长春通源医院
晋中市第二人民医院
东阿县人民医院
成武县人民医院
邳州市人民医院
世博高新医院有限公司
渭南市中心医院
攀枝花市中心医院
新疆维吾尔自治区人民医院

■ 新增8家培训中心:

保定市第一中心医院
成都医学院附属第一医院
来宾市人民医院
保定市第四中心医院

杭州市萧山区第一人民医院
成都市第三人民医院
晋城大医院
莱州市人民医院



积极融入“一带一路”战略

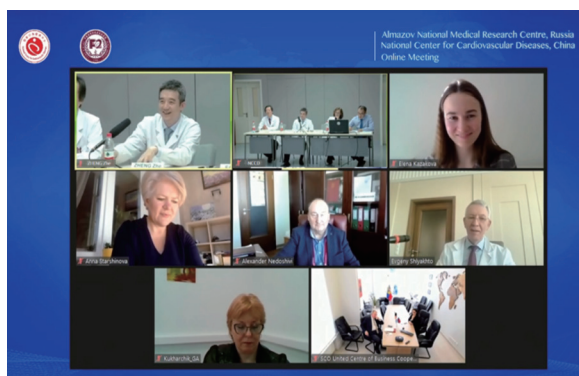
Integration of the Belt and Road Initiative

The National Center for Cardiovascular Diseases, Fuwai Hospital was actively engaged in furthering the influence of the hospital through the national the Belt and Road Initiative .

In 2020, under the impact of the COVID-19 pandemics, the global health system was confronted with great challenge. Under the approval of the National Health Commission of the People's Republic of China, the experts of Fuwai Hospital hosted four International Anti-Pandemic Webinars to provide a platform for surgeons to exchange China's anti-pandemic experiences in aortic pathology patients, covering 37 countries along the line of the Belt and Road Initiative in Europe, Asia, Africa and Latin America, including Russia, Italy, Brazil, Portugal, Greece, Croatia, Turkey, Vietnam, Indonesia, Thailand, India and Argentina etc. A total of 127 experts discussions attracted more than 10,000 views at home and abroad. In the special period of time in human history, Fuwai hospital has sent out a voice from China to the international cardiovascular surgery community and has enhanced our international influence.

The center signed cooperation contracts with ten international medical centers along the line of the Belt and Road Initiative, including Indonesia, Philippines, Burma, Laos, Cambodia, Thailand, Nepal, Pakistan, Kazakhstan and Uzbekistan. Additionally, the center supported the integration of Fuwai Yunnan Cardiovascular Hospital into the national strategy of the Belt and Road Initiative. With the unique advantage of “two independent administration systems in one hospital,” Fuwai has improved its medical service and capacity in south and southeastern Asia. Various forms of academic exchanges, including international fellow training via master's degree programs in cardiovascular clinical research, donating mobile medical vehicles, carrying out short-term free clinics, holding congenital heart disease screening programs , have been successfully conducted in over 30 countries along the line. The goal of these efforts is to optimize medical education and play a leading role in the training of distinguished cardiovascular specialists.

国家心血管病中心，中国医学科学院阜外医院积极响应国家“一带一路”倡议，打造阜外品牌在国际上的影响力。



国家心血管病中心与俄罗斯联邦医学研究中心线上交流



国家心血管病中心参加2020年中意卫生部长对话

2020年，在新冠疫情的冲击之下，全球医疗系统受到巨大的考验。经国家卫健委批准，阜外医院专家团队主办4次国际网络会议，向俄罗斯、意大利、巴西、葡萄牙、希腊、克罗地亚、土耳其、越南、印度尼西亚、泰国、印度、阿根廷等欧洲、亚洲、非洲、拉丁美洲“一带一路”沿线37个国家的外科医生介绍了中国防疫实践和新冠疫情期间主动脉急症诊治经验，参与讨论的专家和学者达127人次，国内外总浏览量超过一万次，在特殊历史时期向国际心血管外科学界发出了中国声音，增强了阜外在国际上的影响力。

国家心血管病中心已与印尼、菲律宾、缅甸、老挝、柬埔寨、泰国、尼泊尔、巴基斯坦、哈萨克斯坦、乌兹别克斯坦等10个“一带一路”沿线国家的医学中心签署合作协议。积极推进云阜融入国家“一带一路”战略，利用“一院两制”优势，发挥向南亚、东南亚的健康辐射功能，开设“一带一路”沿线硕士国际班，完成涵盖一带一路超过30个国家的心血管疾病临床医学研究硕士国际班的创建、招收和教学工作，捐助流动医疗车，开展短期义诊、先心筛查等活动。通过不断完善的学科体系建设，为培养顶尖心血管临床医学研究师资力量和人才发挥引领作用。



交流 Communication

Mario FI Gaudino
Weill Cornell Medicine

NEED FOR SURGEONS DRIVEN



中国心脏大会 (CHC) 2020
CHINA HEART CONGRESS (CHC) 2020



From September 7 to 13, 2020, China heart Conference (CHC) 2020, the Fifth China Vascular Conference (CVC) and the first China Healthy-Lifestyle Medicine Conference (CHMC), jointly sponsored by the National Center of Cardiovascular Diseases, Chinese Circulation Journal and Beijing Kaiqi Cardiovascular Foundation, was successfully held online. With the theme of "Healthy Heart, Healthy China", this conference is divided into three parts: live operation, academic forums and health education. With the help of domestic multi-point interconnection and international omnidirectional communications, it has presented more than 370 academic activities and more than 1500 speeches in one week, and provided participants with medical "feast" of new perspectives and new senses. There were 14.557 million people watched.

The four-day Summit Forum on Coronary Artery Surgery also added a lot of color to this year's CHC online meeting. Led by Academician Hu Shengshou and Professor Zheng Zhe, four live coronary artery operations, nine all-star international expert speakers, nine academic sessions of coronary artery surgery, 82 experts at domestic and abroad, and 42 wonderful speeches attracted more than 40000 audiences. Through the Internet, we witnessed this comprehensive, in-depth and cutting-edge annual banquet in the field of coronary artery surgery. As the regular "highlight" of every year, this year's China Heart Congress specially arranged a 4-day broadcast of 35 online operations, covering adult surgery, coronary intervention, structural heart disease intervention, arrhythmia treatment, pediatric cardiac surgery and vascular surgery. The national team of cardiovascular disease made a collective contribution and carried out a full open operation live broadcast, reflecting the peak level of the professional field, with a total of 700000 people online who watched the operation. The surgical, imaging and instruments techniques are changing rapidly, the quality and effectiveness of cardiovascular surgery have improved significantly. This live demonstration brought the exemplary and leading role of Fuwai surgical team into full play, and improved the quality of specialized medical care.



2020年9月7日至13日，由国家心血管病中心、《中国循环杂志》社、北京楷祺心血管公益基金会三方联合主办的中国心脏大会（CHC）2020暨第五届中国血管大会（CVC）暨第一届中国健康生活方式医学大会（CHMC）线上会议圆满完成。本届大会以“健康心脏，健康中国”为主题，分为手术直播、学术论坛、健康教育三个板块，借助国内多点互联、国际全向互通的形式，在短短一周的时间里共呈现370多场次的学术活动，1500多场演讲，为参会者提供了新视角、新感官、全开放的医学盛宴，共吸引1455.7万人次观看。

为期四天的冠脉外科高峰论坛也为今年CHC线上会议添上了浓墨重彩的一笔。胡盛寿院士和郑哲教授领衔的4场冠脉手术直播、9位全明星阵容国际专家讲者、9个冠脉外科学术专场、82位国内外专家、42场精彩专题演讲，吸引了累计吸引超过4万名观众通过网络亲历了这场全面、深入、前沿的冠脉外科领域年度顶级盛宴。作为每年的“重头戏”，今年中国心脏大会特别安排了为期4天的35场线上手术转播，领域涵盖成人外科、冠脉介入、结构性心脏病、心律失常、小儿心脏外科和血管外科，心血管病国家队集体献技，进行了全程开放式手术直播，体现专业领域的巅峰水准，共70万人在线观摩手术。心血管外科手术技术日新月异，医疗影像检查手段和新型器材也不断推陈出新，服务能力明显提升。本次直播充分发挥阜外医院外科团队的示范、引领作用，提升专科服务能力。



第五届中国血管大会 FIFTH CHINA VASCULAR CONGRESS



FIFTH CHINA VASCULAR CONGRESS

On September 7, 2020, the Fifth China Vascular Congress (CVC 2020) was successfully held in the form of online conference and live webcast for the first time. This academic event to discuss the progress of surgical, endovascular, and hybrid treatment for aortic, peripheral arterial, and venous diseases was attended by 61 foreign experts from 28 countries of 6 continents and 345 domestic cardiovascular surgeons. According to statistics, the total number of online clicks reached 104,993 (excluding replay and recording), which fully reflected the support of domestic and foreign colleagues on China Vascular Congress. CVC 2020 continued to reflect on thinking of medical humanities and invited Mr. Bai Yansong, member of CPPCC, national famous host, again to speak about the significance of the convening of CVC from a different perspective. In accordance with the Belt and Road Initiative, four Overseas Communication Sessions were specially set up, one of which was connected with CICE: CICE meets CVC.

2020年9月7日，第五届中国血管大会（China Vascular Congress, CVC）第一次以线上会议和网络直播的形式举行，来自全国各地345位心血管外科专家和来自六大洲28个国家61位外国专家参加了此次学术盛会，共同探讨了外科、腔内、杂交治疗主动脉、外周动脉和静脉疾病的最新进展。据技术统计显示，中国血管大会在线总点击量达104993人次（均不计算重播、录播），充分体现了国内外专家同道对中国血管大会的支持和肯定。此次大会延续往届会议对医学人文情怀的思考，在开幕式中再次邀请全国政协委员、国家卫健委健康宣传员、中国红十字会副会长、中国血管大会（CVC）血管健康大使白岩松先生，他以别样的视角，畅谈血管大会召开的重要意义，提出“一个担心，一个建议，一个梦想”的话题，引发医者的共鸣和深思。同时，在国家大力提倡“一



带一路”战略的时代背景下，秉承“和平合作、开放包容、互学互鉴、互利共赢”的丝绸之路精神，本次大会特地开设三个海外专场，并特设与国际腔内血管外科大会（CICE）联动的特别专场——CICE meets CVC。



第十二届阜外主动脉病变治疗研讨会 THE 12TH FUWAI AORTIC SYMPOSIUM

The 12th Fuwai Aortic Symposium was successfully held in Fuwai Hospital. This conference focused on "Surgical treatment of aortic root disease" and topics of other aortic diseases which covered surgical, endovascular and hybrid treatment. This academic conference had the honor to invite many well-known international aortic surgery teams to have online communication with our domestic experts regarding the latest progress in surgical and endovascular treatment of aortic diseases. In addition, anesthesiology, extracorporeal circulation, perioperative management and relative basic research on aortic diseases had also been covered by this conference. Moreover, more than 70 experts from domestic and overseas communicated and discussed the frontiers and hot issues in surgical and endovascular treatment of aortic diseases.

第十二届“阜外主动脉病变治疗研讨会”在阜外医院圆满召开。本届会议以“主动脉根部疾病的外科治疗”为重点，并涵盖其他主动脉疾病的外科、杂交和腔内治疗。此次研讨会邀请到多个国际主动脉外科知名团队针对目前主动脉外科及腔内治疗的最新进展和热点问题，通过线上方式与国内同道们深入交流和探讨。此外，本届研讨会还涉及麻醉、体外循环、围手术期管理以及主动脉疾病相关基础研究的最新进展。国内外专家70余人就主动脉疾病外科及腔内治疗的前沿和热点问题发言，并进行交流和讨论。

第十二届 阜外主动脉病变治疗研讨会
2021年 1月9日-10日

大会日程 · 2021年01月10日 (周日)

主办单位: 国家心血管病中心 中国医学科学院阜外医院
北京梅颖心血管公益基金会
国家心血管病专家委员会血管外科专业委员会

承办单位: 中国医学科学院阜外医院 血管外科中心

第十二届 阜外主动脉病变治疗研讨会
2021年 1月9日-10日

第十二届 阜外主动脉病变治疗研讨会
2021年 1月9日-10日

第十二届 阜外主动脉病变治疗研讨会
2021年 1月9日-10日

于存涛

金军

曲勇



中国第一届机械循环支持大会 暨中国首款获批上市人工心脏永仁心高级临床培训会 CHINA'S FIRST MECHANICAL CIRCULATION SUPPORT CONFERENCE AND ADVANCED CLINICAL TRAINING SESSION OF CHINA'S FIRST ARTIFICIAL HEART YONGRENXIN APPROVED BY NPM

On January 5, 2020, the First China Mechanical Circulation Support Conference and China's first approved artificial heart Yongrenxin First Advanced Clinical Training Conference" was successfully held in Beijing National Cardiovascular Center Fuwai Hospital. The purpose of this conference is to strengthen the rapid clinical transformation and standardized application of medical devices in the field of mechanical circulation support in China, and to improve the use of mechanical circulation support devices to treat critically ill patients.

As the initiator of the Mechanical Circulation Support Branch, Academician Hu Shengshou plans to discuss the work content, operation mechanism and future development direction of the Mechanical Circulation Support Branch. At the same time, the first phase of advanced clinical training of Yongrenxin, China's first approved artificial heart to be listed on the market, not only teaches theory, but also invites academician Hu Shengshou, the domestic expert with the largest number of artificial heart implants, to introduce and demonstrate the EVAHEART I implantation procedure. Focus on operational training for surgical practice.

2020年1月5日，“中国第一届机械循环支持大会暨中国首款获批上市人工心脏永仁心第一期高级临床培训会”在北京国家心血管病中心阜外医院成功举办。本次大会旨在为加强中国机械循环支持领域的医疗器械快速临床转化和规范化应用，提高机械循环支持装置治疗危重患者的使用效果。

胡盛寿院士作为机械循环支持分会发起人，筹划讨论机械循环支持分会的工作内容、运行机制和未来的发展方向。同时本次中国首款获批上市人工心脏永仁心第一期高级临床培训会不但理论授课，还请国内植入人工心脏例数最多专家胡盛寿院士，介绍EVAHEART I植入手术过程并进行演示，注重手术实践的操作培训。





中国生物医学工程学会机械循环支持分会成立大会 暨“重症心脏病大会·2020·深圳”

THE INAUGURAL MEETING OF THE MECHANICAL CIRCULATION SUPPORT
BRANCH OF THE CHINESE SOCIETY OF BIOMEDICAL ENGINEERING AND THE
"CRITICAL HEART DISEASE CONFERENCE·2020·SHENZHEN"



On November 27, 2020, the Mechanical Circulation Support Branch of the Chinese Biomedical Engineering Society, with the National Cardiovascular Disease Center Fuwai Hospital as the initiator, was formally established in Shenzhen. A total of 61 academic members were elected. Academician Hu Shengshou was elected as the first chairman. The main tasks of the Mechanical Cycle Support Branch include: to provide academic platforms and related guidance for universities, enterprises and hospitals that develop short- and long-term mechanical cycle support equipment with China's completely independent intellectual property rights, and promote the formation of industry-university-research integration in the industry. Discuss and formulate standardized procedures, expert consensus, clinical guidelines and industry standards for the treatment of end-stage heart failure patients with mechanical circulation support devices.

2020年11月27日，由国家心血管病中心阜外医院作为发起单位的中国生物医学工程学会机械循环支持分会在深圳正式成立，共选举61名学术委员，胡盛寿院士当选为第一届主任委员。机械循环支持分会的主要任务包括：为研制具有中国完全自主知识产权的短期和长期机械循环支持设备的大学、企业和医院提供学术平台和相关指导，促进该行业形成产学研一体化。讨论并制定机械循环支持装置治疗终末期心脏衰竭患者的规范化流程、专家共识、临床指南和行业标准。



中国心胸血管麻醉学会体外生命支持分会 第五届中国体外生命支持年会

THE 5TH CHINA EXTRACORPOREAL LIFE SUPPORT ANNUAL CONFERENCE

On December 11-13, 2020, the 5th China Extracorporeal Life Support Annual Conference was held online. 89 experts and scholars in the field of extracorporeal life support, nine special topics, 45 academic reports were presented wonderfully, 1,326 colleagues registered to participate, 895 visitors attended the conference, and a total of 48,497 people clicked to watch.

The main theme of this annual meeting is: quality control, standardization and retraining. Through the various sections of the VA ECMO support, VV ECMO support, adult cardiopulmonary bypass, pediatric cardiopulmonary bypass, adult ECMO, pediatric ECMO, ECPR, some focus and hot issues are fully discussed, explore and explore the development and application of extracorporeal life support technology in China. It is hoped that through this annual meeting, clinical norms and consensus can be more clarified, and our understanding and understanding of extracorporeal life support work will be further enriched. At the same time, we will train our ECLS team through advanced retraining to improve my country's overall ECLS level.

2020年12月11-13日，持续3天的中国心胸血管麻醉学会体外生命支持分会第五届中国体外生命支持年会于云端举办，89位国内体外生命支持领域专家学者呈现九场专题、45个学术报告，1326位同仁注册参会，895位访客参会，总计48497人次点击观看。

本次年会的主旨是：质控、规范与再培训。通过各板块中对于VA ECMO支持、VV ECMO支持、成人体外循环，小儿体外循环，成人ECMO，小儿ECMO，ECPR中一些焦点热点问题进行讨论，探索并开拓体外生命支持技术在我国的发展与应用。希望通过本次年会能更加明确临床的规范和共识，进一步充实我们对体外生命支持工作的理解与认识，同时通过进阶化的再培训训练我们的ECLS团队，提高我国整体ECLS水准。





CHC2020麻醉论坛 暨2020年国家心血管病专家委员会麻醉专业委员会学术年会

CHC 2020 ANESTHESIA FORUM AND ANESTHESIA COMMITTEE OF NATIONAL EXPERT COMMITTEE ON CARDIOVASCULAR DISEASE 2020 ANNUAL MEETING

From September 11 to September 12, 2020, CHC 2020 Anesthesia Forum and Anesthesia Committee of National Expert Committee on cardiovascular disease 2020 Annual Meeting were successfully held in the form of online meeting. Through the zoom computer client, the experts shared 5 sessions and 22 lectures with 8964 listeners, which were highly praised by the majority of participants.

The meeting opened in a speech by Professor Yan Fuxia, President of the conference at 1:30 pm on September 11. Eight speakers had a face-to-face exchange with the participants on some hot issues of cardiovascular anesthesia. Huang Weiqin, director of Wuhan Asian heart hospital, Lu Jiakai, director of Beijing Anzhen Hospital Affiliated to Capital Medical University, Wang Hongwu, director of TEDA International Cardiovascular Hospital, Chen Shibiao, director of the First Affiliated Hospital of Nanchang University, Huang Zhiyong, director of Shenzhen Fuwai Hospital, Li Chao, director of children's Hospital Affiliated to Kunming Medical University, Ji Hongwen, director of Chinese Academy of Medical Sciences, Fuwai Hospital and Min Su, director of the First Affiliated Hospital of Chongqing Medical University, referring to the latest basic and clinical research results, introduced the key and hot issues of cardiovascular anesthesia.



2020年9月11日-9月12日，CHC2020麻醉论坛暨2020年国家心血管病专家委员会麻醉专业委员会学术年会以线上会议的形式圆满召开。与会专家通过ZOOM电脑客户端，与8964名听众分享了5个场次，22场讲座，受到广大参会者的一致好评。

一天半的的讲座精彩纷呈，内容涵盖学科建设、医师培养、知识更新等方面。本次会议的胜利召开，掀起了2020年新冠疫情以来心血管麻醉领域专业学习和知识更新的高潮，通过在线学习的方式，拉近了参会者与授课专家的距离，相比传统会议室听课的模式，受众面更广，更有利于知识的传播。本次会议的胜利召开为中国心血管麻醉事业的进步打下了坚实的基础，广大心血管麻醉同仁必将在此次会议精神的引领下，努力学习，砥砺前行，用汗水和拼搏夯实理论和临床实践基础，从而提升心血管麻醉的综合实力，为中国心血管麻醉事业的发展添砖加瓦。



2020阜外国际心血管麻醉论坛 暨全国心血管麻醉及围术期处理研讨会

2019 FUWAI INTERNATIONAL CARDIOVASCULAR ANESTHESIA FORUM & CHINA CARDIOVASCULAR ANESTHESIA & PERIOPERATIVE MANAGEMENT SYMPOSIUM.

From December 26 to 28, 2020, 2020 Fuwai International Cardiovascular Anesthesia Forum and National Symposium on cardiovascular anesthesia and perioperative management were successfully held. Due to the prevention and control of the COVID-19 pandemic, we used the form of online video conference to meet you for the first time this year. Experts, scholars and colleagues from the field of cardiovascular anesthesia at home and abroad participated in the event.

Professor Hu Shengshou, president of Chinese Academy of Medical Sciences Fuwai Hospital, was invited to deliver a keynote speech entitled "Chinese cardiovascular surgery 2008-2019" for the opening ceremony of the forum. We not only discussed aortic disease, pediatric heart disease, coronary heart disease, valve disease, organ and blood protection, perioperative monitoring, anesthesia management, clinical research and other aspects, but also discussed in-depth anesthesia for special types of heart disease and interventional treatment of heart disease. We sincerely invited colleagues from all over the country who are engaged in cardiovascular anesthesia, surgery, cardiopulmonary bypass and perioperative management to attend this grand meeting.

2020年12月26-28日，2020阜外国际心血管麻醉论坛暨全国心血管麻醉及围术期处理研讨会在成功召开。今年由于疫情防控的原因，我们首次采用线上视频会议的形式和大家见面。来自国内外心血管麻醉领域专家、学者、同道共襄盛会。

本次论坛邀请了国家心血管病中心 中国医学科学院阜外医院胡盛寿院士为论坛开幕式进行了名为“中国心血管外科2008-2019”的主旨发言。大会先后围绕“心脏麻醉前沿”、“先心病手术围术期管理进展”、“心血管麻醉监测及器官保护”、“特殊麻醉与围术期管理”和“食道超声技术在心脏手术围术期的应用”专题展开了热烈讨论与交流，众多国内外专家学者的精彩报告为与会者奉上了一场学术盛宴。





第九届中国心脏重症大会 THE 9TH CHINA HEART CRITICAL CARE CONGRESS

From August 13 to 16, 2020, the 9th China Heart Critical Care Congress was successfully held in Beijing National Conference Center. As the most influential academic event in the field of cardiac intensive care, the conference had 24 sub sessions and sub forum sections, with more than 800 cardiac intensive care experts attending on-site or online and gave more than 500 special reports. More than 8000 people registered for the conference, more than 50000 people watched the live broadcast online, with a total of 400000 hits and a total viewing time of more than 7.5 million minutes.

In the afternoon of August 14, the opening ceremony of the conference was held ceremoniously. Zhang Yun, academician of Chinese Academy of Engineering, Wang Liji, President of Health Exchange and Cooperation across the Taiwan Straits, and Yang Min, Vice President of the Chinese Medical Doctor Association, delivered the opening address of the conference through live broadcast; Chairman of the conference, Professor Zhang Haitao of Fuwai Hospital, co-chairman of the conference, Chen Yuguo, President of Qilu Hospital of Shandong University, co-chairman of the conference, Professor Li Xiaodong from Shengjing Hospital of China Medical University, and co-chairman Professor Chao Yangong, chairman of the First Affiliated Hospital of Tsinghua University, addressed important speeches on the conference.



2020年8月13-16日，第九届中国心脏重症大会在北京国家会议中心成功举办。作为心脏重症领域内影响力最大的学术盛会，本次大会共设置24个分会场及分论坛板块，共有800余位心脏重症专家现场或在线出席，进行专题报告500余场。大会总计注册人数8000余人，在线直播观看人数超过5万人，总计点击量40万余人次，观看总时长750万余分钟，创下了历届心脏重症年会关注力度的新纪录。

8月14日下午，大会开幕式隆重举行。中国工程院张运院士、海峡两岸医药卫生交流协会王立基会长、中国医师协会杨民副会长通过线上直播为大会开幕致辞；大会主席、阜外医院张海涛教授、大会共同主席、山东大学齐鲁医院陈玉国院长、大会共同主席、中国医科大学附属盛京医院李晓东教授、大会共同主席、清华大学第一附属医院晁彦公教授作为主席团为大会召开送出寄语。

教育与培训 Education and Training



Fuwai Hospital has always advocated the concept of “great leading talents” in education and training program. For being continued to cultivate qualified cardiovascular professionals for China, Fuwai Hospital was recognized as the “cradle” of expert training in the field of cardiovascular disease in China. Fuwai Hospital has established a comprehensive education training system for doctors and researchers at each level. The system includes standardized resident training program focused on the basic skills, postgraduate education to foster scientific research abilities, and fellowship training program with an emphasis on advanced clinical skills. This education system has trained a large number of cardiovascular professionals and technical personnel who currently work at medical institutions across the nation.

In 2020, 32 new postgraduate students were recruited, and 25 students graduated and received their PhD or master's degree from the surgical departments. There are currently 101 undergraduate students at Fuwai surgical team. At the same time, an addition of 119 doctors from domestic medical centers, including 34 surgeons, completed their continuing education training programs in our surgical departments.

阜外医院一直提倡“大人才观”的教育培训理念，为国家培养合格的心血管专业人才，是国家心血管防治领域的人才培养摇篮。以培养年轻医生基本技能的住院医师规范化培训，到以培养科研能力为主的研究生教育，再到以专注临床技能培训的进修医生教育，阜外医院构建了一套完整立体的，可适应我国各层次血管专业人才需要的教育培养体系，为国家输送了大量的心血管专业技术人才。2020年，阜外医院外科系统新入学研究生32名，25名研究生顺利毕业，目前在校研究生101名。同时国内共119名医师顺利完成了在阜外医院外科系统的进修课程，其中心外科医师34名。



2020年阜外外科团队举办的专业学习班 TRAINING PROGRAM AND WORKSHOP 2020

VA ECMO管理进修班

VA ECMO management Training Course

第一期 5月-7月,

Phase 1 May, 2020 - July, 2020

第二期 8月-10月,

Phase 2 August, 2020 - October, 2020

第三期 11月-1月,

Phase 3 November, 2020 - January, 2021

二尖瓣成形专场

Mitral Valve Procedure Workshop

日期: 5月29日, Date: May 29

不停跳搭桥专场

Off-pump CABG Workshop

日期: 7月17日, Date: July 17

外科房颤治疗专场

Training on Surgical Treatment for Atrial Fibrillation

日期: 9月25日, Date: September 25

瓣膜外科手术技能培训班—复杂瓣膜病变

Training Course on Surgical Treatment for Complex Valvular Diseases

日期: 11月3日, Date: November 3

ECMO 植入技术培训班

Surgical Technique for ECMO Implantation

日期: 11月26日, Date: November 26

CTEPH 外科治疗学习班

Training on Surgical Treatment CTEPH

日期: 12月18日, Date: December 18

二尖瓣成形规范化学习班

Training Course for Standardized Mitral Valve Repair

日期: 12月22日, Date: December 22

冠脉搭桥高级研讨会

Advanced Seminar on coronary artery bypass grafting

日期: 12月25日, Date: December 25

中国医学科学院阜外医院心血管外科手术室

专业护士学习班——暨第一届云南省阜外心血管病医院心血管外科手术室专业护士学习班

Seminar on Operating Room Nursing of Cardiovascular Surgery, Fuwai Hospital, Chinese Academy of Medical Sciences, and the First Seminar on Specialized Operating Room Nursing of Cardiovascular Surgery, Fuwai Yunnan Cardiovascular Hospital.

日期: 2020年11月13-15号

Date: November 13-15, 2020

北京医学会麻醉学分会

阜外医院麻醉中心

食道超声技术推广网络培训课程

Esophageal ultrasound technology promotion network training course

日期: 2020年4月23日-5月28日

Date: April 23 - May 28, 2020



科研 Research

During 2020, the Fuwai surgical team published 107 SCI articles and continued to improve its communication of new knowledge in the field of cardiovascular surgery research.

2020年阜外医院外科系统共发表SCI论文107篇，
继续在心血管外科临床与科研领域进行着新知识的传播与交流。

英文期刊 SCI ARTICLES

(第一作者或通讯作者来自外科系统)

Q1(以2020年版中国科学院文献情报中心期刊分区表为准, 所属领域根据文章性质可能为医学、工程学等, 排名不分先后)

1. Chen S, Hsieh MH, Li SH, Wu J, Weisel RD, Chang Y, Sung HW, Li RK. A conductive cell-delivery construct as a bioengineered patch that can improve electrical propagation and synchronize cardiomyocyte contraction for heart repair. *J Control Release*. 2020;320:73-82.
2. Ding L, Hang C, Cheng S, Jia L, Mou L, Tang L, Zhang C, Xie Y, Zheng W, Zhang Y, Jiang X. A Soft, Conductive External Stent Inhibits Intimal Hyperplasia in Vein Grafts by Electroporation and Mechanical Restriction. *ACS Nano*. 2020 Oct 8. doi: 10.1021/acsnano.0c04827. Epub ahead of print.
3. Luo Z, Zhang H, Xie Y, Sun Y, Li M, Fang N, Wang S, Hu S, Pan X. Clinical Application of a Fully Ultrasound-Guided Transapical Transcatheter Mitral Valve Replacement Device. *JACC Cardiovasc Interv*. 2020;13(17):e161-e162.
4. Yan C, Pan X, Wan L, Li H, Li S, Song H, Liu Q, Zhang F, Liu Y, Jiang Y, Wang L, Fang W. Combination of F-ASO and Targeted Medical Therapy in Patients With Secundum ASD and Severe PAH. *JACC Cardiovasc Interv*. 2020;13(17):2024-2034.
5. Xie Y, Lampinen M, Takala J, Sikorski V, Soliymani R, Tarkia M, Lalowski M, Mervaala E, Kupari M, Zheng Z, Hu S, Harjula A, Kankuri E; AADC consortium. Epicardial transplantation of atrial appendage micrograft patch salvages myocardium after infarction. *J Heart Lung Transplant*. 2020;39(7):707-718.
6. Chen L, Hu S, Luo Z, Butera G, Cao Q, Zhang F, Lu M, Wang S, Wang W, Pan X. First-in-Human Experience With a Novel Fully Bioabsorbable Occluder for Ventricular Septal Defect. *JACC Cardiovasc Interv*. 2020;13(9):1139-1141.
7. Hua X, Wang YY, Jia P, Xiong Q, Hu Y, Chang Y, Lai S, Xu Y, Zhao Z, Song J. Multi-level transcriptome sequencing identifies COL1A1 as a candidate marker in human heart failure progression. *BMC Med*. 2020;18(1):2.

8. Abdalla AME, Xiao L, Miao Y, Huang L, Fadlallah GM, Gauthier M, Ouyang C, Yang G. Nanotechnology Promotes Genetic and Functional Modifications of Therapeutic T Cells Against Cancer. *Adv Sci (Weinh)*. 2020;7(10):1903164.
9. Liu Z, Wen B, Cao L, Zhang S, Lei Y, Zhao G, Chen L, Wang J, Shi Y, Xu J, Pan X, Yu L. Photoelectric Cardiac Pacing by Flexible and Degradable Amorphous Si Radial Junction Stimulators. *Adv Healthc Mater*. 2020;9(1):e1901342.
10. Li S, Yan C. Reply: Combination of F-ASO and TMT: Is Natural History of All ASD With Severe PAH Altered? *JACC Cardiovasc Interv*. 2020;13(22):2708-2709.
11. Liu H, Gai S, Wang X, Zeng J, Sun C, Zhao Y, Zheng Z. Single-cell analysis of SARS-CoV-2 receptor ACE2 and spike protein priming expression of proteases in the human heart. *Cardiovasc Res*. 2020;116(10):1733-1741.
12. Hua X, Hu G, Hu Q, Chang Y, Hu Y, Gao L, Chen X, Yang PC, Zhang Y, Li M, Song J. Single-Cell RNA Sequencing to Dissect the Immunological Network of Autoimmune Myocarditis. *Circulation*. 2020;142(4):384-400.
13. Liu W, Ou-Yang W, Zhang C, Wang Q, Pan X, Huang P, Zhang C, Li Y, Kong D, Wang W. Synthetic Polymeric Antibacterial Hydrogel for Methicillin-Resistant *Staphylococcus aureus*-Infected Wound Healing: Nanoantimicrobial Self-Assembly, Drug- and Cytokine-Free Strategy. *ACS Nano*. 2020;14(10):12905-12917.

Q2

1. Liu X, Zhang W, Chen N, Wang L, Wang S, Yu Y, Ao H. Can Preoperative C-Reactive Protein Predict Bleeding After On-Pump Coronary Artery Bypass Grafting? *Ann Thorac Surg*. 2020;109(2):541-546.
2. Shu S, Ren J, Song J. Cardiac xenotransplantation: a promising way to treat advanced heart failure. *Heart Fail Rev*. 2020 Jun 23. doi: 10.1007/s10741-020-09989-x. Epub ahead of print.
3. Zhu C, Wang S, Ma Y, Wang S, Zhou Z, Song Y, Yan J,

- Meng Y, Nie C. Childhood Hypertrophic Obstructive Cardiomyopathy and Its Relevant Surgical Outcome. *Ann Thorac Surg*. 2020;110(1):207-213.
4. Cao L, Guo X, Jia Y, Yang L, Wang H, Yuan S. Effect of Deep Hypothermic Circulatory Arrest Versus Moderate Hypothermic Circulatory Arrest in Aortic Arch Surgery on Postoperative Renal Function: A Systematic Review and Meta-Analysis. *J Am Heart Assoc*. 2020;9(19):e017939.
 5. Zhang X, Guo Y, Pan J, Zhang K, Guo X, Zhu F, Luo M. Endovascular Management of a Short-neck Thoracic Aortic Aneurysm With Patent Ductus Arteriosus. *Ann Thorac Surg*. 2020;110(1):e75.
 6. Zhang X, Zheng L, Luo M, Shu C, Wang E. Evaluation of particle shape, size and magnetic field intensity for targeted delivery efficiency and plaque injury in treating atherosclerosis. *Powder Technology*. 2020;366:63-72.
 7. Fang K, Shu C, Luo M, Li M, Li X, He H, Fan T, Zhao J, Xue Y. First-in-Human Implantation of Gutter-Free Design Chimney Stent Graft for Aortic Arch Pathology. *Ann Thorac Surg*. 2020;110(2):664-669.
 8. Yang D, O'Brien CG, Ikeda G, Traverse JH, Taylor DA, Henry TD, Bolli R, Yang PC. Meta-analysis of short- and long-term efficacy of mononuclear cell transplantation in patients with myocardial infarction. *Am Heart J*. 2020;220:155-175.
 9. Ou-Yang WB, Qureshi S, Ge JB, Hu SS, Li SJ, Yang KM, Zhang GJ, Zhou DX, Chen M, Wang SZ, Zhang FW, Pan XB. Multicenter Comparison of Percutaneous and Surgical Pulmonary Valve Replacement in Large RVOT. *Ann Thorac Surg*. 2020;110(3):980-987.
 10. Kong P, Zhao G, Zhang Z, Zhang W, Fan T, Han Y, Pang K, Wang S, Zhang F, Wang W, Hu S, Pan X. Novel Panna Guide Wire Facilitates Percutaneous and Nonfluoroscopic Procedure for Atrial Septal Defect Closure: A Randomized Controlled Trial. *Circ Cardiovasc Interv*. 2020;13(9):e009281.
 11. Kong P, Zhao G, Zhang Z, Zhang W, Fan T, Han Y, Pang K, Wang S, Zhang F, Wang W, Hu S, Pan X. Novel Panna Guide Wire Facilitates Percutaneous and Nonfluoroscopic Procedure for Atrial Septal Defect Closure: A Randomized Controlled Trial. *Circ Cardiovasc Interv*. 2020;13(9):e009281.
 12. Shi J, Zhou C, Liu S, Sun H, Wang Y, Yan F, Pan W, Zheng Z. Outcome impact of different tranexamic acid regimens in cardiac surgery with cardiopulmonary bypass (OPTIMAL): Rationale, design, and study protocol of a multicenter randomized controlled trial. *Am Heart J*. 2020;222:147-156.
 13. Zhao S, Shi J, Yu G, Li D, Wang M, Yuan C, Zhou H, Parizadeh A, Li Z, Guan MX, Ye S. Photosensitive tyrosine analogues unravel site-dependent phosphorylation in TrkA initiated MAPK/ERK signaling. *Commun Biol*. 2020;3(1):706.
 14. Ren J, Chen L, Zhang N, Chen X, Zhao Q, Chen K, Li X, Ruschitzka F, Duru F, Song J. Plasma testosterone and arrhythmic events in male patients with arrhythmogenic right ventricular cardiomyopathy. *ESC Heart Fail*. 2020;7(4):1547-1559.
 15. Qu J, Zhang D, Zhang H, Rao C, Chen S, Zhao Y, Zheng Z. Preoperative clopidogrel and outcomes in patients with acute coronary syndrome undergoing coronary artery bypass surgery. *J Thorac Cardiovasc Surg*. 2020 Apr 11:S0022-5223(20)30818-7. doi: 10.1016/j.jtcvs.2020.03.118. Epub ahead of print.
 16. Zhang B, Liu Y, Guo H, Li Y, Shi Y, Liang S, Liu H, Sun X. Renal protective effect of the aortic balloon occlusion technique in total arch replacement with frozen elephant trunk. *Ann Cardiothorac Surg*. 2020;9(3):209-219.
 17. Song Y, Hu S, Sun H, Song Y, Wang L, Wang W, Pan S, Wang S, Feng W, Zheng Z. Results of Left Ventricular Reconstruction With and Without Mitral Valve Surgery. *Ann Thorac Surg*. 2020;109(3):753-761.
 18. Yu C, Liu C, Du J, Liu H, Zhang H, Zhao Y, Yang L, Li X, Li J, Wang J, Wang H, Liu Z, Rao C, Zheng Z; MISSION-2 Collaborative Group. Smartphone-based application to improve medication adherence in patients after surgical coronary revascularization. *Am Heart J*. 2020;228:17-26.
 19. Lei C, Huang Y, Yuan S, Chen W, Liu H, Yang M, Shen Z, Fang L, Fang Q, Song H, Tian X, Zeng X, Guo X, Zhang S. Takayasu Arteritis With Coronary Artery Involvement: Differences Between Pediatric and Adult Patients. *Can J Cardiol*. 2020;36(4):535-542.
 20. Sun J, Qian X, Shi Y, Qi H. Valve Sparing Aortic Root Replacement for Aortico-Left Ventricular Tunnel With Bicuspid Aortic Valve. *Ann Thorac Surg*. 2020;110(2):e129-e130.
 21. Meng L, Teng X, Liu Y, Yang C, Wang S, Yuan W, Meng J, Chi H, Duan L, Liu X. Vital Roles of Gremlin-1 in Pulmonary Arterial Hypertension Induced by Systemic-to-Pulmonary Shunts. *J Am Heart Assoc*. 2020;9(15):e016586.
- ### Q3
1. Zhang X, Luo M, Fang K, Li J, Peng Y, Zheng L, Shu C. Analysis of the formation mechanism and occurrence possibility of Post-Stenotic Dilatation of the aorta by CFD approach. *Comput Methods Programs Biomed*. 2020;194:105522.
 2. Li Y, Guo H, Wang L, Liang S, Sun X. Application of Aortic Balloon Occlusion in Total Aortic Arch Replacement with Frozen Elephant Trunk on Clinical Endpoints for Aortic Dissection Patients. *Ann Thorac Cardiovasc Surg*. 2020;26(6):332-341.
 3. Lin S, Zhang H, Rao CF, Chen SP, Qiao SB, Yan HB, Dou KF, Wu YJ, Tang YD, Yang XC, Shen ZJ, Liu J, Zheng Z; Beijing Coronary Angiography Registry Collaborative

- Group. Assessing the association of appropriateness of coronary revascularization and 1-year clinical outcomes for patients with stable coronary artery disease in China. *Chin Med J (Engl)*. 2020;133(1):1-8.
4. Zhu C, Wang S, Cui H, Tang B, Wang S. Associations of myocardial bridging with adverse cardiac events: a meta-analysis of published observational cohort studies involving 4,556 individuals. *Ann Transl Med*. 2020;8(6):369.
 5. Yang K, Luo X, Tang Y, Hu H, Sun H. Comparison of clinical results between percutaneous closure and surgical repair of ruptured sinus of Valsalva aneurysm. *Catheter Cardiovasc Interv*. 2021;97(3):E354-E361.
 6. Li X, Zhang W, Liu J, Gonzalez L, Liu D, Zhang L, Dardik A, Shu C. Contrast-Induced Kidney Nephropathy in Thoracic Endovascular Aortic Repair: A 2-Year Retrospective Study in 470 Patients. *Angiology*. 2020;71(3):242-248.
 7. Zhang R, Wang X, Li S, Yan J. Effect of low-dose exogenous surfactant on infants with acute respiratory distress syndrome after cardiac surgery: a retrospective analysis. *BMC Pulm Med*. 2020;20(1):210.
 8. Yang C, Shu C, Wang L, Li X, He H, Li J, Zhu J, Yang Y, Dardik A. EphB4 signaling maintains the contractile phenotype of adult venous smooth muscle cells. *Am J Transl Res*. 2020;12(8):4522-4531.
 9. Luo M, Fang K, Fan B, Li Q, Li M, He H, Li X, Guo Y, Xue Y, Zhao J, Wang T, Yang C, Li J, Nienaber CA, Shu C. Midterm Results of Retrograde In Situ Needle Fenestration During Thoracic Endovascular Aortic Repair of Aortic Arch Pathologies. *J Endovasc Ther*. 2021;28(1):36-43.
 10. Zhang X, Luo M, Wang E, Zheng L, Shu C. Numerical simulation of magnetic nano drug targeting to atherosclerosis: Effect of plaque morphology (stenosis degree and shoulder length). *Comput Methods Programs Biomed*. 2020;195:105556.
 11. Zhang Z, Wang H, Wang Y, Luo Q, Yuan S, Yan F. Risk of Postoperative Hyperalgesia in Adult Patients with Preoperative Poor Sleep Quality Undergoing Open-heart Valve Surgery. *J Pain Res*. 2020;13:2553-2560.
 12. Wu J, Xie E, Qiu J, Huang Y, Jiang W, Zafar MA, Zhang L, Yu C. Subacute/chronic type A aortic dissection: a retrospective cohort study. *Eur J Cardiothorac Surg*. 2020;57(2):388-396.
 13. Zheng Y, Rao C, Chen S, He L, Hou J, Zheng Z. Surgical left atrial appendage occlusion in patients with atrial fibrillation undergoing mechanical heart valve replacement. *Chin Med J (Engl)*. 2020;133(16):1891-1899.
 14. He H, Li Q, Shu C. Surgical treatment of intravenous leiomyomatosis with inferior vena cava and intracardiac extension. *J Vasc Surg Venous Lymphat Disord*. 2020;8(6):1102-1103.
 15. Yan C, Wan L, Li L, Li H, Du B, Hao S. Transfemoral transcatheter puncture of interventricular septum in a swine model: A novel transfemoral-venous access to left ventricle with the assistance of arterio-venous circuit. *Catheter Cardiovasc Interv*. 2020;96(2):488-496.
 16. Li X, Wang X, Li S, Zeng M, Li D. Viral Respiratory Infection, a Risk in Pediatric Cardiac Surgery: A Propensity-Matched Analysis. *Pediatr Crit Care Med*. 2020;21(7):e431-e440.
- ### Q4
1. Chen Y, Wang G, Zhou H, Yang L, Zhang C, Yang X, Lei G. 90 days impacts of remote ischemic preconditioning on patients undergoing open total aortic arch replacement: a post-hoc analysis of previous trial. *BMC Anesthesiol*. 2020;20(1):169.
 2. Chang Y, Guo H, Qian X, Fang F. A case report of aortic root repair using a pericardial autograft for type A aortic dissection. *J Cardiothorac Surg*. 2020;15(1):319.
 3. Lin H, Hou J, Tang H, Chen K, Guo S, Wang L, Sun H, Zheng Z, Hu S. A Novel Risk Stratification System for Predicting In-Hospital Mortality Following Coronary Artery Bypass Grafting Surgery with Impaired Left Ventricular Ejection Fraction. *Heart Surg Forum*. 2020;23(5):E621-E626.
 4. Liu R, Rui L, Li S, Zhang B, Zhang H, Lin Y, Li H. Absorbable Microplate Externally Suspending Bronchomalacia in Congenital Heart Disease Infant. *Pediatr Cardiol*. 2020;41(6):1092-1098.
 5. Yan S, Lou S, Zhao Y, Liu G, Ji B. Air in extracorporeal membrane oxygenation: can never be overemphasized. *Perfusion*. 2021;36(1):97-99.
 6. Dun Y, Shi Y, Guo H, Liu Y, Zhang B, Sun X. Aortic balloon occlusion technique in total arch replacement with frozen elephant trunk after thoracic endovascular aortic repair. *J Thorac Dis*. 2020;12(5):2474-2481.
 7. Tian L, Gao X, Yang J, Yao Y, Ji H. Association of Adenosine Diphosphate-Induced Platelet Maximum Amplitude With Postoperative Bleeding and Blood Transfusions in Patients Undergoing Coronary Artery Bypass Grafting. *J Cardiothorac Vasc Anesth*. 2021;35(2):421-428.
 8. 104. Yan S, Yang Y, Fan H, Lou S. Cardiopulmonary bypass strategy in a patient with cold agglutinin of high thermal amplitude. *Artif Organs*. 2020;44(5):535-536.
 9. Sun J, Qi H, Lin H, Kang W, Li S, Guo H, Qian X. Characteristics and long-term outcomes of aortico-left ventricular tunnel. *Interact Cardiovasc Thorac Surg*. 2021;32(2):306-312.
 10. Shi Y, Dun Y, Guo H, Liu Y, Zhang B, Qian X, Yu C, Sun X. Clinical features and surgical outcomes of type A intramural hematoma. *J Thorac Dis*. 2020;12(8):3964-

- 3975.
11. Yan H, Tiemuerniyazi X, Song Y, Xu F, Feng W. Comparison of dual antiplatelet therapies after coronary endarterectomy combined with coronary artery bypass grafting: a cohort study. *J Cardiothorac Surg.* 2020;15(1):155.
12. Jiang X, Liu J, Peng B, Zhang H, Li S, Yan J, Wang Q. Contemporary Patterns of Management of Tetralogy of Fallot: Data from a Single Center in China. *Congenital Heart Disease.* 2021;16(1):53-64.
13. Gao H, Luo M, Fang K, Fan B, Zhao J, Xue Y, Shu C. Cumulative sum analysis of the learning curve for the preclosure technique using Proglide. *Interact Cardiovasc Thorac Surg.* 2020;30(2):280-286.
14. Chang Y, Yu CT, Guo HW, Sun XG, Chang Q, Qian XY. Different therapeutic modalities for aortic arch disease combined with Kommerell's diverticulum: single-center experience with nine cases. *J Thorac Dis.* 2020;12(9):4711-4716.
15. Li Y, Guo H, Shi Y, Liu Y, Sun X. Early outcome of aortic balloon occlusion during total aortic arch replacement with the frozen elephant trunk technique for aortic dissection. *Interact Cardiovasc Thorac Surg.* 2020;30(1):91-98.
16. Liu Y, Liang S, Zhang B, Li Y, Wang L, Dun Y, Chen Z, Shi Y, Guo H, Sun X. Early outcomes of hybrid type II arch repair versus total arch replacement with frozen elephant trunk in acute DeBakey type I aortic dissection: a propensity score-matched analysis. *Interact Cardiovasc Thorac Surg.* 2020;31(4):565-572.
17. Zhao R, Qiu J, Wu J, Jiang W, Xie E, Gao W, Yu C, Qiu J. Effect of heated humidified ventilation on intraoperative core temperature and prognosis in normothermic thoraco-abdominal aortic aneurysm repair. *J Thorac Dis.* 2020;12(3):276-283.
18. Wang HB, Zhang L, Zhang Z, Yuan S, Yan FX, Luo QP. Effect of intraoperative dexmedetomidine infusion on delirium in adult patients following cardiac valve surgery: a protocol of a randomized, double-blinded, and placebo-controlled study. *Trials.* 2020;21(1):645.
19. Wang H, Zhang L, Luo Q, Li Y, Yan F. Effect of Sleep Disorder on Delirium in Post-Cardiac Surgery Patients. *Can J Neurol Sci.* 2020;47(5):627-633.
20. Zhou C, Tong Y, Feng Z, Cui Y, Zhao M, Hu J, Liu K, Zhao J, Liu J. Effect of two different colloid priming strategies in infants weighing less than 5 kg undergoing on-pump cardiac surgeries. *Artif Organs.* 2020;44(1):58-66.
21. Zhang P, Lv H, Qi X, Xiao W, Xue Q, Zhang L, Li L, Shi J. Effect of ulinastatin on post-operative blood loss and allogeneic transfusion in patients receiving cardiac surgery with cardiopulmonary bypass: a prospective randomized controlled study with 10-year follow-up. *J Cardiothorac Surg.* 2020;15(1):98.
22. Ma K, Qi L, Hua Z, Yang K, Zhang H, Li S, Zhang S, He F, Wang G. Effectiveness of Bidirectional Glenn Shunt Placement for Palliation in Complex Congenitally Corrected Transposed Great Arteries. *Tex Heart Inst J.* 2020;47(1):15-22.
23. Zhu Y, Yang M, Zhang Y, Meng F, Yang T, Fang Z. Effects of Pulsatile Frequency of Left Ventricular Assist Device (LVAD) on Coronary Perfusion: A Numerical Simulation Study. *Med Sci Monit.* 2020;26:e925367.
24. Shi Y, Zhang X, Du J, Chen S, Zhang H, Yang L, Zheng Z. Elevated postoperative serum uric acid is associated with major adverse events following coronary artery bypass grafting. *J Card Surg.* 2020;35(10):2559-2566.
25. Shu C, Fan B, Luo M, Li Q, Fang K, Li M, Li X, He H, Wang T, Yang C, Xue Y, Gao H, Zhao J. Endovascular treatment for aortic arch pathologies: chimney, on-the-table fenestration, and in-situ fenestration techniques. *J Thorac Dis.* 2020;12(4):1437-1448.
26. Wei K, Guo H, Fang F, Qian XY. Giant right sinus of Valsalva aneurysm led to proximal right coronary artery occlusion. *Anatol J Cardiol.* 2020;23(6):350-353.
27. Cheng G, Li L. High-glucose-induced apoptosis, ROS production and pro-inflammatory response in cardiomyocytes is attenuated by metformin treatment via PP2A activation. *J Biosci.* 2020;45:126.
28. Jiang X, Liu J, Peng B, Zhang H, Li S, Yan J, Wang Q. Impact of Annulus-Sparing on Surgical Adequacy of Pulmonary Valve in Complete Repair of Tetralogy of Fallot with Right Ventricular Outflow Tract Incision. *Pediatr Cardiol.* 2021;42(2):379-388.
29. Wang J, Zhang H, Fan H, Chen K, Zhang Y, Song K, Ao H, Yu C. Intractable mechanical hemolytic anemia complicating mitral valve surgery: a case series study. *BMC Cardiovasc Disord.* 2020;20(1):104.
30. Zhong Z, Yue Z, Zhao Z, Song W, Zheng S, Liu S. Long-term results of the edge-to-edge repair for failed mitral valve repair as a bailout option. *Gen Thorac Cardiovasc Surg.* 2021;69(1):32-37.
31. Zhang C, Zhang H, Yan J, Hua Z, Song Y, Sun H, Li S. Mid-Term Outcome for Anomalous Origin of the Left Coronary Artery From the Pulmonary Artery. *Heart Lung Circ.* 2020;29(5):766-771.
32. Li J, Jiang X, Zhang S, Liu J, Zhang Y, Yan J, Li S, Wang Q. Mid-term Outcome Of Surgical Treatment In Pediatric Patients With Ebstein's Anomaly: A Single-center Cohort Study. *Congenital Heart Disease.* 2020;15(5):387-397.
33. Tiemuerniyazi X, Yan H, Song Y, Nan Y, Xu F, Feng W. Mid-term outcomes of coronary endarterectomy combined with coronary artery bypass grafting. *Interact*

- Cardiovasc Thorac Surg. 2021;32(2):188-195.
34. Wang G, Ma K, Pang K, Hua Z, Zhang S, Qi L, Yang Y, Feng Z, Mao F, Zhang H, Li S. Modified Single Repair Technique for Complete Atrioventricular Septal Defect: A Propensity Score Matching Analysis. *Pediatr Cardiol.* 2020;41(3):615-623.
 35. Zhang X, Zheng L, Wang E, Shu C. Numerical investigations of temperature and hemodynamics in carotid arteries with and without atherosclerotic plaque during open surgery. *J Therm Biol.* 2020;91:102622.
 36. Jin Y, Feng Z, Zhao J, Hu J, Tong Y, Guo S, Zhang P, Bai L, Li Y, Liu J. Outcomes and factors associated with early mortality in pediatric postcardiotomy veno-arterial extracorporeal membrane oxygenation. *Artif Organs.* 2021;45(1):6-14.
 37. Lin H, Yan J, Wang Q, Li S, Sun H, Zhang Y, Zhang L, Liu W. Outcomes of the Warden Procedure for Partial Anomalous Pulmonary Venous Drainage. *Pediatr Cardiol.* 2020;41(1):134-140.
 38. Shen C, Zhang Y, Qu C, Fang J, Liu X, Teng L. Outcomes of Total Aortoiliac Revascularization for TASC-II C&D Lesion with Kissing Self-Expanding Covered Stents. *Ann Vasc Surg.* 2020;68:434-441.
 39. Xie Y, Wang S, Zhao G, Li M, Zhang F, Ouyang W, Pan X. Percutaneous aortic balloon valvuloplasty under echocardiographic guidance solely. *J Thorac Dis.* 2020;12(3):477-483.
 40. Teng L, Fang J, Zhang Y, Liu X, Qu C, Shen C. Perioperative baseline β -blockers: An independent protective factor for post-carotid endarterectomy hypertension. *Vascular.* 2021;29(2):270-279.
 41. Li P, Fang F, Qiu X, Xu N, Wang Y, Ouyang WB, Zhang FW, Hu HB, Pan XB. Personalized Three-Dimensional Printing and Echoguided Procedure Facilitate Single Device Closure for Multiple Atrial Septal Defects. *J Interv Cardiol.* 2020;2020:1751025.
 42. Luo Q, Su Z, Jia Y, Liu Y, Wang H, Zhang L, Li Y, Wu X, Liu Q, Yan F. Risk Factors for Prolonged Mechanical Ventilation After Total Cavopulmonary Connection Surgery: 8 Years of Experience at Fuwai Hospital. *J Cardiothorac Vasc Anesth.* 2020;34(4):940-948.
 43. Li F, Wang X, Wang Y, Xu F, Wang X, Li X, Wang W. Structural Valve Deterioration after Transcatheter Aortic Valve Implantation Using J-Valve: A Long-Term Follow-Up. *Ann Thorac Cardiovasc Surg.* 2020;26(3):158-165.
 44. Ma K, Qi L, Hua Z, Yang K, Zhang H, Li S, Zhang S, He F, Wang G, Feng Z. Surgical Outcomes of Anatomical Repair for Congenitally Corrected Transposed Great Arteries. *Heart Lung Circ.* 2020;29(5):772-779.
 45. Yuan X, Li B, Yang Y, Wang H, Sun H, Song Y, Wang W. Surgical results and pathological analysis of cardiac fibroma in the adolescent and the adult. *J Card Surg.* 2020;35(8):1912-1919.
 46. Ma H, Sun H, Yang Y, Lv F, Ran J. Surgical treatment of left ventricular fibroma in adult: case report and literature review. *Cardiol Young.* 2020;30(9):1328-1331.
 47. Li L, Wang X, Yao Y, Li L. Survey on Anesthesia Services in Fuwai Hospital. *J Cardiothorac Vasc Anesth.* 2020;34(9):2554-2556.
 48. Liu J, Peng Bo, Jiang X, Zhang S, Li J, Lv L, Li Q. The Clinical Application Value of Selective Unifocalization in the Treatment of Severe Pulmonary Artery Atresia with Ventricular Septal Defect. *Congenital Heart Disease.* 16(1), 65-72.
 49. Ran J, Liu Y, Li Y, Li Q, Tang Y, Deng L, Song Y. The effect of endoscopic vein harvesting in coronary artery bypass surgery. *J Thorac Dis.* 2020;12(5):1991-1998.
 50. Li Y, Yan S, Lou S, Sun X. The strategy of cardiopulmonary bypass for total aortic arch replacement and the frozen elephant trunk technique with aortic balloon occlusion. *J Int Med Res.* 2020;48(5):300060520905410.
 51. Dun Y, Shi Y, Guo H, Liu Y, Zhang B, Sun X, Qian X, Yu C. The surgical management of retrograde type A aortic dissection after thoracic endovascular aortic repair. *Interact Cardiovasc Thorac Surg.* 2020;30(5):732-738.
 52. Liu BY, Wu WC, Zeng QX, Liu ZH, Niu LL, Tian Y, Luo Q, Zhao ZH, Quan RL, Lin JR, Wang H, He JG, Xiong CM. The value of three-dimensional echocardiography in risk stratification in pulmonary arterial hypertension: a cross-sectional study. *Int J Cardiovasc Imaging.* 2020;36(4):577-584.
 53. Wang C, Zhang F, Ouyang W, Zhao G, Lu W, Zou M, Pan X. Transcatheter Closure of Patent Ductus Arteriosus under Echocardiography Guidance: A Randomized Controlled Noninferiority Trial. *J Interv Cardiol.* 2020;2020:4357017.
 54. Wang G, Ma K, Pang K, Zhang S, Qi L, Yang Y, Feng Z, Mao F, Yuan J, Zhang H, Li S. Tricuspid valvuloplasty for isolated tricuspid regurgitation in children. *Cardiol Young.* 2020;30(8):1076-1080.
 55. Yao YT, Fang NX, Liu DH, Li LH. Ulinastatin reduces postoperative bleeding and red blood cell transfusion in patients undergoing cardiac surgery: A PRISMA-compliant systematic review and meta-analysis. *Medicine (Baltimore).* 2020;99(7):e19184.
 56. Gao S, Li Y, Diao X, Yan S, Liu G, Liu M, Zhang Q, Zhao W, Ji B. Vacuum-assisted venous drainage in adult cardiac surgery: a propensity-matched study. *Interact Cardiovasc Thorac Surg.* 2020;30(2):236-242.
 57. Guo S, Tong Y, Bai L, Zhang P, Duan X, Liu J. Incidence, Risk Factors, and Outcomes of Hyperferritinemia after Pediatric Cardiac Surgery with Cardiopulmonary Bypass: A Retrospective Study. *Congenital Heart Disease.* 2020;15(5):275-285.

专家简介 Specialists

Xiaodong Zhu, MD

Academician of Chinese Academy of Engineering
Senior Consultant Expert of Fuwai Hospital,
Chinese Academy of Medical Sciences

朱晓东教授

中国工程院院士
中国医学科学院阜外医院资深顾问专家

Shengshou Hu, MD, FACC

Academician of Chinese Academy of Engineering
Director of National Center for Cardiovascular Diseases
President of Fuwai Hospital, Chinese Academy of Medical
Sciences
Director of State Key Laboratory of Cardiovascular Disease
Director of National Clinical Research Center for
Cardiovascular Disease

胡盛寿教授

中国工程院院士
国家心血管病中心主任
中国医学科学院阜外医院院长
心血管疾病国家重点实验室主任
心血管疾病国家临床医学研究中心主任

Zhe Zheng, MD

Secretary of the Party Committee, Deputy Director of
National Center for Cardiovascular Diseases
Secretary of the Party Committee, Deputy President of
Fuwai Hospital, Chinese Academy of Medical Sciences
Deputy Director of National Clinical Research Center for
Cardiovascular Disease

郑哲教授

国家心血管病中心党委书记、副主任
中国医学科学院阜外医院党委书记、副院长
心血管疾病国家临床医学研究中心副主任



Hansong Sun, Director, Cardiovascular Surgery Committee

Deputy Directors: Yan Yang, Hui Xiong, Xin Wang, Wei Feng

外科管委员会主任：孙寒松

副主任：杨研、王水云、王欣、凤玮



Hansong Sun, Director, Center of Cardiac Surgery for Adults

Deputy Directors: Yunhu Song, Wei Feng, Shuiyun Wang, Liqing Wang

成人外科中心主任：孙寒松

副主任：宋云虎、凤玮、王水云、王立清

Hansong Sun, Director, Ward 1

Keming Yang, Deputy Director, Ward 1

一病区主任：孙寒松 副主任：杨克明

Yunhu Song, Director, Ward 2

二病区主任：宋云虎

Sheng Liu, Director, Ward 3

三病区主任：刘盛

Liqing Wang, Director, Ward 5

Xianqiang Wang, Deputy Director, Ward 5

五病区主任：王立清 副主任：王现强

Wei Feng, Director, Ward 6
Shiwei Pan, Deputy Director, Ward 6
Fei Xu, Assistant for Director, Ward 6
六病区主任：凤玮 副主任：潘世伟 主任助理：徐飞

Shuiyun Wang, Director, Ward 7
七病区主任：王水云

Jie Huang, Director, Center of Heart Failure and Heart Transplantation
Zhongkai Liao, Assistant for Director
心力衰竭和移植病区主任：黄洁 主任助理：廖中凯



Shoujun Li, Director, Center of Cardiac Surgery for Children
Deputy Directors: Jun Yan, Xu Wang, Zhongdong Hua
小儿外科中心主任：李守军 副主任：闫军、王旭、花中东

Shoujun Li, Director, Ward 1
Ye Lin, Assistant for Director, Ward 1
一病区主任：李守军 主任助理：林野

Jun Yan, Director, Ward 2
Qiang Wang, Deputy Director, Ward 2
二病区主任：闫军 副主任：王强

Zhongdong Hua, Director, Ward 3
Jing Zhang, Assistant for Director, Ward 3
三病区主任：花中东 主任助理：张旌

Xu Wang, Director, Pediatric Surgical Intensive Care Unit
小儿外科恢复室主任：王旭



Chang Shu, Director, Center of Aortic and Vascular Surgery
Deputy Directors: Cuntao Yu, Chenyang Shen, Xiongjing Jiang
血管外科中心主任：舒畅 副主任：于存涛、沈晨阳、蒋雄京

Chenyang Shen, Director, Ward 1
Xiongjing Jiang, Deputy Director, Ward 1
一病区主任：沈晨阳 副主任：蒋雄京

Chang Shu, Director, Ward 2
Xiangyang Qian, Deputy Director, Ward 2
二病区主任：舒畅 副主任：钱向阳

Cuntao Yu, Director, Ward 3
Xiaogang Sun, Deputy Director, Ward 3
三病区主任：于存涛 副主任：孙晓刚



Wei Wang, Director, Center of Structural Heart Diseases
Deputy Directors: Yongjian Wu, Xiangbin Pan, Zhongying Xu, Yongquan Xie
结构性心脏病中心主任：王巍 副主任：吴永健、潘湘斌、徐仲英、谢涌泉

Yongjian Wu, Director, Ward 1
Jie Qian, Deputy Director, Ward 1
一病区主任：吴永健 副主任：钱杰

Wei Wang, Director, Ward 2
Xinjin Luo, Deputy Director, Ward 2
二病区主任：王巍 副主任：罗新锦

Xiangbin Pan, Director, Ward 3
Gejun Zhang, Xiaopeng Hu, Deputy Director, Ward 3
Qi Li, Assistant for Director, Ward 3
三病区主任：潘湘斌 副主任：张戈军、胡晓鹏 主任助理：李琦



Haitao Zhang, Director, Center of Surgical Intensive Care Unit
Deputy Directors: Ping Liu, Zujun Chen, Juan Du, Yanbo Zhang
术后恢复中心主任：张海涛 副主任：刘平、陈祖君、杜娟、张燕搏

Haitao Zhang, Director, Adult Surgical Intensive Care Unit 1
Zujun Chen, Juan Du, Deputy Director, Adult Surgical Intensive Care Unit 1
成人外科恢复室一区主任：张海涛 副主任：陈祖君、杜娟

Ping Liu, Director, Adult Surgical Intensive Care Unit 2
Yanbo Zhang, Deputy Director, Adult Surgical Intensive Care Unit 2
成人外科恢复室二区主任：刘平 副主任：张燕搏



Fuxia Yan, Director, Center of Anesthesia
Deputy Directors: Su Yuan, Jia Shi, Fujian Duan
麻醉中心主任：晏馥霞 副主任：袁素、石佳、段福建



Bingyang Ji, Director, Center of Perfusion
Deputy Directors: Jinping Liu, Feilong Hei
体外循环中心主任：吉冰洋 副主任：刘晋萍、黑飞龙

Bingyang Ji, Director, Department of Adult Perfusion
成人体外循环科主任：吉冰洋

Jinping Liu, Director, Department of Pediatric Perfusion
小儿体外循环科主任：刘晋萍



Xue Feng, Deputy Director (Presiding), Cardiac Rehabilitation Center
心脏康复中心副主任：冯雪（主持工作）



Xin Wang, Director, Center of Animal Experiment.
动物实验中心主任：王欣

Editorial Staff of Fuwai Surgical Outcomes Report:

Zhe Zheng, Chenfei Rao, Liuzhong Shen, Mingyao Luo,
Kai Ma, Wei Zhao, Xinyi Xu, Yuxin Wang, Weinan Chen,
Xuan Chen **Proofread:** Shengshou Hu

阜外医院外科年报编辑组人员:

郑哲、饶辰飞、沈刘忠、罗明尧、马凯、赵轶、徐心仪、
王玉鑫、陈蔚南、陈轩 **校审:** 胡盛寿

发展历程 History

In 1956, the predecessor of Fuwai Hospital, the Chest Hospital of the Chinese People's Liberation Army (PLA), was founded in the Heishanhu area of Beijing.

1956年，医院的前身中国人民解放军胸科医院于黑山扈成立。



1956



In 1962, Fuwai Hospital was designated as an Institute for Cardiovascular Diseases, identifying it as a hospital specializing in cardiovascular diseases that integrates both patient care and medical research.

1962年，医院兼称心脏血管系统疾病研究所，形成院所一体化的心血管病专科医院。

1962



In 2004, the Cardiovascular Disease Prevention, Treatment and Research Center affiliated to the Ministry of Health was established, marking the official recognition of our hospital as a national institution specializing in cardiovascular disease and integrating medical care, scientific research, medical education, and disease prevention.

2004年，卫生部心血管病防治研究中心成立，标志着我院成为集医疗、科研、教学、预防为一体的国家级心血管病专科医院。



2004



1958

In 1958, responsibility for the Chest Hospital of Chinese PLA was transferred to the local government. The hospital was subsequently relocated to Fuchengmenwai Street, became affiliated with the Chinese Academy of Medical Sciences, and was renamed Fuchengmenwai Hospital Affiliated to the Chinese Academy of Medical Sciences, or Fuwai Hospital for short.

1958年，中国人民解放军胸科医院移交地方，迁至阜成门外，归属中国医学科学院，定名为“中国医学科学院阜成门外医院”，简称“阜外医院”。



1994

In 1994, Fuwai Hospital Affiliated to the Chinese Academy of Medical Sciences was renamed Fuwai Cardiovascular Hospital, Chinese Academy of Medical Sciences.

1994年，中国医学科学院阜外医院更名为中国医学科学院阜外心血管病医院。





In 2011, the State Key Laboratory of Cardiovascular Diseases joined Fuwai Hospital.

2011年，心血管疾病国家重点实验室落户阜外医院。



2011



In 2014, Fuwai Cardiovascular Hospital, Chinese Academy of Medical Sciences was renamed Fuwai Hospital, Chinese Academy of Medical Sciences, National Center for Cardiovascular Disease. The hospital began operating under the dual integrated operation model, which is based on the “two independent legal persons, one administration system.”

2014年，中国医学科学院阜外心血管病医院更名为中国医学科学院阜外医院。国家心血管病中心，中国医学科学院阜外医院正式进入“两个独立法人，一套行政机构”两位一体的运行模式。

2014



2013



2015



In 2013, the Xishan scientific research base was fully launched.

2013年，阜外医院西山科研基地全面启用。



In 2013, the National Clinical Research Center for Cardiovascular Diseases joined Fuwai Hospital.

2013年，国家心血管病临床医学研究中心落户阜外医院。



In 2015, the new medical building opened, integrating the clinic, emergency, and surgical systems to efficiently serve an even greater number of patients. The center has become the world's largest cardiovascular center as well as a national cardiovascular center for treatment, prevention, and medical research and education.

2015年，正式启用了集门诊、急诊、住院、手术等为一体的综合大楼，目前已成为世界上最大的心血管疾病诊治中心和集医疗、科研、预防和人才培养于一体的国家级医学研究与教育中心。

致 谢

Acknowledgements

2020年，国内共131名医师顺利完成了在阜外医院外科系统的进修课程。在此，感谢以下每一位进修医师在过去一年中的辛勤付出，感谢所有帮助阜外发展的同行与朋友的支持！

In 2020, 131 doctors from domestic centers completed training programs in our surgical departments. We express our sincere appreciation for their hard work and dedication as well as the support of our colleagues and friends.

王立新	武警总医院	王晓民	山西省长治市第二人民医院	梁 飞	广东省第二人民医院
姚华青	梅州市人民医院	梁艳盆	山西省长治市第二人民医院	杨 柠	常德市第一人民医院
董广苏	徐州市肿瘤医院	左定荣	曲靖市第一人民医院	张文娟	北京市房山区良乡医院
王 巍	吉林大学中日联谊医院	李为朋	廊坊市人民医院	冯 锋	郑州大学附属郑州中心医院
李焱磊	渭南市中心医院	王 亮	川北医学院附属医院	刘传玲	北大医疗鲁中医院
刘松明	曲靖市第一人民医院	段正伟	郑州市第七人民医院	邹亚男	威海市中心医院
袁井贺	朝阳市中心医院	王晓航	阜外华中心血管病医院	吴 雯	西昌市人民医院
顾传磊	鲁西南医院	陈 刚	郑州市第七人民医院	赵婷婷	树兰（杭州）医院
丁长柏	邳州市人民医院	齐佳杉	南充市中心医院	姜 鹏	东莞市妇幼保健院
成祥军	江门市中心医院	刘慧芳	内蒙古医科大学附属医院	高 雷	廊坊市人民医院
苟小红	重庆医科大学附属永川医院	朱贤林	恩施土家族苗族自治州中心医院	蓝 岚	广州医科大学附属第一医院
潘双洋	成武县人民医院	杨永锋	济宁市第一人民医院	庞志路	河南省人民医院
韦晨龙	西安高新医院	刘 韡	太原市中心医院	吴 敏	衡阳市中心医院
李 伟	阜外华中心血管病医院 （华中阜外医院）	夏 斌	山东省立医院	邵海涛	阜外华中心血管病医院
王金龙	重庆三峡中心医院	郭 颖	邳州市人民医院	余 畅	郑州大学第一附属医院
冯志强	广西中医药大学第一附属医院	李 珊	成武县人民医院	陈景伟	兖矿新里程总医院
林家旺	佛山市第一人民医院	杨燕青	浙江省台州医院	余 鹏	南方医科大学深圳医院
杜 婷	安徽医科大学第一附属医院	郑伟萍	台州恩泽医疗中心（集团） 台州医院	李占建	空军航空医学研究所附属医院
王 征	台州恩泽医疗中心（集团） 台州医院	马文文	徐州市肿瘤医院	邱龙兴	茂名市人民医院
孔继昌	昆明市第一人民医院	魏文博	内蒙古医科大学附属医院	高 爽	邯郸市第一医院
刘 勇	四川大学华西医院	杜 亮	河北医科大学附属第一医院	汪 信	西南医科大学附属中医医院
黎 明	西安交通大学第一附属医院	曾 丽	贵州医科大学附属医院	谭 蕾	北京市健宫医院
夏滕飞	四川省南充市中心医院	刘 洋	南阳南石医院	刘 博	南阳南石医院
栗振坤	聊城市人民医院	吴鹏涛	湖南省省直中医院 （湖南中医药高等专科学校附属第一医院）	赵 亮	齐齐哈尔医学院附属第三医院
姚 伟	焦作市第二人民医院	梁 超	平煤神马医疗集团总医院	李 航	福建医科大学附属协和医院
邹孟轩	阜外医院深圳医院	吴晓顺	郑州人民医院	董宝剑	郑州大学第五附属医院
赵 舟	北京大学人民医院	孙 贺	商丘市第一人民医院	郑井慧	唐山中心医院
李华鹏	中国医学科学院阜外医院深圳医院	蔡立松	开滦总医院	丁钊珊	宁波市第一医院
王 尧	中国医学科学院阜外医院深圳医院	张 博	天津市人民医院	李石磊	沧州市中心医院
何春雷	廊坊市人民医院	王 伟	东阿县人民医院	崔 洁	重庆医科大学附属儿童医院
贾智博	哈尔滨医科大学附属第二医院	丁文平	徐州市中心医院	杨磊磊	贵州省六盘水市人民医院
周 前	荆州市中心医院	罗小会	江苏省苏北人民医院	刘 琴	北京协和医院
别梦军	重庆医科大学附属第一医院	王 钰	泰山医学院附属医院	李 珊	成武县人民医院
周中民	成武县人民医院	宋丽莉	齐齐哈尔医学院附属第三医院	杨晓凡	安徽医科大学第一附属医院
韩越博	安阳市人民医院	卢玉蓉	运城市中心医院	孙凤国	浙江省台州市中心医院 （台州学院附属医院）
晏 明	宜昌市中心人民医院	李星寰	云南省阜外心血管病医院	刘 瑶	武安市第一人民医院
于 杨	成武县人民医院	张 倩	河北中石油中心医院	吴 鸿	南昌大学第一附属医院
赵双涛	兖矿新里程总医院	解孝颖	河北中石油中心医院	钟文鑫	安徽省第二人民医院
袁洪樾	苏州大学附属儿童医院	赵海峰	河北工程大学附属医院	温 凯	武安市第一人民医院
蒋璐霞	兰州大学第二医院	李 义	河北省人民医院	王 瑞	徐州市肿瘤医院
徐大千	郑州大学第一附属医院	赵 闯	平煤神马医疗集团总医院	郭 静	新乡市第一人民医院
罗富超	重庆市涪陵中心医院	黄 静	黑龙江省医院	王延伟	黄河三门峡医院
崔亚玲	广州市第一人民医院	朱柯蓉	昆明医科大学第一附属医院	薛才广	聊城市第二人民医院
赵 映	海南医学院第一附属医院	谈杰超	南方医科大学顺德医院		（以上排名不分先后）