

Department of Surgery

Division of Pediatric Surgery and Vascular Surgery

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General Summary

Pediatric Surgery

Surgery for children at The Jikei University Hospital is offered by a highly trained, expert team of pediatric surgical professionals who specialize in the diseases and conditions affecting young people. Our surgeons specialize in treating neonates, infants, children, and adolescents and understand their unique needs.

Vascular Surgery

Research projects of our department have focused on clinical trials and the development of the endovascular repair of aortic aneurysms and the treatment of peripheral arterial diseases with new techniques and devices.

Research Activities

Pediatric Surgery

I. Education

Education for medical students: Patients who undergo pediatric surgery often have a congenital anomaly. The lecture for students on pediatric surgery is based on embryology.

Education for training physicians: Three objects for training physicians in pediatric surgery are: (1) how to collect blood via the venous route from pediatric patients, (2) understanding blood test results and fluid therapy for pediatric patients, and (3) learning basic techniques for pediatric surgery.

Education for surgical residents: They train to act as lead surgeons or assistants for pediatric surgery.

II. Clinical study

Minimally invasive and scarless surgeries. That is how we make our mark.

1. The Nuss procedure is currently the most common operation for pectus excavatum. Recently, it is performed throughout the world as a minimal invasive procedure. We have already performed more than 500 Nuss operations. However, some fatal complications, such as cardiac injury, have been reported in connection with mediastinal dissection. To safely perform the Nuss procedure, we reported and recommended a new approach to the mediastinal detachment method using endoscopic surgical instruments with a lifting hook.

a. We will evaluate the safety (intraoperative and postoperative complications) of our new Nuss operation.

b. The effect of our Nuss operation will be analyzed using the volume analyzer “SYN-APSE VINCENT,” a 3-dimensional image analysis system.

2. Analysis of the pathogenesis of pneumothorax after the Nuss operation is performed for pectus excavatum.

After the Nuss operation, pneumothorax often occurs, but its pathogenesis has not been analyzed in detail. After the Nuss operation we have observed postoperative pneumothorax in more than 10 patients, mainly in their late teens. We will analyze the pathogenesis of pneumothorax after the Nuss operation for pectus excavatum as follows.

a. Analysis of changes in CT value and lung volume on pre- and post-operative CT images will be performed using volume analyzer “SYNAPSE VINCENT”, a 3D image analysis system.

b. We will analyze lung specimens removed by pneumothorax surgery.

3. Comparative study on the effect of three adhesion prevention agents in pediatric laparotomy and laparoscopic surgery

We will compare 3 adhesion prevention agents about convenience and efficacy in pediatric surgery.

4. We will investigate the relationship between pediatric surgery cases under 1 year old and the pathogenesis of allergies.

The association between laparotomy and allergies in childhood is occasionally reported, but there are few reports in detail. We also have many cases of allergic complications including gastrointestinal tract after laparotomy in children, and sometimes their treatment may be difficult. We will carry out an allergy survey after laparotomy at pediatric surgery certified facilities in nationwide. From the results of these survey, we analyze the relationship and pathogenesis of laparotomy and allergy in children.

III. Basic study

A. Accidental ingestion of coin cell batteries causes esophageal ulcers and strictures, tracheoesophageal fistulas and sometimes fatal gastrointestinal damage.

However, the mechanism of injury is not known in detail, so we made three hypotheses.

1. Compression pressure by the weight of the battery

2. Electrode leakage

3. Short circuit formation between the positive case and the negative cap

To reduce damage to the esophagus and gastrointestinal wall, we modified a new battery that covered the edge of the battery by using heat shrink tube. This improvement had some positive effects. As a result, mucosal damage was reduced. However, when observed over a long period of time, the degree of damage was severe, and the effect was limited in the end. Therefore, we are starting a new experiment using a metal cap that is difficult to dissolve.

Vascular Surgery

1. Development of endovascular repair of thoracoabdominal aneurysms

Although stent grafts for the treatment of abdominal aortic aneurysms (AAAs) have been developed and are commercially available, no such stent grafts are available for the treatment of thoracoabdominal aortic aneurysms (TAAAs) in Japan. The surgical death rate following open surgery for the treatment of AAAs is satisfactory, but that for the treatment of TAAAs remains unacceptably high at 15% to 20%, and further improvement is desperately needed. Because a TAAA involves 1 or more visceral arteries, visceral perfu-

sion must be maintained while the aneurysm is excluded with stent grafts. We have used a custom-made t-Branch stent graft in combination with covered stents (for visceral reconstruction) for the treatment of TAAAs that were considered inoperable because of comorbid conditions or a hostile thorax/abdomen after an approval of IRB. Although stent graft repair for TAAAs requires long operative and fluoroscopic time, this treatment is feasible and safe.

2. Development of endovascular repair of aortic arch aneurysms: Retrograde in-situ branched surgery; Branched Thoracic Arch stent grafts

We have developed a new minimally invasive operation for aortic arch aneurysms. After carotid-carotid bypass surgery if needed is performed and stent grafts are placed, a needle is used to prick the stent graft thorough one side of a carotid artery, after which a covered stent is inserted as a branch and deployed into the stent graft (in an in-situ retrograde fashion). We have examined this retrograde in-situ branched surgery in an in-vitro study and have applied it clinically. This operation is expected to be a less invasive surgery for aortic arch aneurysms. We also use Branched Thoracic Arch stent grafts those are commercially available in Europe for endovascular repair of aortic arch aneurysms after an approval of IRB.

Publications

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