

## 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 the development of the endovascular repair of aortic aneurysms, treatment of peripheral arterial disease with new techniques and devices including clinical trials.

#### Research Activities

##### *Pediatric Surgery*

###### 1. 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 take blood and venous route from pediatric patients, (2) understanding blood test results and fluid therapy for pediatric patients, and (3) learning basic surgical techniques for pediatric surgery.

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

###### 2. Clinical study

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

###### 1) Endoscopic treatment for vesicoureteral reflux with Deflux®

There are 3 options for managing or treating vesicoureteral reflux. We recommend the endoscopic treatment with Deflux® (Oceana Therapeutics, Ltd., Dublin, Ireland), a sterile, biodegradable gel. We have treated many patients, most of whom were treated completely without complications.

###### 2) Laparoscopic percutaneous extraperitoneal closure for inguinal hernia: a learning curve for attending surgeons and residents

Laparoscopic percutaneous extraperitoneal closure for pediatric inguinal hernia is a simple technique in which a purse-string suture made of nonabsorbable material is placed

extraperitoneally around the hernia orifice by means of a special suture needle (LapaHer-Closure™, Hakko Co., Ltd., Medical Device Division, Chikuma, Nagano, Japan). Concerns have been raised about the extensive learning curve for both attending surgeons and residents to master this technique. This study assessed the difference in learning curves for the safe performance of laparoscopic percutaneous extraperitoneal closure by attending surgeons and residents.

3) The Nuss procedure aims to force the sternum forward and to hold it there with an implanted steel bar, but without making a big incision to resect the abnormal cartilage. In this procedure, the curved steel bar is placed under the sternum through small incisions on the sides of the chest. We have reported and recommended a new method of safely performing anterior mediastinal dissection using endoscopic instruments and lifting hook. The number of patients with pectus excavatum treated surgically in our department is the third highest in Japan.

### 3. Basic study

1) MicroRNAs transported by exosomes in body fluids as mediators of intercellular communication in human neuroblastoma

Cancer-cell communication is an important and complex process, achieved through diverse mechanisms that allow tumor cells to mold and influence their environment. Recent evidence indicates that cells communicate via the release and delivery of microRNAs packed into tumor-released exosomes. Understanding the role and mode of action of microRNAs from tumor-released exosomes is of paramount importance in the field of cancer biomarker discovery and for the development of new biomedical applications for cancer therapeutics. (Shinsuke Ohashi, Shuichi Ashizuka, Joji Yoshizawa, Masashi Kurobe, Takao Ohki. A New Index for additional superior bar in Precuts Excavatum's Nuss Procedure. The 47<sup>th</sup> Annual Meeting of the Pacific Association of Pediatric Surgeons. Banff, Canada. May 2014.)

### *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 perfusion 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 approval by an institutional review board. Although stent graft repair for TAAAs requires long operative and fluoroscopic times, this treatment is feasible and safe.

2. Development of endovascular repair of aortic arch aneurysms: Retrograde in-situ branched surgery with 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 through 1 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. For endovascular repair of aortic arch aneurysms we also use, after approval by an institutional review board, branched thoracic arch stent grafts that are commercially available in Europe.

### 3. Research on drug-eluting stent in the superficial femoral artery

The Zilver PTX drug-eluting peripheral stent (Cook Medical, Bloomington, IN, USA) is specifically designed and approved to treat peripheral arterial disease affecting the superficial femoral artery, the main vessel of the thigh. The Zilver PTX is a self-expanding stent made of nitinol, a space-age “shape memory” metal that offers unique mechanical advantages for a stent in the superficial femoral artery.

We have participated in a global registry and randomized controlled trial, in which most patients were enrolled in the United States, but also in Germany and Japan. After the trial's 1-year primary endpoint was reviewed, the Zilver PTX received approval from the Japanese Pharmaceuticals and Medical Devices Agency in January 2012 and is now commercially available in Japan.

## Publications

**Tanaka K, Misawa T, Ashizuka S, Yoshizawa J, Akiba T, Ohki T.** Risk factors for incisional hernia in children. *World J Surg.* 2018; **42**: 2265-8.

**Hiramatsu T, Yoshizawa J, Miyaguni K, Sugihara T, Harada A, Kaji S, Uchida G, Kanamori D, Baba Y, Ashizuka S, Ohki T.** Thalidomide potentiates etoposide-induced apoptosis in murine neuroblastoma through suppression of NFκB activation. *Pediatr Surg Int.* 2018; **34**: 443-50.

**Toya N, Ohki T, Fukushima S, Shukuzawa K, Ito E, Akiba T.** Fenestrated endovascular repair of aortic arch aneurysm in patients with bovine arch using the Najuta stent graft. *J Vasc Cases and Innov Tech.* 2018; **4**: 148-51.

**Toya N, Ohki T, Fukushima S, Shukuzawa K, Ito E, Murakami Y, Akiba T.** Case series of aortic arch aneurysm in patients with bovine arch treated with proximal scalloped and fenestrated stent graft. *Cardiovasc Intervent Radiol.* 2018; **41**: 1648-53.

**Maeda K, Ohki T, Kanaoka Y.** Endovascular treatment of various aortic pathologies: review of the latest data and technologies. *Int J Angiol.* 2018; **27**: 81-91.

**Shukuzawa K, Ohki T, Kanaoka Y, Sumi M, Maeda K, Toya N, Ozawa H.** Outcomes of mini-

incision eversion carotid endarterectomy combined with nontouch isolation technique of the internal carotid artery. *J Vasc Surg.* 2018 Feb; **67**: 490-7.

**Baba T, Ohki T, Kanaoka Y, Maeda K, Toya N, Ohta H, Fukushima S, Hara M.** Clinical outcomes of total endovascular aneurysm repair for aortic aneurysms involving the proximal anastomotic aneurysm following initial open repair for infrarenal abdominal aortic aneurysm. *Ann Vasc Surg.* 2018; **49**: 123-33.

## Reviews and Books

**Harada A, Tsuboi K, Yoshimoto K, Kajimoto T, Kashiwagi H.** Hemorrhagic shock due to spontaneous mesenteric hematoma caused by breakdown of the accessory right colic vein: a case report and literature review. *Jikeikai Med J.* 2018; **65**: 13-6.

**Harada A, Ashizuka S, Kaji S, Kanamori D, Yoshizawa J, Ohki T.** Surgical resection of symptomatic pneumatocoles in a <600 gm premature infant. *J Pediatr Surg.* 2018; **36**: 54-7.

**Ohki T.** Invited commentary on Stent graft for aortic aneurysm. *J Vasc Surg.* 2018; **67**: 440-1.