# Symposium I (DM foot & Critical Limb Ischemia)

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Symposium—II Prof. Yong Kak Lee Memorial Symposium (Abdominal Aortic Aneurysm)

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The lifetime risk that a diabetic patient will acquire foot lesions (ulcers/gangrene) has been estimated at 15% to 25%, with an annual incidence of 1.0% to 4.1%. The incidence of these lesions appears similar in type 1 vs type 2 diabetic patients, although type 2 diabetic patients comprise approximately 90% of the total diabetic population. In 15% of these patients, ulcers will ultimately lead to amputation. The risk for an initial foot ulcer is increased in patients who have had diabetes for 10 years, are male, have poor glycemic control, and already have other cardiovascular, renal, or retinal comorbidities. Foot ulcers occur in different rates in different parts of the world and rates of amputations differ as well, with the highest in Native Americans and lowest in Madrid, Spain. Specifically in North America, foot ulcers and amputations are more common in ethnic minority groups, especially Hispanics and African Americans, as well as in other groups of patients who lack health insurance.

Critical limb ischemia (CLI) mainly affects patients with important comorbidities and significant diffuse multilevel vascular lesions. These patients are frequently diabetics with neuroischemic limb ulcers, gangrene, and foot sepsis. Recently in diabetic patient with CLI, the vascular involvement is extremely diffuse and particularly severe in tibial arteries, with high prevalence of long occlusions.

The management of severe limb ischemia in diabetic patients, particularly those with tissue loss and infection, remains a major surgical challenge. However, advances in multidisciplinary care, including an aggressive revascularization approach, can avoid major amputation in a large percentage of patients. The unique pattern of lower extremity atherosclerosis in diabetes is a critical determinant of the revascularization strategy. Most diabetics with critical ischemia have popliteal/tibial occlusions requiring below-the-knee intervention or bypass grafting. Bypass surgery with vein to crural or pedal arterio-
Best endovascular and surgical therapy for CLI patients

Joh Jin Hyun
Kyung Hee University Hospital at Gangdong

The incidence of critical limb ischemia is estimated to be 50–100 per 100000 every year and leads to pronounced morbidity and mortality as well as to the consumption of many health-care and social-care resources in most developed countries. Ageing populations, the increasing prevalence of diabetes and its lower-limb-related complications, and the failure thus far to substantially reduce tobacco consumption, mean that despite advances in medical therapies, the numbers of patients needing lower limb revascularisation for severe limb ischaemia will probably increase in the foreseeable future.

Two treatments are currently available; bypass surgery and various endovascular therapy including balloon angioplasty, stenting, atherectomy and drug-based technology. Those who favour surgery usually emphasise good long-term anatomical patency and clinical durability. Unfortunately, adequate vein is often unavailable and the long-term results of bypasses constructed with prosthetic materials are much less satisfactory. By contrast, endovascular therapy has several advantages of low procedural morbidity and mortality, reduced costs, the speed with which the procedure can be undertaken, and a shortened hospital stay. During the endovascular era, bypass surgery can have role in the patient who needs the long-term patency due to extensive wound. And, in such cases of failed endovascular therapy, repeated restenosis after endovascular therapy, and TASC lesion, bypass surgery is more optimal option.

Reference

Paramalleolar and inframalleolar distal bypass for CLI in diabetic patients

Hiroyoshi Komai
Department of Vascular Surgery, Kansai Medical University Medical Center

CLI is the severest patient entity in PAD, in terms of both leg and life prognosis. Especially in diabetes, CLI often progresses without the initial signs and symptoms. The most lesions include tibial arteries below the knee, where the endovascular treatment has some limitations. We focus on the CLI patients to perform bypass surgery. CLI patients are so sick of the vascular bed that the bypass surgery around the ankle (paramalleolar) or beyond the ankle (inframalleolar) is often necessary to save the legs. To extend the indication of the bypass and to improve the patency rate of the graft, we are currently applying some precise new techniques for bypass operation. As a result our primary and secondary patency rates of paramalleolar bypass were both 79% in five years and the amputation free rate was 87% in one year and 79% in three years, respectively. Unfortunately, the patency rates were less in patients with diabetes than in those without. It is because of the extent and progression of the atherosclerosis to the extremity. Nevertheless, we vascular surgeon must continue to improve the technique of para- and inframalleolar bypass to save the legs as a last resort.
Oral presentation I

Chair:
Byung Jun So
Wonkwang University
Mitsuaki Sadahiro
Yamagata University

OP-I-1

Early experience of AFX endograft in Hiroshima

Shinya Takahashi, Keijiro Katayama, Shohei Morita,
Seimei Go, Takahiro Taguchi, Tatsuya Kurosaki, Taijiro
Sueda
Cardiovascular Surgery, Hiroshima University Hospital

Purpose
Despite improvements in endograft technology, operational
proficiency, and patient selection, endovascular aneurysm
repair continues to be associated with device-related compli-
cations. A retrospective, observational study was undertaken
to evaluate the clinical outcome and imaging findings of a
unique device having externally-mounted, conformable graft
material.

Methods
From January 2016 to February 2017, 23 cases of infrare-
nal abdominal aortic aneurysms and iliac artery aneurysms
were treated by AFX endovascular aortic aneurysm system,
umibody endograft with ePTFE graft material outside of self-
expandable stent cage. Preoperative and postoperative finding
and early results were investigated.

Results
Mean age was 75.2 ± 12.0 y.o., and male was 19 cases.
4 had iliac artery aneurysm without aortic pathology. 21 had
aneurysm and 2 had aortic dissection. Technical success was
100%. There were no perioperative deaths. In two cases with
extravasation suspected at the common iliac artery, additional
leg extension covered the bleeding point. Major adverse events
occurred within 30 days of implantation in one patient with
aneurysm. In this case, limb occlusion occurred in two weeks
later, and thrombectomy and transluminal angioplasty using
self expandable nitinol stent were performed. Type II endoleak
were evident on completion of angiography in 3 cases, and
postoperative CT angiography identified no patients with type
II endoleak. In a case with hypoplastic iliac artery of 5 mm in
diameter, iliac leg placed uneventful. In two cases with short
proximal neck and reversed taper neck, Endurant cuffs were
added proximally. In one case of subacute aortic dissection
after Y graft replacement, AFX cuff was used to close reentry
intimal tear and reduce flow into the false lumen at L2 and L3.

Conclusions
Our early result of AFX was preferable. The AFX endograft
was associated with a low rate of device-and procedure-related
complications.

OP-I-2

Risk factors for graft-related complications after arte-
rial reconstructions with allografts

Young-Wook Kim, Yang-Jin Park, Seon-Hee Heo,
Byoung-Hoon Chung, Shin-Young Woo, Dong-Ik Kim
Vascular Surgery, Samsung Medical Center, Sungkyunkwan University
School of Medicine, Seoul, Korea

Objectives
We attempted to determine the factors associated with graft-
related complications (GRC) after implantation of the CAA.

Method
Prospectively maintained database of patients who under-
went arterial reconstruction with CAA were retrospectively
reviewed. We reviewed clinical and demographic factors of the
patients including hypertension, gross purulence, immunosup-
pression or anti-cancer chemotherapy after graft implantation
and properties of allograft including source of CAA, donor
age, duration of cryopreservation, composite graft. Risk fac-
tor analysis was conducted using chi-square test and Fisher’s
exact test.

Results
During the past 13 years, we performed 64 arterial recon-
structions (37 abdominal aorta, 22 limb arteries, 2 carotid
arteries, 3 splanchnic arteries) with CAAs for 62 patients (me-
dian age, 64y, IQR 58–72y, male 73%). Forty-four (69%)
CAAs were used in the setting of arterial infection (1 primary
aortitis, 31 infected aneurysm and 12 prosthesis infections)
while 20 (31%) CAAs were used for patients with high risk
of prosthetic graft infection (n = 17) or no available other arte-
rial conduit (n = 3). Sources of allografts were from the aorta
(n = 36, 38%), iliac (n = 48, 50%), femoral (n = 10, 11%),
internal mammary (n = 1). Mean duration of cryopreservation
was 18.3 m (1m–79 m). During the median follow-up of 20.7 m
(range, 1–115 m), 3 early (2 septic shock with multi-organ fail-
ure, 1 unknown cause) and 8 late deaths developed due to un-
derlying disease not to GRCs. And 7 GRCs (4 graft occlusions,
1 anastomotic narrowing, 1 aneurysmal dilatation of CAA, and
1 graft-enteric fistula) were detected. On a risk factor analysis
for GRC, small-caliber CPA was associated with graft occlu-
sion but no other significant factor for GRC was identified.
Conclusion

CAA was an excellent conduit for arterial reconstruction for patients with aortic or arterial infection. Though small caliber CAA is a risk factor for graft occlusion, other factors were not related to GRC.

OP-I-3

Emergency endovascular repair for ruptured abdominal aortic and iliac aneurysms

Toshifumi Kudo, Tsuyoshi Ichinose, Youhei Yamamoto, Masato Nisizawa, Kimihiro Igaru, Takahiro Toyofuku, Yoshinori Inoue

Div. of Vascular Surgery, Dep. of Surgery Tokyo Medical and Dental Univ.

Purpose

To review emergency endovascular aneurysm repair (eEVAR) experienced in our department.

Method

From 2011 to 2015, we experienced 19 cases of abdominal aortic and/or iliac artery aneurysm rupture cases including 12 eEVARs and 7 laparotomy surgeries. In EVAR group, 8 cases of abdominal aortic aneurysm (AAA), 3 common iliac, and 1 internal iliac artery aneurysm were the rupture sites. The anatomy of the aneurysm in EVAR group, 10 cases were within IFU and 2 cases were outside IFU. In the laparotomy group, the site of the proximal cross clamping was infrarenal aorta in 2 cases and suprarenal aorta in 5.

Results

The devices used in the EVAR group were EXCLUDER in 9 cases and EPL in 3 cases. In 3 cases, simultaneously internal iliac artery coil embolization (1 case on both sides) was performed simultaneously. The average bleeding volume, operation time, and ICU staying time were 497 ml, 2 hours 24 min., and 6.3 days, in the EVAR group, and 3,650 ml, 3 hours 31 min., and 17 days in the laparotomy group. In both groups, no deaths were observed within 30 days. But one patient who underwent eEVAR in a shock state was lost due to DIC. In the EVAR group, all patients other than the above case are followed currently in the outpatient clinic with no findings of endoleaks.

Conclusions

It was suggested that eEVAR for ruptured cases could be performed safely and effectively if the systemic circulation is relatively stable and the anatomical form of the aneurysm is suitable.

OP-I-4

Clinical outcomes of ruptured abdominal aortic aneurysm (AAA) in single institution

Jin Go, Jang Yong Kim, Cheng Quan, Young Hwa Kim, Gyeong Jae Koh, Mi Hyoeng Kim, Kang Woong Jun, Jeong Kye Hwang, Sang Dong Kim, Ji Il Kim, Yong Sung Won, Sang Seob Yun, In Sung Moon

Department of Surgery, Seoul St. Mary’s Hospital, The Catholic University of Korea

Background

Ruptured AAA is still challenging for treatment even in endovascular era. Endovascular aneurysm repair (EVAR) for ruptured AAA is considered to be alternative treatment to open surgical treatment (OSR). Authors report clinical outcomes of ruptured AAA repair in single institution.

Methods

This is a retrospective study of patients who admitted with ruptured AAA in Seoul St. Mary’s hospital from 2012 to 2017. Patients’ clinical characteristics were evaluated with EMR and PACS including pre/post-operative outcomes including survival rate, morbidity or acute compartment syndrome rate.

Results

Twenty four patients were enrolled for ruptured AAA. 2 patients arrived as death on arrival. 22 patients underwent emergent treatments (11 for OSR, 11 for EVAR including 2 hybrid treatments). Sex ratio was M : F = 17 : 7 and mean age was 72.5 years old [range; 31–88]. In preoperative period, mean blood pressure was 104/62 mmHg [range; asystole–150/110 mmHg] and cardiopulmonary resuscitation was done in 9 patients. The mean time form ER to OR was 93 minutes. Intraoperative period, aortic occlusion balloon was used in 13 patients (59.1%). 5 tube grafts were used in OSR and 7 bifurcated stent graft for EVAR. Embolization or surgical ligation was done in 4 patients. There were 2 intraoperative deaths in 22 patients who underwent any type of operation. A patient was done Hartmann’s operation due to abdominal compartment syndrome which was found 2 patients during study period. During in hospital treatment, there were 7 patients who done with hemodialysis, 4 patients who treated about pneumonia, respectivley. In hospital 30-days mortality after overall treatments for ruptured AAA were 36.4% (8/22), 54.5% (6/11) in OSR, 18.2% (2/11) in EVAR including hybrid treatment.

Conclusions

30-days mortality rate after treatment in ruptured AAA is 36.4% and still relatively high. Endovascular treatment for ruptured AAA can be considered an alternative treatment if indicated.
Surgical strategies for double barrel Stanford type A acute aortic dissection

Yosuke Inoue, Hitoshi Matsuda, Atsushi Omura, Yosimasa Seike, Kyokun Uehara, Hiroaki Sasaki, Junjiro Kobayashi
Cardiovascular Surgery, National Cerebral and Cardiovascular Center

Purpose
Patent false lumen at downstream aorta after the operation for aortic dissection was known as the predictor of distal reoperation. We performed total arch replacement (TAR) to prevent distal reoperation. This study aimed to determine the predictor of false lumen and aortic dilatation after the surgery for double barrel type Stanford type A acute aortic dissection (AAAD).

Methods
Between 2011 and 2016, we reviewed 274 consecutive patients who were surgically treated for AAAD. Finally 134 patients (Mean ± SD 64 ± 13 years, 72 male) with double barrel type AAAD (patent false lumen at descending aorta in preoperative CT) were enrolled in this study.

Results
TAR account for 65% (87/134) of main aortic procedure. The in-hospital mortality rate was 8.9%. Multivariate analysis revealed cardiopulmonary resuscitation (P = 0.02) and visceral malperfusion (P = 0.03) as risk factors for in-hospital mortality. TAR was or not a risk. As the status of false lumen, dissection at celiac artery (P = 0.05) and left renal artery (P = 0.0004) were related with residual blood flow in false lumen Patent false lumen tends to be related with reoperation (P = 0.08). On the other hand, aortic dilatation (>5 mm larger than preoperative CT) significantly related with existence of contributed to prevent postoperative aortic dilatation.

Clinical outcome of ballerina technique in endovascular aneurysm repair

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Purpose
This study assessed the difference of clinical outcome between using ballerina technique and conventional technique in endovascular aneurysm repair (EVAR).

Methods
From July 2010 to February 2015, 108 patients with abdominal aortic aneurysm underwent EVAR in our institution. Among them, 79 patients with bifurcated limb device were included this study. We compared the operation time, the difference of iliac angle after limb deployment and the frequency of type Ib endoleak and limb migration between using ballerina technique and conventional technique. For statistical analysis, two sample t-test and chi-square test were used.

Results
There were no significant differences of patient demographics and clinical characteristics between two groups. The operation time and the change of iliac angle after limb deployment were not different between two groups (P = 0.584, P = 0.109). Mean follow-up period was 25.34 ± 23.02 months. A significant increase of type Ib endoleak in ballerina group was found comparing with conventional group (12.5% vs. 1.82%, P < 0.046). There were 3 cases of type Ib endoleak in ballerina group. Among them, 2 cases of immediate type Ib endoleak after stent graft deployment were solved by reballooning. In 1 case of type Ib endoleak after 6 months, additional limb stent graft was performed to seal the distal limb. There was no limb migration in ballerina group.

Conclusion
Ballerina technique was involved in the high frequency of type Ib endoleak but we successfully had overcome the endoleak with additional adjuvant treatment. The proper application of ballerina technique may be useful when limb selection is difficult.

Keywords: ballerina technique, endovascular aneurysm repair, clinical outcome

Surgical results of emergency thoracic endovascular aortic repair in patients with acute aortic syndrome

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Background
Acute thoracic aortic emergencies have been particularly challenging for surgeons. Thoracic endovascular aortic repair (TEVAR) has been contributed to improved mortality and rapid postoperative recovery even in high-risk patients compared with open aortic surgery. The purpose of this study is to evaluate the clinical results of emergent TEVAR in patients with acute aortic syndrome.

Methods
Between May 2010 and July 2016, 102 consecutive patients with various aortic pathologies involving descending aorta
underwent TEVAR at our institution. Of these, 7 patients required emergency TEVAR (3 men and 4 women; mean age, 74.2 ± 7 years). Three patients had Stanford type B acute or chronic aortic dissections, 2 had atherosclerotic thoracic aortic aneurysms and 2 had traumatic aortic injuries. Simultaneous supra-aortic debranching was performed in 1 patient.

Results

Emergency TEVAR was completed in all patients. Despite completion of endovascular therapy, 1 patient died of prolonged shock state due to preoperative rupture of thoracoabdominal aortic aneurysm. Respiratory failure requiring prolonged mechanical ventilation was noted in 3 patients. One patient underwent tracheostomy. The mean duration of intensive care unit and postoperative hospital stay were 2 and 34 days, respectively. During the mid-term follow-up, relevant complication was not observed.

Conclusions

Although the pre-operative statuses of the patients were severe, the operative mortality and morbidity were acceptable. TEVAR for acute thoracic aortic emergencies was considered to improve surgical results even in high-risk patients, but length of hospital stay tended to be prolonged in patients experiencing emergency TEVAR.

OP-I-8

Aorto-iliac Aneurysms in Children

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Background

Pediatric aortic aneurysms are rare and quite different from those in adults. Herein we report our experience of treating 4 children with aorto-iliac aneurysms.

Case

During the last 30 years, 3 AAAs and 1 iliac aneurysm in children were open repaired. The causes of AAA were congenital, tuberous sclerosis, and idiopathic and the operations were performed at the ages of 15 months, 7 years, and 8 months, respectively. Endoaneurysmal graft replacement with a Dacron graft was performed in all cases, and two I-type and one Y-type grafts were used. An idiopathic iliac aneurysm was located at the ostium of right external iliac artery and the distal external iliac artery was not found. The ipsilateral leg was perfused by the enlarged deep circumflex iliac artery and inferior hypogastric artery with normal palpable pulsation on the foot. The orifice of the aneurysm was suture-ligated inside the aneurysm and the aneurysm was excised. Because of the well-developed collaterals, reconstruction of the external iliac artery was not necessary. During the follow-up, 1 graft occluded without any symptom or growth retardation. One patient died of uncontrolled seizure with a patent graft.

Conclusions

For the treatment AAA in children, the decision to operate should be carefully executed and the small size, future growth, abundance of collateral circulation and availability of suitable vascular conduit need to be considered. Because of the higher development of collateral circulation and regenerative capacity, the prognosis is usually good in case performed in a dedicated high volume center.
Surgical revascularization for Buerger disease

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Background
Buerger disease is a vasculitis of small and medium arteries. Although surgical revascularization is not often indicated it is sometimes very effective to critically ischemic limbs. We have experienced two cases of bypass surgeries for Buerger disease, resulted in successful improvement of the ischemic symptoms.

Case 1
46-year-old woman complained of her right foot ulcer. She had diagnosed Buerger disease and had undertook finger and toe amputations before. Leg angiography revealed popliteal artery occlusion. After failed angioplasty at previous hospital we performed bypass surgery from above knee to below knee popliteal artery using autologous saphenous vein. After the operation, the wound was healed. Although she needed balloon angioplasty once, she has been well and graft has been patent for 2 years.

Case 2
22-year-old man suffered from right finger and right toe rest pain and left toe ulcer. 3 years ago, he had been diagnosed Buerger disease and performed right leg distal bypass at the previous hospital, which was occluded soon. Leg angiography revealed popliteal artery occlusion. After failed angioplasty at previous hospital we performed bypass surgery from above knee to below knee popliteal artery using autologous saphenous vein. After the operation, the wound was healed. Although she needed balloon angioplasty once, she has been well and graft has been patent for 2 years.

Conclusion
Surgical revascularization for Buerger disease is not always perfect but could be one option to remove their symptoms. Multidisciplinary approach must be necessary for the management of Buerger disease.

Comparison of graft bypass versus stenting for TASC II type C/D lesions in SFA disease

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Introduction
Femoral-popliteal surgical bypass and endovascular stenting are both accepted treatment for TASC II C/D superficial femoral artery (SFA) disease because of intensive development of endovascular technology. We evaluated mid-term outcome in terms of clinical data and patency between surgical bypass using prosthetic graft and endovascular stenting.

Materials and Methods
We evaluated 154 patients with TASC II Type C/D lesions in SFA disease who received surgically prosthetic femoropopliteal bypass or endovascular stenting from January 2012 to December 2015. We compared primary, primary assisted, and secondary patency between two groups in TASC II C/D lesions. Descriptive analyses and categorical variables were performed using Two-tailed t-test and two-tailed Fisher exact test.

Results
We identified 83 surgical bypass (mean age 71.7 ± 8.95 years; males, 81.9%) and 71 stenting (mean age, 70.4 ± 10.00 years; males, 76.1%). The mean stenting length was 11.6 cm, and material for bypass was PTFE graft. The primary patency at 12, 24, and 36 months were bypass group 85%, 80.6%, and 75.2% vs stenting group 67.3%, 55.6%, and 37.5% (P < 0.014). The primary assisted patency at 12, 24, and 36 months were bypass group 91%, 86.6%, and 81.5% vs stenting group 84%, 80.9%, and 70.8% (P < 0.369). The secondary patency at 12, 24, and 36 months were bypass group 91%, 86.6%, and 81.5% vs stenting group 84%, 80.9%, and 70.8% (P < 0.369). The secondary patency at 12, 24, and 36 months were bypass group 91%, 86.6%, and 81.5% vs stenting group 84%, 80.9%, and 70.8% (P < 0.369). The secondary patency at 12, 24, and 36 months were bypass group 91%, 86.6%, and 81.5% vs stenting group 84%, 80.9%, and 70.8% (P < 0.369). The secondary patency at 12, 24, and 36 months were bypass group 91%, 86.6%, and 81.5% vs stenting group 84%, 80.9%, and 70.8% (P < 0.369). The secondary patency at 12, 24, and 36 months were bypass group 91%, 86.6%, and 81.5% vs stenting group 84%, 80.9%, and 70.8% (P < 0.369). The secondary patency at 12, 24, and 36 months were bypass group 91%, 86.6%, and 81.5% vs stenting group 84%, 80.9%, and 70.8% (P < 0.369). The secondary patency at 12, 24, and 36 months were bypass group 91%, 86.6%, and 81.5% vs stenting group 84%, 80.9%, and 70.8% (P < 0.369). The secondary patency at 12, 24, and 36 months were bypass group 91%, 86.6%, and 81.5% vs stenting group 84%, 80.9%, and 70.8% (P < 0.369). The secondary patency at 12, 24, and 36 months were bypass group 91%, 86.6%, and 81.5% vs stenting group 84%, 80.9%, and 70.8% (P < 0.369). The secondary patency at 12, 24, and 36 months were bypass group 91%, 86.6%, and 81.5% vs stenting group 84%, 80.9%, and 70.8% (P < 0.369). The secondary patency at 12, 24, and 36 months were bypass group 91%, 86.6%, and 81.5% vs stenting group 84%, 80.9%, and 70.8% (P < 0.369). The secondary patency at 12, 24, and 36 months were bypass group 91%, 86.6%, and 81.5% vs stenting group 84%, 80.9%, and 70.8% (P < 0.369). The secondary patency at 12, 24, and 36 months were bypass group 91%, 86.6%, and 81.5% vs stenting group 84%, 80.9%, and 70.8% (P < 0.369). The secondary patency at 12, 24, and 36 months were bypass group 91%, 86.6%, and 81.5% vs stenting group 84%, 80.9%, and 70.8% (P < 0.369). The secondary patency at 12, 24, and 36 months were bypass group 91%, 86.6%, and 81.5% vs stenting group 84%, 80.9%, and 88.4% (P < 0.191). Cox proportional hazard models demonstrated a trend toward reduced risk of primary patency failure among patients receiving stents compared with those undergoing bypass procedures (HR, 2.57; 95% CI, 1.17–5.66; P = 0.02). Hypertension, Hyperlipidemia, and smoking history are factors associated with loss of patency.
Conclusion

This is the study comparing prosthetic femoro-popliteal bypass and stenting in TASC II Type C/D lesions. Even though prosthetic femoro-popliteal bypass showed superior result for revascularization of TASC II Type C/D.

OP-II-3

Removal of severely calcified stenosis of the femoral artery using SONOPET

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Objective

This research studied removal of focal severely calcified stenosis by using SONOPET of the common femoral artery in PAD patients.

Methods

Since August 2013, we conducted a retrospective study on 14 cases with 15 limbs (Male:female = 12:2, average age 70±9) which performed removal of protruding calcification using SONOPET. All cases were repaired with vein patch plasty as arterial reconstruction.

Results

Mean follow-up period was 627 days (112~1099 days). The patient background was Fontaine 2:3:4 with 9:2:4 limbs respectively. The lesion was common femoral artery (CFA): 11 limbs, superficial femoral artery (SFA): 1 limb, CFA, SFA and deep femoral artery (DFA): 2 limbs, CFA and DFA: 1 limb. At the procedure, we also conducted iliac artery EVT: 5 limbs, distal artery EVT: 1 limb, distal bypass: 1 limb. Mean operation time of calcification removal was 137 ± 38 minutes. Mean ABI was improved from 0.5 ± 0.2 preoperatively to 0.8 ± 0.3 postoperatively. In all cases, the procedure was successful. After the procedure, no hospital deaths or perioperative complications were observed. In Fontaine 2,3 cases, symptom was improved. In Fontaine 4 cases, foot ulcer/necrosis was improved to a level that allows outpatient treatment. In long-term results, patch plasty maintained patent in all cases and no major amputations were observed.

Conclusion

Calcification removal using SONOPET could preserve intima without risk of rupture or occlusion of patch plasty. This is an effective and minimally invasive procedure for focal severely calcified stenosis of the common femoral artery.

OP-II-4

Peripheral vascular reconstruction using femoral vein

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Purpose

The effects of deep vein graft for complicated peripheral vascular reconstructions has rarely studied. We retrospectively analyzed surgical data of femoral vein graft in peripheral vascular era.

Methods

From January 2005 to December 2016, 35 peripheral vascular reconstructions were performed using femoral vein free grafts for reestablishment of immediate high flow-rate. There were 23 infected femoral or iliac vascular graft resection and in-situ femoral vein graft interposition with or without Gracilis muscle flap. The others were 6 infected dialysis graft reconstruction or dialysis pathway bypass, 2 above knee popliteal artery reconstruction for absence of saphenous vein graft, three mycotic aneurysm reconstruction (2 common femoral artery and one popliteal artery) and one iliofemoral vein bypass for contra-lateral iliac vein obstruction. 31 of the patients were men with a mean age of 67.8±18.2 years (range, 18~81 years). The majority of the patients were of preoperative or intraoperative critically ill in that they had extensive infection (n=30), active bleeding (n=5), renal failure (n=7), hepatic failure (n=2) and recent major surgery (n=3). The mean preoperative physiology score of the vascular POSSUM was 36.2 ± 11.4 (range, 15~57), and the mean operative severity score was 24.8 ± 7.7 (range, 10~39.6).

Results

There were 2 early mortality associated with systemic embolism and multigrain failure. 33 patients survived and recovered from systemic infection or critical hemodynamic instability. During the mean 5 years of follow-up, complications such as aneurismal dilation, recurrent infection, graft stenosis/occlusion, lower limb edema and other clinical problems that required at attention were not observed.

Conclusions

We determined that deep veins can be applied as ideal graft conduits for reconstructing the peripheral vessels under complicated conditions in select patients.

Keyword: deep vein graft
Gender-related differences of vein bypass graft intimal hyperplasia and clinical outcomes for critical limb ischemia; A propensity matched analysis

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Purpose
Gender differences of clinical outcomes in critical limb ischemia (CLI) undergoing lower extremity bypass remain understudied. Since the number of female CLI patients have been rapidly increasing in Japan because of the society aging, it’s important to evaluate the gender-specific differences in patient characteristics and clinical outcomes. Our objective is to analyze gender-related differences of vein graft intimal hyperplasia and clinical outcomes for CLI utilizing propensity score matching.

Methods
This was a single-center, retrospective analysis of 401 consecutive CLI cases (86 female cases) undergoing paramalleolar bypass with autogenous vein graft between January 2000 and December 2013. This study included intensive ultrasound surveillance of the bypass graft and clinical follow-up to 5 years. The clinical outcomes (primary patency, secondary patency, intimal hyperplasia rate and limb salvage rate at 5 years) measurements were assessed according to the Kaplan–Meier method, and intergroup differences were compared using the log-rank test. The propensity score matching analysis was performed with IBM SPSS Statistics Version 23 package to examine the relationships of gender to clinical outcomes among single vein graft cases. Propensity score models adjusted for 15 covariates (including selected comorbidities, adjunctive medications and vein graft quality).

Results
In 401 cases before matching, cigarette smoking was commoner in male (70% vs 25%, \(P < 0.001\)). Female suffered from poorer primary patency (44% vs 65% at 5 years, \(P < .001\)), secondary patency (79% vs 89% at 5 years, \(P = .014\)), and higher intimal hyperplasia rate than male (47% vs 27% at 5 years, \(P = .002\)). After excluding patients with unsuitable matches and matching propensity scores, 43 matched pairs were subjected to further analysis. In the propensity matched pair analysis, female significantly suffered from poorer primary patency (49% vs 79% at 5 years, \(P = .006\)) and higher intimal hyperplasia rate than male (43% vs 8% at 5 years, \(P = .002\)). Furthermore, this analysis demonstrated that graft intimal hyperplasia in the female gender group was likely to occur not only in the early period (within one year) but also in the late period (two or three years after surgical revascularization). On the other hand, secondary patency (86% vs 89% at 5 years, \(P = .471\)) did not significantly differ between gender, and female had more re-intervention for graft stenosis than male (\(P < 0.05\)). Limb salvage rate in two groups (95% vs 97% at 5 years, \(P = .605\)) was also comparable.

Conclusion
Primary graft patency was significantly less in female, and female gender was significantly associated with higher rates of intimal hyperplasia. Because of higher rates and delayed occurrence of graft intimal hyperplasia, female gender may benefit from more intensive post-operative graft surveillance protocols.

The results of in situ prosthetic graft replacement for an infected aortic disease

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Objective
To review the outcomes of in situ graft replacement of infected AAAs, aortic grafts, and endografts.

Summary Background Data
Infected abdominal aortic aneurysms (AAAs), aortic grafts, and endografts are rare but life-threatening conditions.

Methods
A total of 23 consecutive patients who underwent in situ graft replacement of infected AAAs, grafts, and endografts at our center from January 2001 to December 2014 were retrospectively evaluated. Treatment involved removal of all infected tissue, including the infected aortic tissue and graft, in situ prosthetic graft reconstruction, and wrapping of the graft with retrocolically transposed great omentum. Sensitive antibiotics were administered pre- and postoperatively.

Results
Fourteen patients (60.9%) with a primary infected AAA, three (13.0%) with an infected graft after open repair of AAA, and six (26.1%) with an infected endograft after endovascular repair underwent in situ prosthetic graft replacement with infected tissue and graft removal. The 30-day mortality was 4.3% (1 of 23). The cause of death was proximal anastomosis rupture on the 11th day after in situ graft replacement of an infected endograft. The reinfection rate was 17.4% (4 of 23) during a mean follow-up of 31 months. All new grafts of patients who underwent in situ graft replacement of infected
grafts became reinfected. Another patient became reinfected after surgery for primary infected AAA. There was no late in situ graft reinfection-related death.

**Conclusion**

In situ graft replacements of primary infected AAA or infected endografts have acceptable outcomes but the outcome for infected aortic grafts is questionable.

**OP-II-7**

**Endovascular Management of the Superior Mesenteric Artery Embolism: A 7-Year Sing**

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**Purpose**

Retrospective evaluation of 7-year experience with endovascular management of acute mesenteric ischemia (AMI) due to embolic occlusion of the superior mesenteric artery (SMA).

**Materials and methods**

From 2009 to 2016, we analysed the in-hospital mortality of 10 patients with acute mesenteric embolism who underwent primary endovascular therapy with subsequent on-demand laparotomy. Catheter directed thrombolysis was used in all 10 patients (5 women, 5 men, median age 76 years) with embolic occlusion of the SMA. Adjunctive stenting (n = 6) were also utilized.

**Results**

We achieved complete recanalization of the SMA stem in 100%. Subsequent exploratory laparotomy was performed in 40.0% (n = 4), and necrotic bowel resection in 40.0%. The total in-hospital mortality was 0%.

**Conclusion**

Primary endovascular therapy for acute embolic SMA occlusion with on-demand laparotomy is a recommended method used in our centre to treat SMA occlusion. This combined approach for the treatment of AMI is associated with in-hospital mortality rate of 0%.

**Keyword:** Acute intestinal ischemia, Superior mesenteric artery occlusion, Thrombolysis

**OP-II-8**

**In vivo potentiation of stem cell angiogenesis by combination with self-assembling biopeptides**

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**Purpose**

The use of nanomaterials for biomedical applications has become a promising field in regenerative medicine. Self-assembling biopeptides (SAP) have been proposed as a good candidate due to its role of potentiating the action of cells or molecules when combined together. In this study we investigated whether the combination of mesenchymal stem cells (MSC) with SAPs can improve angiogenesis in ischemic hindlimbs of rats for potential translational application in vascular diseases.

**Methods**

Ischemic hindlimbs were created in rats and divided into 4 groups: control, MSC, SAP and MSC + SAP. Their perfusion was measured at 7, 14 and 28 days with laser Doppler and hindlimb muscles were also harvested at the same time points. Immunohistochemical stainings for stem cell (CD105, CD90, CD29) and angiogenesis (CD31, vWF, alpha-SMA) markers were performed. RT-PCR was also performed for angiogenesis markers. The degree of fibrosis and apoptosis was also determined by Masson’s trichrome and TUNEL staining, respectively.

**Results**

MSCs were detected in all groups except control, with the highest presence of MSCs shown in the combination group after 28 days. The presence of MSC markers in the SAP only group suggests the recruiting ability of endogenous stem cells by SAPs into the site of action. Compared to the other 3 groups, the combination group showed a significantly higher expression of angiogenesis markers on histological analysis, but not so on RT-PCR. There was also an overall improved perfusion in the combination group. Finally the degree of fibrosis and apoptosis was significantly lower in the combination group.

**Conclusions**

SAPs have the role of improving survival of MSCs, which in turn leads to improved angiogenesis, decreased fibrosis and lower apoptosis rates in ischemic hindlimbs. SAPs are a promising tool for potentiating the effects of stem cells for application in vascular diseases.
LS

Introduction of Newly Emerging EVAR Device in Korea

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PP-I-1

Results of Infrainguinal Bypass with a Composite Graft in Comparison with Other Graft Materials

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Purpose
We aimed to investigate the outcome of infrainguinal bypass with a composite graft combining a polytetrafluoroethylene (PTFE) graft with an autogenous vein in the absence of adequate single segment great saphenous vein (GSV).

Methods
We retrospectively reviewed 44 infrainguinal arterial bypass surgeries performed on 37 limbs with chronic occlusion of the femoropopliteal arteries from 2012 to 2016 and compared the outcomes of composite grafts with those of other graft materials.

Results
Among 44 infrainguinal arterial bypasses, 11 were performed with composite grafts. Reoperative bypass surgeries crossing the knee joint were common in the patients who underwent bypasses with composite grafts. The primary patency of below-knee bypasses with composite grafts was comparable with that of below-knee bypasses using an autogenous vein graft (83% vs. 71% at 2 years, respectively).

Conclusions
Infrainguinal arterial bypasses with composite graft had a reliable graft patency. In patients without other alternatives for revascularization, bypass with a composite graft can be an option.

PP-I-2

Sclerotherapy in JAPAN

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Objective
Sclerotherapy is indicated in many outpatients who have web type, reticular type, and other types of varicose veins. In many institutions, endothermal ablation is performed but sclerotherapy is not because of the complexity of the procedure, low medical treatment fee, and frequent complications. We examined the complications of sclerotherapy and elucidated the associated problems.

Subjects
The number of limbs treated was 3,833 in the 3 years since our hospital was opened in October 2013. Of these, 586 limbs (15%) that underwent sclerotherapy were included in this study.

Methods
Foam sclerotherapy with Polidocanol (0.5% or 1%) was used. Compression was applied for 48 h using class 2 stocking. The levels of skin elasticity and pigmentation before and after sclerotherapy were measured using a melanin measurement device.

Results
Limbs treated with sclerotherapy accounted for an increasing proportion of the total limbs treated each year (100 (10%) limbs, 163 (13%) limbs, 323 (21%)). Of 97 limbs, three limbs with hyperpigmentation and one limb with skin induration were noted. Skin elasticity and melanin levels returned to pretreatment levels 3 months after sclerotherapy.

Conclusions
Sclerotherapy have been increasing in number every year. In most cases, neither induration nor pigmentation was noticeable 3 months after sclerotherapy. It is advisable to start treatment with a low concentration and in the less severely affected limb in bilateral cases.
PP-I-3

Limb salvage for multi-level arterial occlusive disease: patch angioplasty, stent, bypass

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Purpose

The outcome of revascularization for multi-level arterial occlusive disease was relatively poor, especially in female even advances of endovascular treatment and surgical techniques. Preservation of natural collateral vessels is important to prevent limb-threatened condition in those patients. We experienced one case of limb salvage with multiple treatment modalities such as patch angioplasty, stent, and bypass for preserving collateral vessels.

Materials

An 81 year old woman with a medical history of hypertension, severe chronic obstructive pulmonary disease, transferred for her unhealing ulcers on right first and third toes, and lateral malleolar area. Her CT showed shaggy aorta, stenosis of both iliac arteries, and total occlusion of right femoral arteries. The patent distal popliteal artery (PA) was supplied by collateral arteries.

Results

We performed endarterectomy and patch angioplasty from right external iliac artery (EIA) to deep femoral artery and eversion endarterectomy of proximal superficial femoral artery (SFA). And then we inserted a stent in right iliac artery and performed bypass grafting from proximal SFA to above knee PA with ipsilateral saphenous vein. During the procedures, we preserved collateral vessels. She has been in process of wound care without post-operative complication.

Conclusions

Consideration of appropriate modalities with preservation of collaterals is important for the limb salvage of multi-level arterial occlusive disease.

Keyword: Arterial occlusive disease, Angioplasty, Bypass, Stent, Collaterals

PP-I-4

Rare involvement of von Recklinghausen disease to arterial structure causing pseudoaneurysm of the brachial artery and surrounding nerve paralysis

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Vascular lesions in patients with von Recklinghausen disease are relatively rare but can potentially lead to serious consequences. We report a case of a brachial artery pseudoaneurysm associated with von Recklinghausen disease, who underwent exclusion of the aneurysm and reconstruction with an autologous saphenous vein graft.

A previously fit and well 31-year-old male was seen in a clinic because of numbness, pain and motor disturbance of the left thumb and the left index finger. He had a history of von Recklinghausen disease. The patient was transferred to the orthopedic department of our hospital as a diagnosis of soft tissue tumor in the upper arm with median nerve disturbance, and then referred to our department due to a suspicion of vascular lesions. Computed tomography angiography confirmed an aneurysmal formation of the left brachial artery in the middle of the upper arm. On the basis of these findings, rupture of the left brachial artery caused by infiltration of neurofibroma of von Recklinghausen disease was highly suspected. To relieve the finger and hand ischemia, a left axillary-antecubital brachial artery bypass with proximal and distal ligation and exclusion of the pseudoaneurysm was performed. The patient had an uneventful postoperative course and was discharged 10 days later.

After leaving the hospital, he had experienced the exacerbation of pain in his left upper arm and nerve disturbance. An ultrasound examination revealed re-expansion of the aneurysm and residual flow in the sac, then reoperation, opening the aneurysmal sac and ligating the inflow arteries, was performed 30 days after the initial procedure. Two years after surgery, the patient did well, and the vein graft remained patent without complications at the anastomotic sites on serial follow-up imagings.

PP-I-5

Related factors of positive symptom in spontaneous isolated superior mesenteric artery dissection

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Introduction

A spontaneous isolated superior mesenteric artery (SMA) dissection (SISMAD) without involvement of the aorta is considered rare disease. SISMAD can trigger lack of intestinal blood supply, eventually it is a major cause of severe clinical symptom, even causing death. The aim of this study was to determine the related factors that have an effect on manifestation of clinical symptom in SISMAD patients.

Methods

Between June 2010 and June 2016, 31 patients (28 men and 3 women) who diagnosed SMA dissection at Chung-Ang University Hospital were included in this study. The patient’s characteristics, laboratory findings, and radiologic findings were retrospectively reviewed. Bowel enhancement, distance from the SMA ostium and length of dissection were collected based on abdominal spiral CT angiography.

Results

The subjects averaged $51.3 \pm 9.11$ years of age. 28 (90.3%) patients complained of abdominal symptom and 3 (9.7%) patients had no symptom. The mean of distance of the SMA ostium (with symptomatic and asymptomatic patients) was $1.24 \pm 1.49$ cm and $1.37 \pm 1.30$ cm. And mean of the length of dissection was $10.12 \pm 3.52$ cm with symptomatic patients, $6.30 \pm 1.65$ cm with asymptomatic patients. Distance of the SMA ostium and bowel enhancement observed in CT angiography were not associated with positive clinical symptom ($p = 0.681$ and $p = 0.126$). But the length of dissection was associated with positive clinical symptoms ($p = 0.045$).

Conclusion

In SISMAD patients, the length of dissection is correlated with manifestation of clinical symptoms. Based on our study, SISMAD patients with longer length of dissection need to attentive management with close follow-up.

Keyword: Superior mesenteric artery, Dissection, Computed tomography, Angiography

Methods

This is a case series, and the data were obtained from our institution’s database. Between 2006 and 2016, we reviewed patients who managed cancer or AAA during the same hospital stay or follow up period. The intraoperative characteristics, treatment technique used, complications, patients’ clinical evolution, and survival outcomes were analyzed.

Results

Between 2006 and 2016, there were 14 patients who managed cancer or AAA during the same hospital stay or follow up period. Most of the patients were male and the most frequent form of neoplasia was lung cancer. Coincidental malignancy and AAA were found in 3 patients. Surgery for AAA repair was performed after the cancer treatment in 1 case, before cancer treatment in 1 case and concomitantly in 1 case. Endovascular aneurysm repair (EVAR) was used in 1 case and conventional open repair (OR) in 2 cases. There were no cases of death related to the aneurysm surgery.

Conclusions

The coincidence of malignancy and AAA raises obvious problems of management, particularly as regards priority of treatment. In these cases, it is important for the treatment to be individualized, and the disease of greater severity should be treated first.

Stent insertions for proximal vein lesions in vascular access malfunction patients

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Among endovascular treatment options, stent insertions have usefully performed in many vascular fields. So, stent insertions can be also attractive for in vascular access (VA) malfunction. Especially, when only balloon angioplasty is not enough to overcome a VA malfunction, stent insertion for proximal vein lesion can be effective. So, we evaluated cases of stent insertions for proximal vein lesions in VA malfunctions. We performed 18 stent insertions for proximal vein lesions in VA malfunctions. In VAs, we performed 14 stent insertions in AVF and 4 stent insertions in AVG.

Among AVFs, we performed 13 stent insertions in brachiocephalic (BC) AVF and 1 stent insertion in basilic transposition AVF. Locations of proximal vein lesions consisted of 8 in cephalic vein arch, 4 in subclavian vein, 3 in axillary vein, 1 in brachiocephalic vein, 1 in cephalic vein and 1 in brachial vein. During follow-up period, AVF flow have been improved and
well continued. Although we need to do longterm follow-up and large-volumed study, we suggest that stent insertion for proximal vein lesion in VA malfunction can be an effective modality.

Chair:
Sang Young Chung
Chonnam National University
Yukio Obitsu
IUHW Mita Hospital

PP-II-1
Treatment strategy based on the natural course for spontaneous isolated abdominal aortic dissection

Ji-Hee Kang, Young-Wook Kim, Seon-Hee Heo, Shin-Young Woo, Yang-Jin Park, Dong-Ik Kim, Duk-Kyung Kim
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Objectives
To determine the clinical features and natural course of ISAAD.

Methods
To detect ISAAD, we searched patient database with key words of “aortic dissection” or “dissection AND aorta” within the interpretation text of the CT images performed from 2003 to 2015. Diagnosis of ISAAD was made by reconfirming a typical finding of “double lumen sign” on axial view of contrast-enhanced CT scan. Abdominal ADs extended from the distal thoracic aorta or secondary to traumatic or iatrogenic cause were excluded from the study. We retrospectively reviewed demographic and clinical features, coexisting disease, aorta-related events and morphologic changes on CT images during the follow-up period.

Results
Total 1,958 patients with AD were detected on the primary screening. Among them, 210 ISAAD patients (median age, 70 years; range, 30–93 years; male, 73.8%) were enrolled excluding trauma or iatrogenic cause (n=6). Demographic, clinical and morphologic features of ISAAD were summarized in the Table 1. As shown in the table, ISAAD often affect infrarenal aorta (86.7%) and rarely extend to the visceral branch (1.4%). During the follow-up period of 40months (median, 1–158 months), there were progression of AD in 7%, false lumen enlargement in 8.5% and aortic rupture in 1.4%. The 2 aortic ruptures occurred in patients with Ehlers-Danlos syndrome. Five (2.4%) elective AAA repairs (1 open repair and 4 EVARs) were performed due to large AAA size at the initial presenta-
There was no aorta-related death other than the 2 aortic rupture patients. We summarized the follow-up results in Table 2.

**Conclusion**

On the follow-up examinations of CT scan, ISAAD showed progression of AD, expansion of false lumen or visceral artery involvement is uncommon. Aortic rupture occurred only in patients with connective tissue disease. Therefore, ISAAD can be observed with same treatment criteria with other AAA patients unless it causes symptom or underly cause is connective tissue disease.

### Table 2 Follow-up results of 142 patients with isolated spontaneous abdominal aortic dissection (ISAAD)

<table>
<thead>
<tr>
<th>Result</th>
<th>N = 142</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median duration of follow-up (month, range)</td>
<td>40.3 (1–158)</td>
</tr>
<tr>
<td>Age, median year (range)</td>
<td>67.5 (30–90)</td>
</tr>
<tr>
<td>Male gender</td>
<td>105 (73.9%)</td>
</tr>
<tr>
<td>Progression of dissection</td>
<td></td>
</tr>
<tr>
<td>Prograde</td>
<td>4 (2.8%)</td>
</tr>
<tr>
<td>Retrograde</td>
<td>6 (4.2%)</td>
</tr>
<tr>
<td>No progress</td>
<td>130 (91.5%)</td>
</tr>
<tr>
<td>Remodeling</td>
<td>2 (1.4%)</td>
</tr>
<tr>
<td>False lumen diameter</td>
<td></td>
</tr>
<tr>
<td>Enlarged</td>
<td>12 (8.5%)</td>
</tr>
<tr>
<td>Thrombosis (total)</td>
<td>4 (2.8%)</td>
</tr>
<tr>
<td>No change</td>
<td>121 (85.2%)</td>
</tr>
<tr>
<td>Aortic rupture</td>
<td>2* (1.4%)</td>
</tr>
<tr>
<td>Aorta-related death</td>
<td>2* (1.4%)</td>
</tr>
</tbody>
</table>

*Two aortic rupture developed in patients with Ehlers-Danlos syndrome.

**PP-II-2**

**The treatment of varicose veins with the wide-spread use of endovenous ablation**

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¹Vascular Surgery, International University of Health and Welfare, Shioya Hospital, Tochigi, Japan, ²Vascular Center Sanno Hospital and Sanno Medical Center, Tokyo, Japan

**Background and Objectives**

In Japan, stripping under TLA has been used in the treatment of primary varicose vein due to saphenous vein reflux. However endovenous laser ablation using a 1470-nm diode laser with radial 2 ring fiber (EVLA1470) has received National Health Insurance coverage in 2014. As a result, the use of EVLA1470 has become widespread. We herein report the results of varicose veins treatment at our hospital.

**Methods**

Five hundred and one patients with saphenous vein reflux who received treatment between October 2013 and January 2017 were included in the present study. The surgical results (operating time, complications, ablation rate, and LEED) in among the patients who underwent stripping (group A) and those who underwent EVLA 1470 (group B) according to Japan Guideline for EVLA, were retrospectively assessed.
Results

Group A and group B included 50 patients and 422 patients, respectively. Twenty-three patients who underwent EVLA using a 980-nm laser ablation and radiofrequency ablation were excluded. The operative time in group A was 48 ± 16 min, while that in group B was 25 ± 9 min which was statistically significant (p < 0.05), respectively. The length of the treated vein and LEED in groups B were 33 ± 10 cm and 77 ± 18 (J/cm). The patients of group A and B felt little pain. EVLA resulted in an occlusion rate of 99.6% at approximately.

Conclusions

EVLA1470 might be the first choice treatment for patients with primary varicose vein.

PP-II-3

Incidence and predictors of access site pseudoaneurysm after peripheral arterial disease angioplasty

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Purpose

Access site pseudoaneurysm is a rare by increasing complication after endovascular intervention, yet its incidence and predictors have not been extensively studied, especially after therapeutic angioplasty. The aim of this study was to investigate the incidence and predictors of access site pseudoaneurysm after therapeutic angioplasty for peripheral arterial diseases.

Method

We retrospectively reviewed a prospectively collected data of 273 patients who underwent therapeutic angioplasty for PAD from January 2015 to November 2016. We used ultrasound-guided puncture for all patients. All patients underwent ultrasound evaluation of arterial access site within 24 hours after intervention. Clinical data and procedural variables were compared with a control group of non-pseudoaneurysm patients.

Results

The incidence of femoral artery and brachial artery pseudoaneurysms were 2.7% and 0.39%, respectively. The mean age of patients with pseudoaneurysm was 70.4 years and 75% were males. Twenty-five percent of patients were on dual antiplatelet therapy, and 12.5% were on anticoagulation. Male gender, DM, cardiovascular disorders and retrograde puncture were risk factors for pseudoaneurysm formation but sheath size, presence of calcification and BMI were not significant. Closure devices were used in 45% of patients, and pseudoaneurysm formation was found in only 12.5% of these cases. Therapeutic ultrasound-guided compression was used successfully for all cases of pseudoaneurysm.

PP-II-4

Surgical manifestations in vascular complications of Behcet’s disease

Chanjoong Choi, Sungsin Cho, Min-Ji Cho, Won Pyo Cho, Sanghyun Ahn, Sang-II Min, Jongwon Ha, Seung-Kee Min
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Introduction

Behcet’s disease (BD) is rare multi-systemic disease, sometimes involving large vessels. Although many BD patients have been treated medically, the vascular complications in BD often require surgical treatment. The aim of this study was to analyze the surgical manifestations of vascular BD and the long-term consequences of the surgery.

Materials and Methods

The BD patients with vascular manifestations who were treated by open or endovascular surgery in Seoul National University Hospital between 1990 and 2014 were reviewed retrospectively.

Results

Twenty patients had vascular complications requiring surgery. Mean age was 42 years and male were 90%. The main location of vascular BD was aorta in 8 cases, leg arteries in 8, visceral artery in 1 and veins in 3 cases. A total 44 surgeries were done, including 25 open and 19 endovascular or hybrid surgeries. Ten patients needed 2 or more surgeries due to various complications. In open surgery group, 8 vascular complications developed, in 7 artificial grafts and one allograft, with no complication in autogenous vein grafts. In endovascular group, 9 vascular complications developed. During the mean follow-up period of 190.1 ± 77.5 months, there was no mortality.

Conclusion

Vascular BD sometimes requires surgical treatment, but multiple interventions are often required. Careful decision-making for selecting the timing of surgery, type of surgery, and vascular conduit are very important. Multidisciplinary approach with vascular surgeons, cardiac surgeons, rheumatologists and intervention radiologists are essential for long-term success.

Keyword: Behcet, surgery, endovascular, open surgery, complication
PP-II-5

Revascularization using femoral vein graft

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Introduction
Great saphenous vein (GSV) is the most common autologous vein graft for revascularization. However, it is often unsuitable for large vessel reconstructions due to size mismatch.

Methods
Twenty five patients performed with vascular reconstruction using FV graft between July 2009 and March 2017 in our institution were retrospectively analyzed. Preoperative ultrasonography was performed to evaluate a diameter of FV and no existence of deep venous thrombosis. At graft harvesting, both GSV and profunda veins were preserved to keep venous drainage of limb.

Results
Of the 25 cases, 14 cases with 14 limbs were the recipients of living donor liver transplantation, 5 cases with 8 limbs were the patients with infected prosthetic graft or arterial aneurysm, and 6 cases with 6 limbs were the patients who needed reconstruction of the portal vein or inferior vena cava. FV grafts were used as a conduit in 23 cases, and as a vein patch in 2 cases. Revascularization were with success in all cases and no aneurysmal changes at the site of reconstruction were found postoperatively. Postoperative minor complications of limb (edema, bleeding, lymphorrhea) were more found in liver transplantation recipients than in others.

Conclusion
FV grafts were useful for various vascular reconstructions. All procedures were performed safely, however, cautious observation of limb was needed in the patients who had severe comorbidity such as recipients of liver transplantation.

PP-II-6

Comparison among open thrombectomy, hybrid thrombectomy and thrombolysis in acute limb ischemia

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Introduction
Acute limb ischemia (ALI) results from a sudden decrease in limb perfusion that threatens limb viability and often requires urgent revascularization. There were severe revascularization methods such as thrombectomy and thrombolysis. But, there were a limitation of two methods. So that, recently hybrid thrombectomy with fogarty over the wire is popular. But. There were rare results about comparison among open thrombectomy, hybrid thrombectomy and thrombolysis in acute limb ischemia.

Methods
From January 2011 December 2016, we reviewed prospectively collected data about patients who were treated as acute limb ischemia. We examined the patient characteristics, Rutherford classification, Target lesion, Procedure detail and follow-up data. We compared technical success, postoperative result and patency rate among open thrombectomy (OT), hybrid thrombectomy (HT) and thrombolysis (TL) in acute limb ischemia.

Results
The 62 patients with ALI were included in our study for 5 years. 21 OTs, 21 HTs and 20 TLs were performed. There were no differences among three group except target lesions. Total technical success rate is 80.5% (50 patients), that of OT is 76.2% (16 in 21 patients), that of HT 90.5% (19 in 21 patients), that of TL is 75% (15 in 20 patients) (p = 0.372). The mortality is 6 cases (3 cases in OT, 1 cases in HT, 2 cases in TL). The patency rate of HT at 1 year is 85%, that of OT is 71% and relatively that of y is 69% (Log Rank = 0.340, Fig. 1). But there were statistically no significant differences in postoperative result and patency rate among three groups.

Conclusion
Among treatment of ALI, HT with fogarty over wire shows good technical success rate and primary patency rate comparing OT and TL. But there were statistically no significant differences.
Early Outcomes of Endovascular Intervention with Drug Coated Balloons

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Purpose
The aim of this study was to evaluate early outcomes after percutaneous treatment of femoropopliteal artery disease using paclitaxel-coated balloons.

Methods
A retrospective chart review of 64 lesions in 51 patients underwent endovascular intervention using drug coated balloon (DCB) between July 2015 and February 2017. We analyzed the correlations ankle brachial index (ABI) differences after DCB with the differences of balloon size between provision balloon and drug coated balloon, the inflation times and the different devices. For statistical analysis, paired t-test, two sample t-test and one way ANOVA were used.

Results
Most common used balloon size was 5 mm in diameter (35 cases, 53.8%) and most common balloon size difference between provision balloon and drug coated balloon was 1 mm (32 cases, 49.23%). There were 31 TASC A lesions, 17 TASC B lesions, 14 TASC C lesions, and 2 TASC D lesions. There were 4 cases of drug coated balloon after atherectomy. Over a median 225 days follow up, technical success rate was 100% and target lesion revascularization occurred in 2 cases with an average time to first reintervention of 7 days. The clinical characteristics of 2 patients were not different from the others. Improvement of at least 1 Rutherford category was seen in 42 limbs (65.6%). There was significant improvement of ABI after intervention using DCB (P = 0.000). Different devices, inflation times and the size difference between provision balloon and DCB did not affect the changes of ABI (P = 0.254, 0.596, 0.372). There were no complications related to DCB.

Conclusion
DCB is associated with favorable functional and clinical outcomes in patients with femoropopliteal artery disease requiring percutaneous revascularization.

Comparison result of treatment outcome between patch angioplasty and primary closure during carotid

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Objective
Primary closure (PC) and Patch angioplasty (PA) during carotid endarterectomy (CEA) have been compared in previous studies and disfavoring the use of PC after CEA because its possibility of higher perioperative neurologic complication and restenosis rate. The aim of this study was to evaluate the outcomes of PC versus PA using propensity score matching (PSM) and multiple logistic regression analysis.

Methods
Between November 1994 and October 2016, patients who underwent primary CEA procedures was retrospectively analyzed. One vascular surgeon prefers routine PC and the other prefers routine PA closure using bovine pericardial patch. Endpoints were ipsilateral stroke, any clinical stroke, cranial nerve palsy, hematoma, bleeding which required re-operation within 30 postoperative days. Restenosis rate, overall survival, stenosis-free survival, and stroke-free survival during follow up periods were also investigated.

Results
During study period, 435 PC cases and 476 PA cases were included in this study. After PSM, baseline characteristics (age, gender, hypertension, diabetes, dyslipidemia, smoking, atrial fibrillation, previous percutaneous coronary intervention or coronary artery bypass grafting, contralateral carotid occlusion, degree of carotid stenosis, and symptomatic status within 6 months) were balanced. Finally, 377 pairs of matched cases were analyzed. Statistical analysis showed that there were no statistical differences between two groups in ipsilateral stroke (p = 0.45), any clinical stroke (p = 0.75), cranial nerve palsy (p = 1), hematoma (p = 0.18), bleeding which required re-operation (p = 0.12) within 30 postoperative days and restenosis rate, overall survival, stenosis-free survival, and stroke-free survival during follow up periods were also investigated.
nosis rate during follow up (p = 0.16). Additionally there were no differences between two groups during follow-up in overall survival, stroke-free survival, and restenosis-free survival with p value of 0.136, 0.07, and 0.06, respectively.

**Conclusion**
In our study, PC during CEA is not inferior to PA closure.

**Keyword:** carotid endarterectomy, patch closure, primary closure, outcome

### OP-III-2

**Risk of major cardiovascular events in the mildly stenosed carotid artery**

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**Objective**
The aim of this study was to evaluate the predictive value of detecting subclinical major cardiovascular events (MACE) in patients with asymptomatic mild carotid artery stenosis (CAS).

**Materials and methods**
This retrospective observational study comprised 461 patients who underwent initial duplex ultrasound (DUS) at our institution between January 2008 and December 2010, and only those with more than 1 DUS were included during the 8-year follow-up. CAS was classified as mild (30–49%; 267 patients) and moderate (50–69%; 194 patients). CAS progression was defined as an increase to a higher category. The primary end point was the development of MACE, including coronary heart disease (CHD), stroke, and all-cause mortality.

**Results**
The incidence of stroke (P = 0.52), CHD (P = 0.16), and mortality (P = 0.07) in patients with mild CAS showed no differences to those in the moderate CAS group. According to the multivariate regression analysis, CAS progression was independently associated with the development of MACE (OR: 5.09; 95%, CI: 3.00–8.63; P < 0.01), and high HDL-cholesterol levels were correlated with the decreased risk of MACE (OR: 0.97; 95%, CI: 0.95–0.99; P < 0.01). According to the Kaplan–Meier analysis, both the mild and moderate CAS groups demonstrated similar primary end-point-free survival rates during the follow-up period (log-rank test; p = 0.71). Patients with moderate CAS, however, had significantly decreased long-term overall survival compared with the mild CAS group (log-rank test; p = 0.005).

**Conclusion**
This study shows that the risk of a cardiovascular event and mortality in patients with asymptomatic mild CAS is comparable to that of those with moderate CAS.

### OP-III-3

**Spontaneous isolated superior mesenteric artery dissection has treatment time window for complete resolution**

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Cardiovascular Surgery, Shizuoka City Shizuoka Hospital

**Purpose**
We investigated the relation among the presence of symptoms on presentation, 3D morphology, and clinical outcome in spontaneous isolated superior mesenteric artery dissection (SISMAD).

**Methods**
Twenty-seven SISMAD cases from 2010 to 2016 were retrospectively analyzed. Twelve cases were symptomatic cases. Two of them underwent emergent SMA stenting, and resulted in complete resolution (CR) of SISMAD. The other 10 cases were hospitalized and strictly observed using antithrombotic and antihypertensive drugs. Fifteen cases were asymptomatic and had been followed-up using CT imaging. Length of dissection (L), and false luminal diameter (FD) at the level of the maximally dilated diameter (MD) were measured.

**Results**
The symptomatic cases had significantly longer L than asymptomatic cases (72.7 ± 17.1 vs. 50.9 ± 24.8, p = 0.02). Significant difference was also detected in the true luminal diameter (TD: 4.20 ± 2.08 and 6.21 ± 2.18, p = 0.03). During the observational period, no case experienced in-stent stenosis, bowel ischemic complication, or aneurysm rupture. The CR was more frequently detected in the symptomatic cases (5 vs. 1, p = 0.02). And FD/MD of symptomatic cases significantly decreased on the final observation (p = 0.04).

**Conclusion**
It was indicated that presence of symptom in SISMAD related to the length of the lesion, false luminal pressure. Whether it was invasive or conservative, the earlier intervention resulted in the better clinical and morphological outcome.
**OP-III-4**

**Successful surgical treatment for pancreaticoduodenal artery aneurysm with misplaced coil**

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**Introduction**

True pancreaticoduodenal artery aneurysm (PDAA) are rare and compose about 2% of visceral aneurysms. More than half of pancreaticoduodenal artery aneurysm is associated with celiac axis (CA) or superior mesenteric artery (SMA) stenosis or occlusion. Coil embolization of PDAA is reported as a safe option even in the patients with CA or SMA steno-occlusion. But not every endovascular approach is successful. Here we report our experience of successful surgical treatment for the patient with PDAA and mislodged coil.

**Case**

Fifty-two-year-old female was referred to our vascular clinic for PDAA after fail to embolize it from regional hospital. Her PDAA was found on the sonogram for health screening. At the regional hospital, coil embolization was tried but abort- ed after migration of coil in between the common hepatic and proper hepatic artery. Our vascular team planned embolization of the aneurysm after CA recanalization. But again, we failed to recanalized the CA. Finally, surgical approach was chosen. The procedure was composed of the interposition graft for the aneurysm with saphenous vein and removal of coil. With minimal dissection of pancreaticoduodenal artery proximal and distal to the aneurysm, artery was controlled and aneurysm was incised along counter border of the pancreas. Then several back bleeders were controlled with fine nonabsorbable sutures at inside the aneurysm. Coil was removed through direct arteriotomy at common hepatic artery near the proper hepatic artery. The aneurysm was left open after interposition with saphenous vein. Postoperative recovery was uneventful except transient mild elevation of pancreatic enzymes and the patient went home with stable vital sign at 7th postoperative day.

**Summary**

Coil embolization is reported as safe option for the treatment of PDAA. Surgical treatment still have its’ role, especially for the patients who failed endovascular approach. Fine technique is essential for successful surgical treatment.

**Keyword:** Pancreaticoduodenal artery aneurysm

**OP-III-5**

**A new vascular graft technique for hemodialysis: insertion technique**

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**Background**

When creating an arterio-venous graft (AVG), stenosis of the venous anastomotic site influences the patency rate. In our hospital, we create a vascular access in many dialysis patients, and in patients with no alternative choice of construction site an AVG by arterio-venous graft implantation at the upper arm. In such cases too, there are many cases in which patients suffer from problems such as stenosis in the venous anastomotic sites.

**Methods**

At this time, I have devised so as to avoid this vascular access problem in the venous anastomotic site. For the vein side, instead of anastomosing a vascular graft, a vascular graft is inserted into the vein. This insertion is done in the same way as inserting large diameter sheaths into arteries and veins in PCPS or endovascular aneurysm repair. The inner sheath is pulled out and 2–3 cm of a vascular graft is placed in the vein. Simple fixation is done to the vascular graft and the vein, and the artery side is anastomosed as conventionally done.

**Results and Conclusions**

Currently, this treatment has been applied to 3 cases, and the early postoperative results (at 1 month later) are stable. I am going to observe patency in the middle and distant periods.

**OP-III-6**

**Contemporary Outcomes of Surgical Thrombectomy for Prosthetic Vascular Access Occlusion**

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**Purpose**

Surgical or endovascular thrombus removal and revision for AVG remains the major goal toward access salvage and prolongation of patency rate. We reviewed our experience and analyzed the factors associated with patency.

**Methods**

Between January 2013 and June 2016, 196 surgical thrombectomy (ST) procedures for AVG thrombosis were performed in 111 patients. For analysis, patients were divided into 2 groups; ST with balloon angioplasty for stenosis (ST-BA),
ST with surgical revision for stenosis (ST-SR). We compared primary failure and primary patency data for groups. Primary failure was defined as repeated AVG occlusion not amendable for at least 1 session for hemodialysis after ST. Primary patency was defined as the time (months) with uninterrupted patency and without intervention.

Results
During the study period, 103 patients received ST with repair of stenotic lesions and included in this study. ST-BA group was consisted of 54 (52.4%) patients. Among 49 patients in ST-SR group, 14 (29%) patients received combined balloon angioplasty for other stenotic lesions. Primary failure occurred in 2 patients (2%, 1 for each group, \( P = 1.000 \)). Overall primary patency rates at 3 months, 6 months, and 1 year were 60%, 54%, and 39% for ST-BA group and 76%, 74%, and 61% for ST-SR group (\( P = .088 \)). Fifty-four (52%) patients demonstrated single stenosis and remaining 49 patients showed multiple stenoses. In patients with single stenosis, there was no difference between 2 groups regarding primary patency (\( P = .520 \)). However, the primary patency in patients with multiple stenoses was significantly higher in ST-SR group compared with ST-BA group (\( P = .048 \)).

Conclusions
Overall primary patency of 2 groups was not significantly different, therefore, surgical thrombectomy with balloon angioplasty may be a possible option for AVG occlusion. However, surgical revision should be considered in patients with multiple stenoses with regard to higher primary patency.

Keyword: Hemodialysis, Vascular access, Prosthetic graft, Thrombosis

**Op-III-7**
Long-term outcomes of stent placement for May Thunner syndrome

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Purpose
We assess the clinical results of stent placement after treatment of deep vein thrombosis (DVT) in patients who previously underwent venous stenting for May-Thurner syndrome (MTS).

Materials
We reviewed the data of 128 patients with DVT caused by MTS who were treated with stent placement from January 2005 to May 2016. We evaluated to patency of iliac vein stent, venous clinical Severe score (VCSS) after contralateral occlusion during follow up.

Results
Among 128 iliac vein stentings, male patients were 26 and mean age is 54.3 (Range: 19–85). During follow-up (mean 46 months, Range 1–133), 5 year patency rate of iliac vein stent is about 80%. There were 21 ipsilateral stent occlusions and 10 contralateral occlusions. There were 12 post-thrombotic syndromes over VCSS 5. Factors of ipsilateral and contralateral occlusion of iliac vein after stent are coagulopathy (CI: 1.254–5.535, \( P < 0.001 \)) and stent deployment into IVC (CI: 1.325–7.324, \( P < 0.001 \)).

Conclusions
Iliac vein stenting in MTS shows good long-term result. But, accurate deployment of iliac vein stent during procedure and regular follow-up in patients with coagulopathy are necessary.

**Op-III-8**
National trend for the treatment of chronic venous diseases in Korea between 2010 and 2016

Jin Hyun Joh, Ho-Chul Park
Kyung Hee University Hospital at Gangdong, Kyung Hee University School of Medicine, Seoul, Korea

Background
Chronic venous disease (CVD) of the legs occurs frequently. Currently, limited data about the nationwide trend for the treatment of varicose vein are available with respect to the Korean population. The aim of the present study was to identify the national trend in the treatment of CVD in Korea.
Methods and Materials

A serial, cross-sectional study was conducted with the use of time trends to analyze patients with CVD between 2010 and 2016. The present study endeavored to analyze trends in the number of patients and procedures for CVD including sclerotherapy, conventional open surgery, and endovenous thermal ablation. Health Insurance Review and Assessment (HIRA) Service data was used to analyzed for the trend. For the endovenous thermal ablation, the data were collected by the request to the device supplying company. A linear-by-linear association was performed to determine the trend.

Results

A total of 1,037,476 patients were managed with CVD between 2010 and 2016. The rate of CVD patients per 1,000,000 Medicare beneficiaries substantially increased during the study period from 2,832 patients in 2010 to 3,152 in 2016 (risk ratio (RR), 1.11; 95% confidence interval (CI), 1.06–1.17; P <.001). Conventional surgery including stripping and local resection of varicose vein slightly decreased from 553 procedures in 2010 to 512 in 2014 (risk ratio (RR), 0.93; 95% confidence interval (CI), 0.82–1.04; P = 0.21). Sclerotherapy slightly decreased from 321 procedures in 2010 to 293 in 2014 (risk ratio (RR), 0.91; 95% confidence interval (CI), 0.78 to 1.07; P = 0.26). Radiofrequency ablation increased from 12 procedures in 2011 to 55 procedures in 2014 (risk ratio (RR), 4.58; 95% confidence interval (CI), 2.45–8.56; P <.001).

Conclusion

Total CVD patients slightly increased during the last 6 years. The conventional open surgery and sclerotherapy were slightly decreased. On the other hand, radiofrequency ablation was significantly increased in Korea.

Oral presentation IV

Chair:
Jung Kee Chung
Seoul National University
Ikuo Fukuda
Hirosaki University

OP-IV-1

Lessons from Below The Knee Complete revascularization using Y graft technique

Kilsoo Yie
Cheju Halla General Hospital

Purpose

We tried to evaluate the efficacy of angiosome guided revascularization, comparing the results between complete revascularization using GSV Y graft and single graft bypass.

Method

From Jul 2008 to Dec 2016, a total of 123 CLI patients underwent BTK or pedal bypass surgery for critical limb ischemia. 90 pts (105 limbs) underwent single graft bypass (anterior tibial artery or posterior tibial artery), otherwise 33 patients (37 limbs) underwent complete revascularization using GSV Y graft.

Results

There is no statistical differences between both two groups in terms of preoperative demographics, postoperative complications and mean 5 years follow up results. However, in the patients who underwent single graft bypass surgery, primary patency is longer in positive pedal arc group compared to no pedal arch group (85% in positive pedal arc group vs. 46% in no pedal arc group). In the patients who underwent Y graft bypass surgery, primary patency was similar in both group. (87% in positive arc group vs. 78% in no pedal arc group).

Conclusion

Angiosome guided treatment is necessary in the cases of negative pedal arch. If the patients shows negative compatibility in terms of wound location with angiosome area, and poor pedal arch, complete revascularization using GSV Y graft or angiosome guided single bypass surgery is reasonable. Otherwise, if pedal arch is competent in peri-operative evaluation, single bypass surgery regardless of angiosome is sufficient.

Keyword: pedal artery bypass surgery, below the knee
Predictive value of the abnormal ABI for coronary re-intervention and mortality in patients with CAD

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Objective
Low ankle-brachial index (ABI) and borderline ABI is associated with increased all-cause mortality, cardiovascular death and major adverse cardiac events (MACE). The purpose of this study was to investigate the value of low and borderline ABI in coronary re-intervention and mortality in patients with coronary artery disease (CAD).

Methods
The data were derived from patients with CAD who were enrolled to investigate prevalence of peripheral arterial disease in Korean patients with CAD and cerebrovascular disease in 2010 from SNUH (N = 284). The deaths were confirmed at the National Statistical Office by December 2014. All patients underwent follow-up coronary angiography as study induced or clinically induced.

Results
Of the 284 patients, 32 had <1.0 or >1.4 ABI (G1) and 252 had normal ABI (G2, CAD with 1.4 ≥ ABI ≥1.0). Mean follow-up was 47 months. All cause deaths and MACC occurred in 6 (18.8%) and 20 (62.5%) in G1, and in 17 (6.8%) and 83 (34.5%) in G2, respectively (p = 0.019, p = 0.0021) during the 4 year follow-up. All CAD progression were higher in G1 (16 (50.0%) vs 79 (31.4%), p = 0.0352). And incidence of the clinical induced coronary re-intervention was significantly higher in G1 (hazard ratio = 2.959, 95% CI 1.299–6.743). No difference regarding the coronary disease progression which was not required re-intervention and incidence of study induced re-intervention between the groups.

Conclusion
CAD with low ABI and borderline ABI increased clinically induced coronary re-intervention and all-cause mortality during long-term follow-up.

“Open versus endo first” issue for infrapopliteal lesions in critical limb ischemia: Why is open surgery first-line treatment?

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Introduction
As for the treatment of critical limb ischemia (CLI), the limb salvage is not accomplished without revascularization. Two options for arterial reconstruction are available to address the CLI associated with these pathologies: open (bypass) surgery and/or endovascular therapy (EVT). Paramalleolar or below-the-ankle bypasses using a vein graft have been established as first-line treatment, whereas EVT has prevailed as an effective treatment of CLI with comparable outcomes. Thus, the “Endo-first vs. Open-first” battle to treat infrapopliteal lesions in patients with CLI has continued throughout the current decade. To compare the outcome of Endo-first with Open-first revascularization, our results were summarized in patients with CLI after infrapopliteal bypass grafting.

Methods
From July 2012 to June 2015, 153 limbs from 131 patients performed infrapopliteal bypass grafting were studied. After preceding EVT, the case which were underwent bypass surgery were 48 limbs/42 patients (EVT-first group: Ef group). The case which bypass surgery without preceding EVT were 105 limbs/131 patients (Open-first group: Of group).

Results
The incidence of end stage renal disease with hemodialysis was significantly higher in Ef group (71% versus 57%). There were no significant differences in the age and the cardiac performance. Survival rates at 1 and 3 years were 57%, 42% in Ef group, 86% and 68% in Of group, respectively. The 3-year cumulative primary patency rate and amputation-free survival rate were 73%, 80% in Ef group and 82%, 87% in Of group. There were significant difference between Ef group and Of group in amputation-free survival rate (Log Rank P < 0.03).

Conclusion
This study show that in comparison with EVT-first revascularization to the infrapopliteal lesion, open-first was higher amputation-free survival rate.
Effectiveness of transcutaneous oxygen pressure measurement (TcPO2) for critical limbs ischemia

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Background
Wound healing in CLI is challenging and few studies reflect possibility of wound healing or potential need of revascularization. TcPO2 is one of tools, which can reflect microcirculation and known to give information about possibility of wound healing or potential need of revascularization.

Methods
This is a retrospective study of patients with CLI in Seoul St. Mary’s hospital from 2016 to 2017 from prospectively registered. Patients with CLI treated according to TcPO2. CLI with TcPO2 above 40 was underwent surgical approach such as amputation, skin graft and debridement. CLI with TcPO2 less 40 underwent to restore peripheral vascularization.

Result
Twenty two (22) critical limb ischemic patients with untreated ulcer were enrolled. Sex ratio was M:F=16:6. The mean age was 65.6 years old. Comorbidities with CLI were HTN (13), DM (14) and ERSD with Hemodialysis (8). In this study, we divided two groups that the one was the difference in TcPO2 score before-and-after vascular management and the other was the success rate of healing process in CLI patients after surgical management of intractable ulcer. In the difference of TcPO2 score before-and-after vascular management, mean gap of score in before-and-after vascular treatment was +10.39, clinically results healed ulcer without amputation (6), healed ulcer with amputation (3), need for taking follow-up measures (1). In this group, vascular managements were divided into 7 percutaneous transluminal angioplasty including drug-eluting balloon, 1 hybrid operation and 2 open surgical managements. The other group, primary success rate in surgical management was 83.3% (10/12 patients). The primary managements for CLI consisted of orthopedic amputations (7), skin grafts for intractable ulcer (2) and debridment for necrotic tissues (1).

Conclusions
TcPO2 was able to predict results of primary amputation and need for revascularization according to its data.

A multicenter experience with abdominal aortic endograft infection in Japan

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Purpose
Endovascular aneurysm repair (EVAR) is widely used with stable results, and its infectious complication is considered to be rare with poor prognosis. However, there is still no definite treatment strategy. We report a Japanese multicenter experience with infected EVAR and their outcomes.

Methods
In 110 months from July 2007 to August 2016 at our department and related facilities, 1407 EVARs for abdominal aortic aneurysms or iliac artery aneurysms were performed, and patients diagnosed with infected endografts were reviewed.

Results
Seven patients (0.6%) with an infected endograft were identified. The implanted device was 4 of Excluder and 3 of Zenith. Median time between EVAR procedure and diagnosis of endograft infection was 7 months (2.8–31 months). Clinical findings at presentation included fever (n = 5), abdominal/back pain (n = 3), and rupture (n = 1). Preoperative blood cultures were gram-positive (n = 2) and gram-negative (n = 1). Medical treatment with antibiotics was performed in 6 patients except for a ruptured patient. Ultimately, 5 of 7 patients underwent endograft explantation after a median of 17 days (0–40 days). In situ aortic replacement was performed in all 5 patients using autogenous femoral vein in 3 and prosthetic graft bonded with rifampicin in 2. Early mortality was only in a ruptured patient who died the day after the surgery, and median hospital length of stay was 38 days in survived 4 patients. Two patients who had been managed only medically died 6 months by comorbidity and 22 months by graft-related.

Conclusions
Aortic endograft infection after EVAR should be treated by excision and in situ or extra-anatomic replacement in princi-
ple. When the patient’s general condition is stable, replacement using autogenous femoral vein graft might be recommended.

**OP-IV-6**

Clinical Experience of Arterial Cystic Adventitial Disease

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**Background**

Arterial cystic adventitial disease (CAD) is a rare cause of intermittent claudication and nonatherosclerotic condition without cardiovascular risk factors. The etiology and treatment of CAD have remained controversial. The purpose of this study was to analyze the results of surgical treatment in arterial CAD.

**Methods**

We retrospectively reviewed 18 patients with arterial CAD who have undergone surgical treatment in our hospital from 2006 to 2016. All of the patients were diagnosed with using both computed tomography and duplex sonography. Only 1 patient was performed by adding magnetic resonance imaging.

**Results**

There were 16 (88.9%) patients in men and median age was 50.5 years old. The popliteal artery was the most commonly involved artery (88.9%) and left side was more commonly involved rather than right side (66.7% vs 33.3%). There were 17 (94.4%) symptomatic cases with claudication (16 cases, 88.9%) or swelling (1 case, 5.5%). Only one patient had no symptoms related with CAD. 12 (66.7%) patients were treated with cystic resection only, 5 (28%) patients were underwent bypass with saphenous vein reconstruction, 1 (5.5%) patient was underwent bypass with synthetic graft reconstruction. Recurrence was observed in 2 (11.1%) patients who underwent cystic resection only.

**Conclusion**

This study was conducted with small group of patients, so further comparative study with large group patients might be required.

Keyword: Cystic Adventitial Disease, clinical outcome

**OP-IV-7**

Open aortic arch surgery following thoracic endovascular aortic repair with debranching

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**Background**

Thoracic endovascular aortic repair (TEVAR) with debranching has been considered as therapeutic options for aortic arch disease in high-risk patients. However, with the increase of endovascular cases, open aortic arch reoperation subsequent to TEVAR is highlighted.

**Methods**

Since 2013, 103 patients with different aortic arch pathologies underwent primary TEVAR, 31 patients required supra-aortic debranching to obtain adequate proximal endograft fixation.

**Results**

Four of 31 patients, open aortic arch reoperation had been performed during mid-term follow-up. Three of 4 patients required secondary procedures due to stent-related complications. After TEVAR complications comprised progressive type Ia endoleaks (N=2) and retrograde type A aortic dissection (N=1). The other showed impending rupture of aortic root pseudoaneurysm which was not associated with primary TEVAR. All 4 patients underwent aortic arch replacement via sternotomy. The surgical technique included a hypothermic circulatory arrest with the aid of antegrade cerebral perfusion (SCP). Debranching bypass grafts were divided and used as an inflow of SCP. Furthermore, transected distal stump of the aortic arch was reinforced with previously inserted stent grafts. There was no operative death in this series.

**Conclusions**

Despite the high-risk nature of the complications, secondary open aortic arch reconstructions after TEVAR were successfully performed.

**OP-IV-8**

Extra-anatomic abdomen-sparing ascending aorto-femoral artery bypass surgery showed good patency in the patients who had mid-aortic disease

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Introduction
Mid-aortic disease or mid-aortic syndrome, which is characterized by juxta-renal aortic obstruction, is a rare and challenging condition for aortic surgeons to repair. We report the results of extra-anatomic abdomen-sparing ascending aorto-femoral artery bypass thru subcutaneous tunnel routes.

Methods
From November 2007 to October 2015, 5 patients were enrolled and median age is 59 years old (range: 53–85, two octogenarians). Their accompanying diseases were coronary artery disease in 4, critical limb ischemia in 2, quadriplegia in 1 and pulmonary thromboembolism + deep vein thrombosis + LAA thrombus in 1 patient, respectively. Bed-ridden status was in 3 patients. Concomitant CABG was conducted in 4 patients (on-pump in 1 and off-pump in 3 patients, respectively/res redo OPCAB in one patient) and numbers of coronary anastomosis were 2 (range: 1–2). Access routes to ascending aorta were full-sternotomy in 3, Rt. para-sternal incision in 1 and upper-half sternotomy in 1 patient, respectively.

Results
Median op time is 340 minutes (range: 185–410), and there was no on-pump conversion in OPCAB cases. Postop ICU-stay and hospital-stay are 6 days (range: 2–14) and 28 days (range: 11–289), respectively. There were no operative mortalit, one follow-up mortality case (bed-ridden, redo OPCAB, unknown at postoperative 315 days) and 3 morbidities (pleural effusion, sacral pressure sore and wound dehiscence needs re-closure). Mean survival time is 6.815 years (95% C.I. 3.446–10.184) and 8-year survival rate is 75%. Mean graft-patency time is 8.53 years (95% C.I. 8.530–8.530) and 8-year patency rate is also 100% by CT angiogram or ultrasound exam.

Conclusion
Conducting extra-anatomic abdomen-sparing ascending aorto-femoral artery bypass surgery is feasible for mid-aortic disease and its results are acceptable.

Keyword: mid aortic disease

OP-IV-9
Technical consideration for endovascular recanalization of aortoiliac occlusive lesions: single-center experiences

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Purpose
Endovascular treatment of aortoiliac occlusive disease is challenging and still on the debate. Authors reviewed our experience of endovascular management for aortoiliac occlusive disease (AIOD), focusing on technical considerations.

Method
Retrospective study was done from prospectively registered data for the patient with aortoiliac occlusive disease (AIOD) treated by endovascular means in vascular and transplantation surgery in Seoul St. Mary’s hospital from May 2012 to Feb 2017. Patient’s clinical characteristics, procedure in details and post operative record were summarized.

Results
Fourteen patients was enrolled. The mean age was 59 years (range, 43–75 years). The indication of the treatment was 5 acute attack on chronic AIODS, 4 chronic limb threatening Ischemia and 5 chronic short distance claudication. There was 2 extensive AIOD: 1 common femoral artery, 1 superficial femoral artery. Two methods of access was used to recanalize each iliac lesion: 25 ipsilateral groin access with retrograde recanalization, 3 brachial access with antegrade recanalization after failed femoral access. Thrombectomy was done in 8 cases: 7 open thrombectomy and 1 AngioJet thrombectomy. Stents was used in all cases including 2 Viabahn covered stent. The 30-day post procedural mortality and morbidity rate was 0%.

Conclusion
Different modalities used for the aortoiliac endovascular treatment offer all the benefits for treatment on a case-by-case basis. In our experiences of failed retrograde recanalization via femoral access, early change of brachial arterial access with antegrade recanalization is taken into consideration to avoid technical failure.
Objective
To determine risk factors for development of an early postoperative stroke after carotid endarterectomy (CEA).

Method
We conducted a retrospective analysis using database of patients who underwent CEA in a single institution during the past 22 years. Early postoperative stroke was defined as any cause of stroke within 30 days after CEA. Risk factor analysis was conducted using uni- and multivariable analyses testing variables of demographic, clinical features and coexisting disease, contralateral internal carotid occlusion, symptom status, previous neck radiation, primary closure of carotid arteriotomy, and synchronous CEA and coronary artery bypass grafting (CABG).

Results
1,065 CEAs for 977 patients were included for the analysis. Within 30 days after CEAs, 18 (1.7%) stroke developed within 30 days which included 13 ischemic strokes and 5 hemor-
rhagic strokes and 15 ipsilateral strokes and 3 non-ipsilateral strokes. Univariate and multivariate analysis of the risk factors for early post-CEA stroke were demonstrated in the table.

**Conclusion**

CEAs for patients with symptomatic carotid stenosis (OR, 2.806; 95% CI, 1.033–7.626; \( p = 0.043 \)) or concomitant CEA and CABG (OR, 6.454; 95% CI, 1.505–27.628; \( p = 0.012 \)) were followed by significantly higher rates of early post-CEA stroke.

**PP-III-2**

**Long-term outcome of arterial or venous angioplasty using a bovine pericardium**

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**Background**

Patch angioplasty is commonly performed to repair a vessel wall without stenosis. Bovine pericardium is a good alternative patch material to autogenous vein in many vascular fields. This study is to analyze the long-term result of angioplasty using a bovine pericardium, and to identify the risk factors for significant complications.

**Material and Methods**

Retrospective review on the patients who received vessel repair using a bovine pericardium from February 2012 to December 2016 was done. Demographic data, clinical characteristics and complications were reviewed. Subgroup analysis was done according to vessel types (artery vs. vein), the shape of applied bovine pericardium (tube vs patch), and manufacturers (Vascuguard® vs Periborn®).

**Results**

A total of 62 patients underwent patch angioplasty with a bovine pericardium. Mean age was 68 years and male were 77%. The repaired vessel consisted of 47 arteries (76%) and 15 veins. Patch shape was used in 56 (90%), and a tube shape was made and used in 6. Complications of occlusion or partial thrombosis developed more often in venous patch, although wound hematoma was more common in arterial patch. Early reoperation was done in 3 venous patches. Perioperative death occurred in 1 case after arterial patch due to acute stroke. Late complications were similar in both patches. Tube-shape angioplasty was done only in venous repair, but 50% required reoperation due to early thrombosis in 2 and hematoma in 1. Two repaired vessels were occluded in both group or tube-shape and patch-shape in long-term. Vascuguard was used in 44 (71%) and Periborn in 18. By multivariate analysis, the only risk factor for thrombotic occlusion was tube-shape repair (OR 27.5, \( p = 0.013 \)).

**Conclusion**

Although, reconstruction of vessel with bovine patch is safe and effective, tube-shaped repair should be done carefully due to the high risk of thrombotic occlusion.

**PP-III-3**

**Experience of direct oral anticoagulant for non-massive pulmonary embolism with deep vein thrombosis**

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**Background and Objectives**

In Japan, the indication of DOAC (direct oral anticoagulant) has been extended to vein thromboembolism (VTE) including deep vein thrombosis (DVT) and pulmonary embolism (PE). DOAC has been the first-line therapy for VTE, mainly for DVT, in substitution for warfarin. The aim of this study is to assess the effect of DOAC for non-massive PE.

**Methods**

Four patients (male in all) were diagnosed as acute non-massive PE with DVT in 2014–2015. Continuous intravenous administration of heparin at a dose of 12,000 U/day and oral intake of a dose of 60 mg of Edoxaban were carried out. The vascular echo and enhanced CT were taken to follow the condition of PE and DVT. Blood samples were taken at the stages of pre-treatment, post-treatment after 1 week, 1 month, and 2 months.

**Results**

The average age was 59.8 (42–82) years old and the body weight 72.7 (59.9–87) kg. Serum creatinine level was 0.91 (0.85–1.04) mg/dl at the pre-treatment. VTE were considered due to cancer, positive of anti-cardiolipin antibody, or recurrence of DVT. The period of use of heparin was 4.25 (2–5) days. After the treatment, the amount of thrombi reduced in 3 patients and disappeared completely in 1. Fibrin/fibrinogen degradation products (FDP) and D-dimer (DD) were improved; 18.8 (pre) → 9.6 (1W) → 4.9 (1M) → 2.7 µg/ml (2M) and 9.41 → 4.27 → 2.01 → 0.37 µg/ml, respectively. PT-INR and APTT were not significantly changed; 0.96 → 1.11 → 1.29 → 1.15 and 28.8 → 35.2 → 34.7 → 29.2 sec. There were no hemorrhagic complications.
Conclusions
DOAC should be considered the first-line therapy for non-massive PE with DVT.

PP-III-4
How can we avoid open conversion after EVAR?
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Most secondary interventions are performed with endovascular means for treatment of EVAR complication. However, open conversion (OC) is inevitable in some patients after EVAR. Surgical morbidity and mortality associated with elective OC is reported significantly higher compared to elective open surgical repair of abdominal aortic aneurysm (AAA).

Objectives
We attempted to seek ways to avoid open conversion after EVAR.

Method
We reviewed medical records and pre- and post-EVAR images for patients who underwent OC. OC was defined as AAA sac open irrespective of aortic clamping or stent graft removal. We investigated provable causes of the OC and sought ways to avoid the complications resulting in OC.

Results
During the period of the last 14 years, we have experienced 16 OCs at a single institution which included 6 institutional cases and 10 transferred patients from other hospitals. Our institutional incidence of OC was 1.5% (6/406 EVARs) and patient characteristics were summarized at the table. When we reviewed provable causes of OC, type Ia endoleaks (n = 5), type III endoleaks (n = 3), identifiable source of stent graft infection (n = 4, nearby sources, 2; remote sources, 3), overlooked aortic pathology before EVAR (n = 2; infected AAA, 1; type I neurofibromatosis, 1) were identified. Five patients with type Ia endoleak had hostile neck anatomy and intraoperative aortic rupture occurred due to technical inadequacy at the time of EVAR. As results of OC, we have experienced no surgical mortality, 3 early postoperative complications including late midcolic artery rupture, left colon ischemia and acute renal insufficiency.

Conclusion
We think an early or late OC can be avoided to some extent by proper patient selection, careful endovascular technique and prophylactic measures to prevent late stent graft infection.

PP-III-5
Outcomes of Upper Arm Tapered Graft for Preventing Steal Syndrome in Dialysis
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Purpose
Dialysis access steal syndrome is an uncommon but challenging complication that occurs due to a functioning arteriovenous fistula or graft in 2 to 20% of chronic kidney disease patients who require hemodialysis. Several studies presented the treatment options for steal syndrome, but there are no clear predictive factors or preventive methods. We investigate the effectiveness and surgical outcome of tapered graft in upper arm dialysis access for prevent steal syndrome.

Methods
The analysis was performed in 216 patients in whom the creation of arteriovenous fistula or graft in upper arm from January 2014 to December 2016 in our Hospital.

Results
The 4 to 6 mm tapered graft was used in 55 patients, 6 mm straight graft was 89, and arteriovenous fistula was 172 patients. 2 (3.6%) patients in tapered graft have symptoms of ischemic steal syndrome (>3 grade), 15 (16.8%) in non-tapered graft and 31 (18.0%) in arteriovenous fistula (p = 0.012). The 1-year patency was 56.8% in tapered graft, 37.8% in non-tapered graft and 14.5% in arteriovenous fistula (p = 0.035).

Conclusion
Upper arm tapered graft can be the option for prevent steal syndrome. However, graft patency was decreased compared with non-tapered graft or arteriovenous fistula.
Replacements of abdominal aortic aneurysm in patients under 30-year-old

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Purpose
To discuss the abdominal aortic aneurysm (AAA) replacement for younger patients, we retrospectively analyzed patients under 30 year-old who underwent AAA replacement.

Methods
Among 3003 patients who underwent AAA replacement during last 40 years, 10 patients were under 30 year-old (2–29 year-old, 7 male). All patients were suffered from connective tissue disease; Marfan syndrome in 9 and Loeys-Dietz syndrome in 1. Five patients had the history of cardiovascular surgery. The etiologies were dissection in 8 and degenerative in 2. All patients underwent graft replacement of infrarenal AAA with bifurcated graft in 6 and straight graft in 4.

Results
Except for urgent/emergent cases, rapid expansion of aneurysm at the rate of 4.3 ± 0.9 mm within 6 months were observed. The AAA diameter at surgery was 46.7 ± 9.2 mm. No hospital mortality and operative morbidity were encountered. Median follow up period was 94 [range, 0–382] months. One remote death due to suicide was observed at 262 months. Nine patients have required the additional cardiovascular surgery within 2 years.Total number of aortic surgeries in life for each patient were two in 2, three in 3, four in 1, five in 1, and six in 1.

Conclusion
AAA replacement in patients under 30 year-old is safe. Even in younger patients with connective tissue disease, AAA should be included in the routine medical check-up and earlier surgical indication should be considered for its rapid expansion.

Inferior vena cava filter insertion through the popliteal vein: enabling the percutaneous endovenous intervention of deep vein thrombosis with a single venous approach in a single session

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Purpose
To evaluate the efficiency of placing an inferior vena cava (IVC) filter through the same popliteal vein access site used for peripheral endovascular intervention (PEVI) in patients with extensive lower extremity deep vein thrombosis.

Materials and Methods
This retrospective study included 21 patients undergoing IVC filter insertion through the popliteal vein over a 3-year period. Patient medical records were reviewed for the location of the deep vein thrombosis, result of filter removal, and total number of endovascular procedures needed for filter insertion and recanalization of the lower extremity venous system. Follow-up lower extremity computed tomography (CT) venography was also reviewed in each patient to assess the degree of filter tilt in the IVC.

Results
All patients had extensive lower extremity deep vein thrombosis involving the iliac vein and/or femoral vein. Seventeen patients showed deep vein thrombosis of the calf veins. In all patients, IVC filter insertion and the recanalization procedure were performed during a single procedure through a single popliteal vein access site. In the 17 patients undergoing follow-up CT, the mean tilt angle of the filter was 7.14 ± 4.48° in the coronal plane and 8.77 ± 5.49° in the sagittal plane. Filter retrieval was successful in 16/17 patients (94.1%) in whom filter retrieval was attempted.

Conclusion
Transpopliteal IVC filter insertion is an efficient therapy that results in low rates of significant filter tilt and enables a single session procedure using a single venous access site for filter insertion and PEVI.
PP-IV-1

Optimal Treatment for Acute Superior Mesenteric Artery Thromboembolism

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Background
Acute superior mesenteric artery (SMA) thromboembolism is rare but possible life threatening event. Optimal treatment strategy is under debating. We conducted a guided therapy strategy (GTS) study and analyzed the results.

Method
From 2007 to 2016, we have treated 47 patients who diagnosed to acute SMA thromboembolism guided by GTS manual. Mean age was 67.3 ± 7.2 year-old and 40 (85.1%) patients were male. 32 patients showed atrial fibrillation. 16 (34%) patients had a history of previous thromboembolism in cerebral, cardiac, splanchnic and extrimity. Time duration from symptoms onset to hospital visiting was 3.4 ± 1.2 hours.

Results
Contraindication of heparin was noted in two cases. Initially, 8 (17%) patients who all had atrial fibrillation required emergent or urgent operations. They underwent abdominal cavity exploration (8 cases) with or without SMA thromboembolectomy (6 cases). Second look operation was performed in three patients. 37 patients who were treated by closed observation and medication including antithrombotic and/or anticoagulation agent did not showed mortality and small bowel ischemic necrosis. Four of them needed another cardiac surgeries during initial hospitalization.

Conclusions
Initial combination use of heparinization, anti-platelet agent loading and splanchnic vessel dilator might have positively affected to splanchnic circulation environment. Atrial fibrillation-associated embolism required surgery more frequently (17% of total acute SMA thromboembolism). Protocol based guided therapy can lead to improved outcome. Comprehensive evaluation and protocol based guided treatment can lead to improved clinical outcomes. Concomitant cardiovascular disease which need invasive treatment may happen during the disease course.

Keyword: SMA embolism

PP-IV-2

Effect of diameter of saphenous vein on stump length after cyanoacrylate glue ablation

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Background
Cyanoacrylate embolization (CAE) for varicose veins using
VenaSeal has recently been introduced for treatment of the incompetent saphenous vein. Although the preliminary studies have been limited to moderate-sized great saphenous veins, larger diameter of saphenous up to 20 mm has been included in some report. The purpose of our study is to investigate the correlation between the diameter of the saphenous vein and the stump length.

Materials and Methods
A retrospective review was performed with data of varicose vein patients who underwent radiofrequency ablation (RFA) and CAE. Preoperatively, the diameter of saphenous vein was measured. RFA and CAE was initiated 2 cm and 5 cm distal from the junction, respectively. Stump length was measured immediately after procedure and at 1 week. The clinical outcomes were evaluated. The paired t-test and correlation analysis were used for statistical analysis. P-value < 0.05 was considered statistically significant.

Results
During the study period, 841 patients underwent RFA or CAE. Among them, 41 saphenous veins were performed with CAE in 26 patients. The complete occlusion was achieved in all patients. There was no endovenous glue-induced thrombosis (EGIT) after CAE. After CAE, the mean VAS was 2.59 and 0.32 on postoperative 0 and 7 days, respectively (P < .0001). The correlation coefficient between the diameter and stump length in RFA group was −0.017. The mean diameter of the saphenous vein in CAE group was 7.1 ± 2.2 mm. The mean stump lengths of the saphenous vein were 26.1 ± 10.2 mm and 28.1 ± 13.6 mm postoperative 0 and 7 days, respectively (P = .002). Correlation analysis showed that the Pearson correlation coefficient between the diameter and stump length on postoperative 0 and 7 days were 0.627 (P < .001) and 0.177 (P = .430), respectively.

Conclusion
CAE is an effective and safe modality to treat the saphenous vein insufficiency. The stump length were increased with larger diameter of saphenous vein.

PP-IV-3

Popliteal artery pseudoaneurysm associated with osteochondroma

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Background
Vascular complications from osteochondroma are rare and include essentially stenosis, occlusion, and pseudoaneurysms.

Case Presentation
A 25-year-old male developed pain and swelling at inside of the right thigh after work. Neurologic compromise was not evident, and distal pulses were palpable. The MRI depicted soft-tissue mass in other hospital. After profuse bleeding occurred during biopsy of the soft tissue mass, CT angiography revealed a pseudoaneurysm of the right popliteal artery with a small, sharp exostosis tip of the dorsal distal femur. In a surgery the exostosis tip and vein patch plasty of popliteal artery.

Conclusion
It is important to consider that sharp tips in exostoses regardless of size may also be cause to complications and resection should be considered as a preventive measure or after complications like the formation of a pseudoaneurysm have occurred.

PP-IV-4

Percutaneous transluminal angioplasty for malfunction of autologous arteriovenous fistula: single center experience

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Purpose
The percutaneous transluminal angioplasty (PTA) for malfunction of autologous arteriovenous fistula (AVF) for hemodialysis (HD) is emerging as a salvage management. But, details of PTA for AVF malfunction have not been fully evaluated. So, we studied about clinical aspects of PTA for AVF malfunction.

Methods
Between January 2013 and December 2016, total 549 PTAs in 312 patients were performed for vascular access (VA) malfunctions. VAs included 211 AVFs and 127 AVGs. 211 AVFs consisted of 121 brachiocephalic (BC) and 90 radiocephalic (RC) AVFs. 279 PTAs in 211 AVF patients were performed. Among 279 PTAs, we evaluated clinical characteristics, locations of lesion, etiologies of malfunction, AVF flow, AVF flow ratios, numbers of BAs, intervals of BAs, treatment modalities and balloon-assisted maturation (BAM) rate.

Results
There was no difference in clinical characteristics, locations of lesion, etiologies of malfunction, AVF flow ratios, numbers of BAs, intervals of BA, and BAM rate between BC and RC
**PP-IV-5**

**Pharmacomechanical Thrombectomy with AngioJet Compared with CDAT for Treatment of Acute DVT**

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Seoul St. Mary's Hospital

**Background**

Conventional anticoagulation for acute DVT can cause post thrombotic syndrome (PTS). Therefore, early thrombus removal strategies for acute DVT are widely appreciated across different societies. PMT is recently-established therapy to manage acute DVT, when experts and resources are available. In Korea, CDAT is popular options for acute DVT because PMT devices are limited by reimbursement issues. We compared the results of PMT with AngioJet with CDAT and evaluated risk factors affecting patients’ outcome.

**Materials and Methods**

This is a retrospective study from prospectively registered database of the patients, who underwent interventional procedures due to acute DVT in Seoul St. Mary’s Hospital from 2012 to 2015. PMT with AngioJet and Solent Omni catheter was compared to CDAT for acute DVT. Patients’ demographics, procedural information, their results and complications were retrieved from EMR and PACS and analyzed with SPSS 10.1.

**Results**

Fifty eight patients were enrolled. 22 patients were treated by PMT, and 36 by CDAT. There was no procedure or in-hospital mortality in both groups. There were 3 additional thrombolysis in PMT group and 6 in CDAT group. There was no difference of technical success rate between PMT and DCAT regardless of thrombolysis (P = 0.4183, P = 9.205). The limitation of PMT with AngioJet was short operating time of AngioJet (less than 5mins) with residual thrombus while large thrombus embolization in DCAT.

**Conclusion**

PMT with AngioJet and DCAT are an safe and effective strategy for early thrombus removal of patients with acute DVT with different pitfalls. This study is limited by small number and retrospective study.

Keyword: DVT, AngioJet

**PP-IV-6**

**In-situ aortobiiliac reconstruction of infected abdominal aortic aneurysm with autologous vein grafts followed by endovascular treatment**

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A 61-year-old male presented with abdominal pain. Laboratory results showed leukocytosis and increased C-reactive protein levels. Computed tomography (CT) scan showed a 45 mm-sized cauliflower-shaped abdominal aortic aneurysm and periaortic fluid collection, consistent with infectious aneurysm. Autologous vein graft replacement were performed. The graft was consisted of bilateral superficial femoral vein. Antibiotics therapy was continued and laboratory findings were improved. There were no major complications during hospital stay. Although the patient was transferred to his previous hospital on the 14th post operative day (POD), He was readmitted to our hospital with hematemesis and melena on the 18th POD. CT showed extravasation from right graft limb. He underwent covered stent graft (Fluency®) implantation immediately. After endovascular treatment, gastrointestinal endoscopy revealed a duodenal fistula. We scheduled a laparotomy with general surgeons, but just before the operation, he had hematemesis and melena again. CT scan showed extravasation from left graft limb. He underwent covered stent graft implantation into the left vein graft’s limb. After that, partial duodenectomy and duodenojejunostomy were performed. His post operative course was unremarkable, and he was transferred to a rehabilitation hospital with oral antibiotics. There were no recurrence of infection and bleeding at 1-year post-operative follow-up. Autologous vein graft showed durability against infected lesion, even containing artificial material. The patient should be observed closely to clarify long-term result.
PP-IV-7
Safety of Renal Function After Endovascular Aneurysm Repair (EVER): 6-month short-term follow up

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Background
Endovascular aneurysm repair (EVAR) became the most frequent treatment of infrarenal abdominal aortic aneurysm (AAA). The problem of decreased renal function caused by EVER is controversial. The aim of this study was to analyze the effect of the EVER on the renal function by calculating the estimated glomerular filtration rate (eGFR) and the morphological repercussion of the stents at the renal level by computed tomography (CT) scan.

Method
From January 2012 to May 2016, 38 patients with AAA treated by endovascular aneurysm repair was studied retrospectively. We analyze the evolution of the preoperative and 6-month postoperative renal function. Renal function was evaluated by eGFR, according to the Chronic Kidney Disease Epidemiology Collaboration formula, and expressed mL/min/1.73 m². Regarding morphological repercussion of the stents, we estimated preoperative and 6-month postoperative renal artery diameter and observed newly developed stenosis by computed tomography.

Result
Among 108 patients who underwent EVAR, 38 patient were included for this study. Preoperative mean eGFR was 74.1 mL/min/1.73 m² and 6-month postoperative mean eGFR was 71.8 mL/min/1.73 m². The mean decrease in eGFR was −2.2 mL/min/1.73 m², this was not remarkable decrease compared to literatures. Renal artery diameter was slightly reduced at 6-month postoperative CT scan. The mean variation of renal artery diameter was 6.35%. Only one infarction of renal artery was detected, and others did not detected new or progression of renal artery stenosis or newly developed thrombosis.

Conclusion
This study revealed EVAR did not affect remarkable renal function and morphological change such as stenosis or renal infarction. Further comparative study with infrarenal and suprarenal fixation will be needed to find out safety of renal function after EVAR.

Keyword: renal function, EVAR, AAA

Poster Exhibition
P-29
Effects of CTRP9 on impaired wound healing in diabetes

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Impairment of wound healing is a common symptom in diabetes. C1q/TNF-Related Protein (CTRP) 9 is the closest paralog of adiponectin which has been reported to have beneficial effects on wound healing. In the current study, we demonstrate that CTRP9 regulates growth, differentiation, and apoptosis of HaCat human keratinocytes. We found that CTRP9 augmented TGFβ1 expression and phosphorylation of p38 in a dose-dependent manner. Furthermore, suppression of TGFβ1 by siRNA significantly abrogated the effects of CTRP9 on p38 phosphorylation implying that CTRP9 stimulates wound recovery through TGFβ1-dependent pathway in keratinocytes. In conclusion, these results suggest that CTRP9 has suppressive effects on the hyperkeratosis. This study provide an effective therapeutic strategy for treatment of diabetic foot.

P-30
Impacts of Arteriovenous Hemodialysis Shunt Location and Type in Patients having coronary Artery Bypass

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Objective
The coronary steal in having coronary artery bypass graft (CABG) with in situ internal thoracic artery (ITA) and ipsilateral upper extremity arteriovenous (AV) hemodialysis (HD) access has been reported in some cases. But the long-term clinical effect in this phenomenon is not clear. The aim of this study was to determine the impact of upper extremity HD access location and type in patients having CABG with in situ ITA.

Methods
Between January 2001 and December 2014, 111 patients received upper extremity HD access creation after CABG using in situ TIA were analyzed retrospectively in this study. All patients underwent CABG using in situ left ITA (LITA) to revascularize the left anterior descending artery (LAD). 93 patients (84%, ipsilateral group) underwent HD access on left
upper extremity and 18 patients (16%, contralateral group) on right were compared in the clinical characteristics and outcomes. The primary end point was defined as late death and the adverse cardiac events that was composite of sudden cardiac death, myocardial infarction, hospital admission for angina or congestive heart failure, and repeat coronary revascularization.

Results
The mean interval periods of HD access creation after CABG were 34 months. After HD access creation, the mean follow-up periods were 39 months. There was no significant difference in the demographics, clinical feature between ipsilateral group and contralateral group. Kaplan–Meier analysis showed that the two groups had no significant difference in the adverse cardiac events ($P = 0.257$) and the overall survival ($P = 0.167$) during follow-up. In multivariate logistic regression analysis, previous cerebrovascular disease (hazard ratio, 2.686 [95% CI, 1.16 to 6.16], $P = 0.020$) and HD access using the prosthetics graft (hazard ratio, 2.921 [95% CI, 1.24 to 6.87], $P = 0.014$) were the risk factors of adverse cardiac events.

Conclusion
The ipsilateral HD access creation is not associated with the adverse cardiac even.

P-31
General anesthetic versus local anesthetic for endovascular aortic aneurysm repair
권현희, 노민수, 최병문, 고기영, 정민재, 최경학, 권태원, 조용필
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Objective
The aim of this study was to compare general and local anesthetic techniques in patients treated with endovascular aortic aneurysm repair (EVAR) for infrarenal aortic aneurysms.

Materials and Methods
In this single center, observational cohort study, a total of 259 consecutive patients who underwent elective EVAR was included in this study; 144 patients (126 men, mean age 72.8 years) underwent EVAR under general anesthesia (GA group) and 115 (100 men, mean age 72.3 years) under local anesthesia (LA group). A retrospective analysis regarding technical feasibility and 30-day morbidity and mortality was performed.

Results
There was no anesthetic conversion (from LA to GA) during EVAR and no significant difference was noted in the incidence of endoleaks and its types between the two groups: 20 (14.1%) in GA group and 21 (18.4%) in LA group ($P = 0.348$). Thirty-day re-procedure was performed in 14 patients (9.7%) received EVAR in GA and in 5 patients (4.3%) in LA ($P = 0.099$). There were no significant differences in 30-day morbidity (20.1% in GA versus 16.5% in LA, $P = 0.457$) and mortality between the two groups.

Conclusions
We have not shown a definite difference in 30-day outcomes between GA and LA for EVAR. The anesthetist and surgeon, in consultation with the patient, should decide which anesthetic technique to use on an individual basis.

Keyword: general anestheisa, local anestheisa, clinical outcome, abdominal aortic aneurysm

P-32
Management of endoleak after EVAR (Endovascular Aneurysm Repair) in single institution
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Purpose
EVAR is well accepted treatment modality for abdominal aortoiliac artery aneurysm (AAA). Endoleak is one of frequent complication, which needs medical attention depending on type of endoleak. Authors tried to evaluate management of endoleak in single institution.

Methods
This is a retrospective study from prospectively registered data base for the patients, who underwent EVAR from 2012 to 2016 in Seoul St. Mary’s Hospital in vascular and transplant surgery. Patient’s clinical characteristics were evaluated with EMR and PACS.

Results
One hundred and thirteen patients were treated for AAA. EVAR or Hybrid treatment were done in 90 patients. Endoleak was detected during procedure in 12.2% (11/90) (Type Ia(3), Type II(4), Type III(4)). New endoleak was detected in 3.3% (3/90) (Type Ia(1), Type Ib(1), Type V(1)). Additional chimney stentgraft for renal artery and proximal aortic extension was done for persistent type Ia endoleak though two type Ia endoleaks disappeared spontaneously. Type Ib endoleak was managed by embolization of internal iliac artery and iliac limb extension deployment. 4 patients with type II endoleak were followed up without sac size change though sac size increased
by 1 cm in one patient. One patient suffered from limb occlusion and acute limb ischemia after type V endoleak. There were 2 type III endoleaks in EVARs with sandwich techniques, in which one type III endoleak disappeared whereas the other is under observation. Survival of group with endoleak in any period was not significantly different from group without endoleak when treated properly.

Conclusion
Endoleak after EVAR is frequent and needs medical attention depending on endoleak type and aneurysm sac enlargement. Endoleak after EVAR needs regular observation and additional endovascular treatment if persistent.

Keyword: EVAR (Endovascular Aneurysm Repair), abdominal aortoiliac artery aneurysm (AAA), Endoleak

Renal artery distal embolism during endovascular abdominal aortic aneurysm repair

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We performed EVAR under general anesthesia. We planned the procedure using the stent graft of suprarenal fixation (Medtronic, Edurant®). On angiography, we could identify the proximal and distal landing zone and location of the both renal artery. After stent graft deployment, completion angiogram showed sluggish flow of the left renal artery which was suspicious of distal embolism to left renal artery. Urokinase (100,000 unit) mixed with 20 ml of saline was slowly infused after selection of left renal artery using 5Fr microcatheter. Completion angiogram shows improved renal artery flow.

His creatinine level showed a temporary rise (up to 1.82 mg/dl on postoperative 2 days) but recovered to the level before procedure. On follow up enhanced CT scan, we found patent stent graft and no endoleak, but newly developed left renal cortical infarction without no evidence of renal artery stenosis.

Factors Affecting Patency Following Successful Percutaneous Intervention for Dysfunctional Hemodialysis

정이지, 김성민, 고홍규, 노민수, 고기영, 김민주, 권태원, 김희진, 조용필
서울 아산병원 혈관외과

Objective
This study aimed to investigate the patency following initial successful percutaneous transluminal angioplasty (PTA) for untreated dysfunctional hemodialysis vascular access and to identify predictors of PTA durability.

Methods
This retrospective observational study included data of 132 consecutive initial PTA of hemodialysis vascular access in 126 patients who showed immediate technical and clinical success and had at least 1 year of follow-up data.
Results
The mean duration of primary and secondary patency post-PTA was 16 and 27 months, respectively. On multivariate adjusted Cox regression analysis, dyslipidemia ($p < 0.001$), use of insulin ($p = 0.016$), and arteriovenous graft (AVG) ($p = 0.016$) were significantly associated with shorter primary patency. Dyslipidemia ($p < 0.001$), use of antiplatelet medication ($p = 0.013$) and failed vascular access ($p = 0.004$) were significant predictors of secondary patency loss. Use of statin was the only clinical variable associated with increased primary and secondary patency ($p < 0.001$). According to a subgroup analysis on the type of vascular access and dysfunction, primary and secondary patency rates were significantly higher in the arteriovenous fistula (AVF) and failing vascular access groups than AVG and failed vascular access groups, respectively. Early dysfunction (within 6 months) was significantly higher in the AVF and failed vascular access groups after initial PTA, but there was no significant difference after multiple PTAs.

Conclusions
Post-PTA primary and secondary patency rates were significantly higher with AVF and failing vascular access. Use of statin was associated with increased primary and secondary patency after initial successful PTA in this study.

Keyword: vascular access, dysfunction, endovascular procedure, outcome

Endovascular treatment of celiomesenteric trunk aneurysm
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Purpose
To determine the treatment modality and short term outcome of endovascular repair of visceral artery aneurysm, especially celiomesenteric trunk (CMT) aneurysm.

Materials and Methods
The patient, 45-year-old man was referred to our hospital for incidentally founding of celiomesenteric trunk aneurysm on chest CT for regular check-up. He was otherwise healthy without any symptoms. On CT angiography and SMA arteriography, The diameter of the saccular aneurysm was 21 mm and located in the middle of SMA orifice and celiac bifurcation. Hepatic artery and splenic arteries were originating from the aneurysm.

Results
Endovascular coil embolization of the common hepatic artery, splenic artery and the aneurysm was done, followed by a stent-graft deployment in the SMA covering the orifice to the aneurysm. On immediate follow-up arteriography, the aneurysm wasn’t opacified anymore, and hepatic artery flow was maintained by collaterals. 3 days after procedure, CT angiography was done, and well-embolized CMT aneurysm, proximal CHA and splenic artery was visualized. There was no evidence of splenic infarction or hepatic failure on CT angiography or on the labs. He was discharged 5 days after endovascular treatment.

Conclusions
Coil embolization and stent graft insertion is a safe and effective treatment modality for CMT aneurysm. And It is also attributed to shortening of hospital stay.

Keyword: celiomesenteric trunk aneurysm, endovascular treatment

Is compression required during radiofrequency ablation for varicose vein?
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Background
Endovenous radiofrequency ablation (RFA) is now popular
modality for varicose vein treatment. However, the mechanism of heat transduction of the second generation RFA is not well understood. And technical details, including the need of vein emptying, vein wall contact to heating probe, or proximal vein compression, are not standardized yet. The aim of this study is to analyze the result of RFA and to establish optimal procedural techniques leading to the best results.

Methods
This is a retrospective study of a prospectively registered database of patients who underwent RFA with ClosureFast VNUS (Covidien, Mansfield, Mass, USA) for varicose vein in Seoul National University Hospital from Nov 2016 to Jan 2017. A total of 40 limbs in 35 patients were reviewed with self-reported questionnaires and pre- and post-operative DUS.

Results
Mean age was 56 years and women were 68.8%. Obese patients (BMI >24) were 5.7%. Clinical category was C2 in 58.6%, and C3 in 34.5%. Clinical outcomes significantly improved after 6 months; VCSS (4.4 to 2.3; P <.001) and QoL score (8.4 to 4.1; P <.001). Obliteration distance from the saphenofemoral junction were 1.28∼1.41 cm in GSV, and 1.15∼1.65 cm in SSV. There was one case of asymptomatic endovenous heat-induced thrombosis, which resolved completely after 2-week medication of rivaroxaban. This case was the first RFA done in SNUH, without compression of the proximal SFJ during the first firing (3 cm distal from SFJ). Because of the evidences of forward heating up to 3 cm during RFA, we changed our protocol to apply proximal SFJ compression with Doppler probe, which prevented new EHIT ever after.

Conclusions
RFA was effective in improving symptoms and quality of life of varicose vein patients. Simple external compression during the first firing of RF energy could prevent the forward heating injury and EHIT development.

Impact of DM duration and degree of carotid artery stenosis on major adverse cardiovascular events

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Background and Purpose
The aim of this study was to investigate impact of diabetes duration and carotid artery stenosis on the occurrence of major adverse cardiovascular events (MACE) in asymptomatic type 2 diabetes mellitus (T2DM) patients.

Methods
A total of 2006 asymptomatic T2DM patients aged >50 years who underwent baseline carotid Doppler ultrasound screening were stratified by diabetes duration and degree of carotid artery stenosis into four subgroups. The primary outcomes were occurrence of MACE, defined as fatal or nonfatal myocardial infarction (MI) and stroke, and all-cause mortality.

Results
The difference of the MACE incidence was significantly greater in patients with a longer diabetes duration and significant carotid stenosis (P <0.001). The risk of stroke (P =0.001) and MI (P =0.039) both increased in parallel with diabetes duration and significant carotid stenosis, but no significant difference was noted in the incidence of all-cause mortality (P =0.694). Multivariate regression analysis found that patients with both a longer diabetes duration and significant carotid stenosis demonstrated additive and very high risks at MACE (HR 2.07, 95% CI 1.17–3.66; P =0.012) and stroke (HR 3.38, 95% CI 1.54–7.44; P =0.002) although a longer diabetes duration did not affect the risk of MI.

Conclusions
The present study on asymptomatic T2DM patients without prior cardiovascular disease shows that there is a significantly higher risk of MACE in patients with both a longer diabetes duration and significant carotid stenosis compared with those with a shorter duration and nonsignificant stenosis.

Keyword: cardiovascular diseases, carotid artery stenosis, diabetes complications, diabetes duration

Management of aorto-enteric fistula or erosion: review of 11 patients focusing on cause and treatment

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Objectives
Aorto-enteric fistula is a catastrophic complication of aortic disease or aortic surgery. We reviewed the underlying causes of aorto-enteric fistula (AEF) or aorto-enteric erosion (AEE) and its treatment.

Methods
A retrospective review of single center data of AEF/AEE
was conducted. Demographic and clinical feature, underlying disease, prior aortic surgery and in hospital mortality were investigated in those patients.

Results
From September 2003 to December 2007, 11 patient (median age, 59.5 years; range, 30–76 years, male 75%) underwent surgical treatment due to AEF/AEE. The clinical features, underlying causes and treatment results are shown in the table.

Conclusion
Secondary AEF after abdominal aortic aneurysm repair (endovascular or open repair) was most common. Mortality rate of surgical treatment for the patient with AEF or AEE was still high. Therefore, we have to focus on the prevention of this condition.

### P-39
**My experience of VenaSeal: first report in Korea**

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**Purpose**
Cyanoacrylate closure of the saphenous vein with the VenaSeal Closure System is a new technique just approved at Dec, 2016 in Korea. We report the early experience and the results of a VenaSeal Closure System for the treatment of great saphenous veins and small saphenous veins as a first report in Korea.

**Methods**
24 subjects with incompetent saphenous veins (29 GSVs and 9 SSVs) were treated at a single session. Concomitant phlebectomy for below knee area were performed in 17/24 (70.8%). All procedures were started with local anesthesia and switched to IV sedative anesthesia if patients request. Subjects returned to clinic at 10 days, 1 month and 3 months. Post-procedure evaluations including numerical pain rating score, rVCSS and AVVQ were performed. Duplex ultrasound was performed at 10 days, 1 month and 3 months.

**Results**
All treated veins (29 GSVs, 9 SSVs) (100%) had complete closure by duplex ultrasound during the follow-up period. Numerical pain rating scale of 6 hrs after procedure was 2.6. The rVCSS and AVVQ was improved during the follow up period. Under routine oral anti-inflammatory agents for 5 days, phlebitis in the treatment area occurred in 3/24 subjects (12.5%).

**Conclusions**
Cyanoacrylate closure is safe and effective for the treatment of incompetent saphenous veins.

### P-40
**Bilateral internal iliac artery aneurysm: open repair and preservation of pelvic flow**

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Purpose

Isolated iliac artery aneurysms are known as rare disease account for less than 2% of all arterial aneurysms. At least preservation of one direct flow to internal iliac artery (IIA) is important to prevent unexpected complication from regional ischemia. We recently experienced 2 cases of open repair of bilateral iliac aneurysms.

Materials

A 64 year old man visited our out-patient department with a continuous lower abdominal pain for 2 days. His CT image had showed bilateral IIA aneurysms. The maximal diameter of right IIA aneurysm was 4.0 cm and that of left IIA aneurysm was 6.8 cm. And another a 63 year old man visited our clinic for his pulsating abdominal mass. Huge bilateral common iliac artery (CIA) (right 7.8 cm, left 6.7 cm) and IIA aneurysms (right 1.9 cm, left 5.9 cm), and small abdominal aortic aneurysm (3.4 cm) were found on his CT.

Results

First patient received open repair of both IIA aneurysms. We dissected left IIA aneurysm and control of CIA and external iliac artery (EIA). After intra-aneurysmal suture ligation of distal run-off branches, we performed interposition grafting from left CIA to left EIA. For preserving of pelvic flow, we dissected proximal and distal right IIA aneurysm and performed interposition grafting with 8 mm PTFE. For second patient, we performed aneurysmal repair with aorto-biiliac bypass including revascularization of right IIA (end-to-end anastomosis with right limb of graft) and exclusion of left IIA aneurysm.

Conclusions

Open repair of IIA aneurysms still durable method of treatment with excellent outcomes in the era of endovascular treatment. For preventing of complications such as buttock claudication, colonic ischemia, gluteal necrosis and spinal cord ischemia, it is important that maintains perfusion of IIA for preserving pelvic flow.

Keyword: Iliac artery, Aneurysm, Revascularization

P-41

Cerebral hypoperfusion syndrome after transluminal atherectomy carotid artery

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Introduction

Cerebral hypoperfusion syndrome (CHS) is a rare complication of carotid endarterectomy (CEA) or carotid artery angioplasty and stenting. It is probably the cause of most postoperative intracerebral hemorrhages and seizures in after CEA. But, very few cases of cerebral hyperperfusion syndrome have been reported to occur after 1 week of surgery.

Case Presentation

We present a case of a 70-year-old female who has hypertension, cerebral infarction. She presented to the emergency department with abdominal distension after colonoscopy 2 hours ago. Her abdomen CT present large amount of free air in abdomen, she underwent laparoscopic primary repair for a bowel perforation. After that, she recovered well. At the time of hospitalization due to cerebral infarct (2 yrs ago), incidentally founded severe stenosis on Rt. ICA on Brain CT angiography. Follow-up during the current admission term, Still exists stenosis on Rt. Proximal ICA. She decided to undergo surgery. Transluminal artherectomy carotid artery with patch, right was performed. Three days after surgery, she was transferred from ICU to the general ward. At POD#7, Her Conscious Consciousness falls and falls down during a walk in the hospital, At that time, BP 180/110 mmHg checked. And It was appeared acute ICH on Brain CT, MRI. She immediately transferred to ICU.

Discussion

In this case, our assessments to cause of ICH are three:
Cerebral hyperperfusion syndrome (CES), Hemodynamic instability, Hypocoagulate state due to anticoagulant agents. Among these assessments, CES seems to be the most likely cause of ICH in this case. CES has many risk factors, a few of them corresponded to this case: High grade stenosis, Hypertension, Perioperative use of anticoagulant or antiplatelet agents.

Conclusion

High grade stenosis, hypertension, use of anticoagulants is an cause of CES, so patients with these risk factors need caution. And sufficient explanation to patient is needed when receiving operation permission.

Keyword: Cerebral hypoperfusion syndrome (CHS), Transluminal atherectomy of carotid artery, carotid endarterectomy (CEA), carotid artery angioplasty, carotid artery stenting

P-42

Two cases of superior mesenteric vein thrombosis after acute appendicitis

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Introduction

Superior mesenteric vein thrombosis have been rarely reported as a complication of appendicitis. In these cases, the thrombosis was identified with computed tomography and patients have been recovered successfully with antibiotics and anticoagulation.

Presentation of Case 1

A 57-year-old man diagnosed as acute appendicitis and SMV thrombosis at the CT scan. The patient was initially received laparoscopic appendectomy and transfer to out hospital for management of SMV thrombosis. The patient was treated with anticoagulation and antibiotics for one month and was discharged after satisfactory clinical improvement. However, the patient showed recurrent abdominal pain and Laparoscopic ileocecectomy for remnant appendicitis was performed and his postoperative course was unremarkable. He was discharged with anticoagulation. Outpatient review at three months was unremarkable.

Presentation of Case 2

A 47-year-old man showed abdominal pain 18 days after laparoscopic appendectomy. CT scan revealed a periappendiceal abscess and SMV thrombosis. The patient was initially managed by anticoagulation and antibiotics for 4 days and was discharged with medication after satisfactory clinical improvement.

Conclusion

Acute appendicitis is a common surgical presentation, usually diagnosed with a history and examination. Imaging modalities such as a CT scan can be helpful. Complications such as thrombosis in the superior mesenteric vein are rare and can be managed successfully with ant.
The 10th Korea-Japan Joint Meeting for Vascular Surgery

S-II

Prof. Yong Kak Lee Memorial Symposium (Abdominal Aortic Aneurysm)

Chair:
Young Wook Kim
Sungkyunkwan University
Taijiro Sueda
Hiroshima University

S-II-1

Introduction of Prof. Yong Kak Lee

In Sung Moon
The Catholic University

S-II-2

EVAR in Hostile Anatomy (hostile neck, access etc)

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Endovascular aneurysm repair (EVAR) is limited by anatomy of aneurysm and vascular access. AAA within Indication for use (IFU) for EVAR showed durable long term results in recent trials. But, AAA outside of IFU for EVAR showed inferior results compared to AAA within IFU. New generation endograft showed improved results compared to old generation endograft. New generation endograft has new concept and different approach in treatment of AAA. So, when you treat AAA in hostile anatomy, you need to understand the anatomy of AAA in detail and, also need to understand IFU for each device available in your region. There are many different kinds of endograft from different concepts, which may be not available in your region. Here, I am going to introduce new devices with different indications, which extend application of EVAR to AAA in hostile anatomy within IFU. Also, I can show EVAR with adjunctive procedures including chimney technique, sandwich technique and etc.

Current Hostile Anatomy in AAA

Hostile aortic neck: length, angulation (A B), shape, thrombus, calcification Iliac artery anatomy: concomitant aneurysm, internal iliac artery aneurysm

Vascular access: diameter calcification of external iliac artery, diameter, angulation and calcification of common femoral artery

Current Endograft in the World

Standard EVAR: AneuRX (Medtronic), Zenith (Cook Medical), Excluder (Goremedical), Endurant (Medtronic), Altura (Lombard), Anaconda (Vascetek), Talent (Medtronic), SEAL (S&G), AFX (Endologix), Treo (Bolton), E-Vita (JoTec),

Fenestrated EVAR: Zenith Fenestration (Cook Medical), Zenith Branched (Cook Medical), T Zenith branch (Cook Medical), fenestrated Anaconda (Vascetek), Customized Treo (Bolton)

Flexible stent grafts: C3 (Goremedical), Aortofix (Lombard) Polymer based therapy: Ovation (Endologix), Nellix (Endologix) Repositionable stent graft: C3 (Goremedical), Anaconda (Vascetek),

Iliac bifurcated Devices: Zenith IBD (Cook Medical), Gore IBD (Goremedical) Low profile Stent graft: AFX (Endologix), Ovation (Endologix), Ingraft (Cordis), Zenith alpha (Cook Medical) Standard EVAR with adjunctive procedures: Chimney tech, Octopus tech, Sandwich tech,

Branch Stent graft: V12 (Atrium), B graft, fluency (Bard), Viabahn (Goremedical), life stream (Bard) Anchoring Device: Endoanchor (Medtronic)

Application of Endograft to AAA with hostile anatomy

Short aortic neck: fenestration devices, ChEVAR, Angulated aortic neck: Endurant (Medtronic), C3 (Goremedical), Aortofix (Lombard), Anaconda (Vascetek), Calcified or thrombosed aortic neck: Ovation (Endologix), Nellix (Endologix) Narrow distal Aorta: AFX (Endologix), AUI (Cook Medical, Medtronic) Concomitant CIAA: Zenith IBD (Cook Medical), Gore IBD (Goremedical) Angulated vascular access, Zenith spiral (Cook Medical), Ovation (Endologix) Small vascular access: AFX (Endologix), Ovation (Endologix), Ingraft (Cordis) Type I endoleak with complex aortic neck: Endoanchor (Medtronic)

Vascular Specialists can do EVAR in hostile anatomy with new generation endograft and adjunctive procedures within IFU, which was outside of IFU before and need to understand anatomy of AAA in detail for successful EVAR.

Current surgical strategy for AAA

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Purpose

Surgical strategy for abdominal aortic aneurysm (AAA) has been dramatically changed with an advent of stent-graft (SG). In this presentation, outcomes of surgical results with endovascular aneurysm repair (EVAR) were analyzed and current
strategy for AAA with EVAR was clarified.

Methods

Results
Rates of EVAR in AAA surgeries were approximately 10% in the home-made SG era. It was 50% in 2007 and increased year-by-year up to 78% in 2015. It was 57% at 2015 in Japan. Comparing three eras, mean age (y) was increased; 70.3, 72.9, and 73.8, respectively (p < 0.0001). Rate of emergency surgery was decreased; 25, 20, 7%, respectively (p = 0.053). Mortality of elective surgery was decreased; 2.5, 2.0, 0.6%, respectively (p<0.05). Mortality of emergent surgery was decreased; 29, 20, 13%, respectively (p<0.01).

Conclusions
With an advent of SG, rate of emergent surgery for AAA was decreased and surgical results of not only elective surgery but also emergent surgery were improved.

S-II-3
AAA: Contemporary surgical role in endovascular era
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1. Stent-graft explantation
- Early failure (< 30 days)
  1. Stent-graft migration & type I endoleak
  2. Infection
  3. Inadvertent coverage of renal or visceral arteries
  4. Technical failure during stent-graft placement
- Late failure (> 30 days)
  1. Endoleak: not amenable to endovascular management
  2. Stent-graft infection
  3. Aneurysm rupture
  4. Stent-graft thrombosis
- Open conversion after EVAR
  - Incidence: ~9%
  - EUROSTAR registry (2000): 2.1%
  - 9% at 6-year follow-up (Verzini, 2006)
Technical challenges of open conversion

1. Cumbersome vessel dissection due to periadventitial inflammation
2. Difficult to achieve proximal and distal control due to endograft
   - Incomplete proximal control → additional suprarenal clamping
   - Incomplete distal control → suprarenal → suprarenal
3. Endograft injury or stent fracture? → no reports
4. Intraluminal balloon occlusion
5. Suprarenal fixation with dense incorporation to the aortic wall
   → challenging complete removal
   → risk of denudation & laceration of juxarenal aorta
6. High mortality & morbidity than primary open repair
   → 23% - 10% vs. <5%

Chronic reaction of aortic wall to the stent-graft

- Inflammatory response to foreign body
  → Cumbersome dissection

- Atrophy of the aortic wall
  → Post EVAR, stress on aortic wall - shear stress ↓, tensile stress ↓
  → diameter ↓ (X), wall thickness ↓ (C)
  → vessel wall atrophy

- Partial preservation of SG at the sealing zone is recommended, if well incorporated and sealed adequately

- Morbidity & mortality after SG explantation
  → total removal (97%) vs partial removal (13%)

Lipsitz et al. JVS (2003)

Partial explantation of stent-graft

- When standard graft is anastomosed to the endograft, include the aortic/iliac wall & SG remnant into the suture line.
  1. More secure
  2. Less prone to bleeding anastomosis
  3. Minimize the risk of severe aortic wall injury during total explantation
  4. Simplify the operative approach
  5. Reduce the amount of dissection required
  6. Prevent late remnant SG migration and type I endoleak

2. Infected endograft

1. Infected aneurysm per se
2. Infection after EVAR
3. Improper EVAR in infected aneurysm

3. Rescue out of troubles during EVAR

F/86
Multifocal stenosis in both CIA & EIA
→ Balloon angioplasty, 7mm x 4cm

4. Rescue just after EVAR

M/72
3.2 cm
7.2 cm
**EVAR vs. OPEN: Which one is better?**

1. in patients with low surgical risk?
2. in high surgical risk group?
3. cost-effectiveness?
4. in ruptured AAA?

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**Question 1. EVAR vs OPEN**

in patients with low surgical risk?

- RCTs
  - EVAR-1
  - DREAM
  - OVER
  - ACE

Answer

; EVAR has failed to prove better outcomes than OPEN.
; OPEN > ENDO in low risk patients

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**Question 2. EVAR vs OPEN**

**cost-effectiveness?**

- EVAR trial / DREAM
- Korean data

**Comparison of Costs of Endovascular Repair versus Open Surgical Repair for Abdominal Aortic Aneurysm in Korea**

JKMS

This study was designed to compare the hospital-related costs of elective abdominal aortic aneurysm (AAA) repair using endovascular (EVAR) and open surgical (ENDO) repair at 36 hospitals, in order to assess the comparative cost-effectiveness. The study included 100 patients who underwent EVAR and 100 who underwent END0 repair at 36 hospitals. The mean hospital-related costs were KRW 12.0 million for EVAR and KRW 17.3 million for END0 repair. The cost savings and the mean hospital stay were significantly longer in the EVAR group. END0 repair had a shorter mean hospital stay and a lower hospital-related cost. The cost savings in the EVAR group were significant (p<0.001). The cost savings in the EVAR group were significant (p<0.01). The mean hospital stay was significantly longer in the EVAR group.

Min SI et al. JKMS 2012

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**Question 3. EVAR vs OPEN**

in Ruptured AAA?

- No good level 1 evidence
- Collected world experience
  - 13 centers
  - 680 EVAR
  - 763 OPEN
  - 30 day mortality: EVAR 19.7% vs OPEN 36.3% (p<0.0001)

→ EVAR is a better way to treat ruptured AAAs in anatomically suited patients. (low level of evidence)

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Interpretation

- EVAR was associated with a significantly lower operative mortality than open surgical repair.
- However, no differences were seen in total mortality or aneurysm-related mortality in the long term.
- EVAR was associated with increased rates of graft-related complications and reinterventions and was more costly.
- In patients with low to intermediate risk factors, open repair of AAA is as safe as EVAR and remains a more durable option.
Open repair for late failure after AAA treatment

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Background
Since its advent in 1991, endovascular aortic aneurysm repair (EVAR) has become a mainstay of treatment for abdominal aortic aneurysm (AAA). By the unprecedented adoption of EVAR, open surgical repair for AAA and late failure after AAA treatment are changing, and become important and difficult.

Materials and Methods
1) The current status of AAA treatment in Japan was investigated from National Clinical Database (NCD). We present the outcomes of 13218 patients in Japan during 2011.

2) Additionally, the results of AAA treatment patients (open repair and EVAR, 616 patients) in our hospital will be reported.

3) Regarding re-intervention for late failure after AAA treatment, we present the patients who have undergone late open conversion after EVAR and have complicated secondary aorto-enteric fistula.

Results
1) 13218 cases with AAA including iliac aneurysms were registered, including 1253-ruptured AAA cases. 45% of AAA cases were treated by EVAR (54%: open repair). The operative mortality of ruptured and non-ruptured AAA was 18.8%, and 0.8%, respectively. 9% of the open repair patients were required temporary clamping of the renal artery. Both operative mortalities of ruptured and non-ruptured AAA were significantly low in EVAR group.

2) In our hospital, we generally followed the instructions for use (IFU). 616 cases without ruptured AAA had electively undergone AAA treatment (EVAR: 41.4%, open repair: 58.6%). The operative mortality of ruptured and non-ruptured AAA was 14.3%, and 0.27%, respectively. 11% of the open repair patients were required temporary clamping of the renal arteries during recent 3 years. Operative mortality between EVAR and open repair was not significant.

3) We have experienced 4 late open conversions after EVAR and 5 secondary aorto-enteric fistulas after open repair. Although there was the difficulty of the operation, all patients survived for a longer duration.

Conclusion
The outcomes of AAA treatment in Japan and our hospital were considered satisfactory. Finally, we present the late open conversion after EVAR and the secondary aorto-enteric fistula after open repair as a late failure.