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Original Article

Open Surgical Management of Atherosclerotic Aortoiliac Occlusive Diseases (AIOD) Type 1

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Abstract

Objective: **The common techniques for open anatomical revascularization of aortoiliac occlusive diseases (AIOD) type 1 are aortofemoral bypass (AFB) and aortoiliac endarterectomy (AIE). These procedures are suitable for hospital where endovascular facility is not available. The aims of this study were to review and compare morbidity, mortality and 3-year patency rate of AFB and AIE at the Lampang Regional Hospital.**

Methods: **Patients with AIOD who underwent AFB or AIE for lower extremity ischemia were identified from prospective medical records during November 2007-November 2013. Demographic and clinical data including outcome data were obtained from clinical summary records. The decision to perform which operation was based on surgical risk and surgeon's preference. Kaplan-Meier analysis was performed to examine the survival of patients.**

Results: **A total of 10 patients underwent 5 AFB and 5 AIE. The 30-day mortality rate was 10%. One-year survival rate was 75%. One-year graft patency rate was 100%. Late complication occurred in two patients including worsening of congestive heart failure and another case with empyema thoracis after treatment HAP. The overall 3-year survival rate of both AIE and AFB were 40%.**

Conclusions: **AIE has provided the advantage of avoiding prosthesis. This technique is safe and equally effective as AFB in term of patency and survival.**

Keywords: **aortoiliac occlusive diseases, aortoiliac endarterectomy, aortofemoral bypass**

INTRODUCTION

The syndrome of thrombotic obliterans of the aortic bifurcation (type 1) is relatively rare (5-10%) arterial occlusive diseases[1], first described in 1948 by Lerich and Morel[2], compared to type 2 (25%) (extended to external iliac artery and type 3 (65%) (stenosis within aorta, iliac and common femoral artery)[3]. In the past, thromboendarterectomy, first described by Dos Santos of Lisbon in 1947 and Edwin j. Wylie adapted this technique to aortoiliac region in 1951, has been well standardized. The survival treatment of aortoiliac occlusive diseases (AIOD) reported in the literature with major complication including 10-20% occlusion rate at 5 years and 25-30% at 10 years[4-8]. Although the advent of interventional treatment has brought a paradigm shift of aortoiliac occlusive diseases (AIOD) management, but this method may be use in a small group of patient. However, the open surgical revascularization is still important for unsuitable lesion and non-specialize vascular unit hospital.

The aim of this study was to evaluate the morbidity, mortality and 3-year patency rates and survival of type

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1 AIOD patients managed by AIE or AFB at one hospital.

Surgical technique

The operations were carried out under general anesthesia. All cases were approached through transperitoneal exposure with careful dissection of the abdominal aorta between the proximal aortic neck and both common iliac artery. In case of AIE, a vertical aortotomy was performed and extended to right common iliac artery, separation arteriotomy of left common iliac artery to avoid nerve plexus located just proximal to left common iliac artery. Artherosclerotic plaque and thrombus were removed. Then tacking suture with 4/0 double end prolene was placed circularly at the cut edge of the intemal plaque. For the AFB, bifurcated knitted Dacron graft was performed in all patients. The limb of grafts was tunneled as an anatomical bypass and anastomosis onto common femoral artery with profundaplasty. For one patient, concomitant iliofemoral bypass was done.

Materials and Methods

Between November 2007-November 2013 medical records of ten patients (7 males and 3 females) presented with critical limb ischemia undergoing open aortic anatomical bypass to treat aortoiliac occlusive diseases type 1 at Lampang Regional Hospital were reviewed retrospectively. Ethical approval was obtained from Lampang Regional Hospital Research Ethic Committee.

All patients in this retrospective cohort study had undergone screening for the presence of cardiovascular risk factor including DM, HT smoking and medical co-morbidity (Table 1). CT angiography was performed to delineate the extent and distribution of occluded lesion (Figure 1). In selected cases, intra-operative duplex ultrasound was used to demonstrate stenotic lesion. For one patient, atherothrombotic plaque extended to proximal external iliac artery and concomitant iliofemoral bypass with expanded polytetrafluoro-ethilene 6 mm was performed.

Postoperatively all patients were followed in out-patient department for the clinical assessment and vascular examination with duplex ultrasound imaging studies as indicated.

Mortality data was obtained from hospital record. One patient died after 6 months and 2 patients lost follow-up at 10 months and 20 months respectively.

Comparisons between the groups were made using the Fisher exact test with $p < 0.05$ considered to be significant. The patency of AIE, AFB and survival rates were all analyzed using the Kaplan-Meier analysis

Table 1 Patients' characteristic (no; %)

Age (year)	**Mean + SD (67.75+12.34)**
Sex	
Male	6 (60)
Female	4 (40)
Cardiovascular risk factor	
Smoking	4 (40)
DM	1 (10)
HT	5 (50)
Co-morbidity	
COPD	3 (30)
CKD	2 (20)
CHF	1 (10)



Figure 1 CTA finding for AIOD type 1

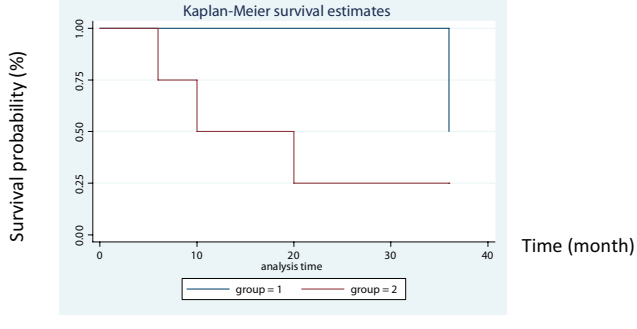


Figure 2 Comparison of survival and patency between group 1 (AIE) and group 2 (AFB)

Table 2 Symptom and indication for bypass (no %)

Severe claudication	2 (20)
Ischemic limb	4 (40)
Rest pain	4 (40)

Table 3 Operative morbidity (no %)

Mid foot amputation	1 (10)
Left hip disarticulation	1 (10)
Left AK amputation	1 (10)
Toe amputation	1 (10)

(Figure 2).

Results

During the 3-year follow-up period, 10 patients with critical limb ischemia from AIOD type 1 with or without additional femoro-tibio-crural diseases were operated. All patients had cardiovascular risk factor, but no definite treatment for coronary artery diseases. Clinical indication for bypass surgery included severe claudication, ischemic limb and rest pain (Table 2).

Of 10 patients with AIOD type 1, 5 were AIE and 5 were AFB. All cases were performed with trans-peritoneal approach (Table 4). There were no significant differences among the two groups (p = 0.548). One postoperative death occurred after AIE on day 29. One patient against advice after AFB had post-operative worsening of congestive heart failure, left pleural effusion, hospital acquired pneumonia, DVT and eventually left empyema thoracis. In this case, the duration of hospital stay was 69 days.

Three patients were amputated at the same level of pre-operative ischemic demarcation (Table 3). One patient was amputated above the level of ischemic tissue loss after AFB (Figure 3, 4). No amputation required for severe claudication patients.

Table 4 Characteristics of patients

	AIE	AFB	p-value
Age	63.5±7.14	72±16.02	
Sex			
Male	4	1	0.103
Female	2	4	
Clinical presentation			
Ischemic limb	2	2	0.548
Non-ischemic limb	2	4	
Duration of follow up (month)	24.75±13.04	18±13.36	



Figure 3 Ischemic demarcated line of further hip disarticulation patient

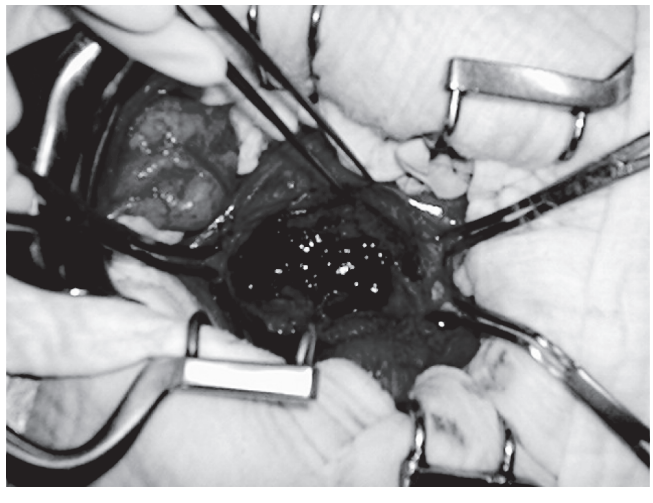


Figure 4 Fresh clotted blood in the abdominal aortic lumen

The remaining 8 patients were discharged from the hospital with satisfactory surgical outcome. All patients were follow up 1 month, 3 months, 6 months and 1 year after operation then received further follow up treatment for each medical condition.

At 3-year follow-up, there were additional 3 deaths due to cardiovascular diseases, COPD and one additional graft loss but no further operative intervention was identified.

DISCUSSION

Aortoiliac occlusive (inflow) diseases have been

Table 5 Duration of patency

	AIE	AFB	*p*-value
< 18 month	2	2	0.757
18-36 month	2	2	

Table 6 Cause of death after open anatomical AIOD type 1 management

Cause of death	Number of patients
Cardiovascular	4
COPD	1

classified into three categories. Less than 10% of inflow diseases are limited to aorta and common iliac artery. Patients with type 1 AIOD are frequently asymptomatic due to the development of collateral. However, for subgroup of patients with AIOD type 1, additional femoro-tibial or tibio-crural diseases with critical limb ischemia has been considered the surgical management for AIOD. An option for AIOD which was summarized by Rutherford included anatomical and extra-anatomical bypass[9]. Because of many type 1 lesions are now treated by endovascular intervention. In the hospital not amenable to catheter-based therapies, the open surgical management of AIOD would be appropriated.

In this study, AIE and AFB for treatment AIOD can be performed with acceptable peri-operative morbidity and mortality. Both AIE and AFB provided good symptomatic relief of AIOD patients. AIE patients appear to have better patency rate after 3 years follow up but limited number of patient (Figure 2).

The recent article by Van Den Akker noted that patient symptom, survival and graft thrombosis were significantly poorer for critical ischemic patients[10]. This observation by Crawford et al. reported significantly early (6% versus 3%) and late mortality (55% versus 33%) rate in patients with rest pain when compared with claudication alone[11].

There were additional two deaths between one and two years after operation in this review. One case was due to cardiovascular with COPD and another case suspicious from acute graft thrombosis followed by further cardiovascular problem.

One case after AIE and concomitant ilio-femoral bypass survived until complete follow up. The most common cause of death for AIOD patient, same as peripheral artery occlusive disease is cardiovascular event (Table 6), as noted by Hertzer NR et al[12].

CONCLUSION

Open anatomical aortic reconstruction, both AIE and AFB, would be safe and effective for symptomatic relief of AIOD type 1 patients with critical limb ischemia in hospital where stent deployment is not possible. The AIE procedure appeared to be safe and equally effective as AFB in term of graft patency and survival (Table 5).

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