

Original Article

Evaluation of Aorto-Bifemoral Bypass in Treatment of Chronic Obstructive Aorto-Iliac Disease

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Abstract - Chronic Aortoiliac Occlusive Disease (AIOD) is a multifactorial vascular disorder, and management of it is considered a challenge for vascular surgeons. **Objective:** The study aims to assess outcomes after aortofemoral bypass. **Patients and Methods:** This is an observational descriptive study of patients with proven diagnosis of AIOD who underwent aortofemoral bypass at the Department of Vascular Surgery- Tishreen University Hospital in Lattakia-Syria from January 2021 through January 2023. **Results:** The population of patients is predominantly males (82.9%), with a mean age of 53.29±5.3 years. The high percentage of patients suffering from various risk factors for AIOD, in which hypertension represents the most frequent one (48.6%), with the presence of a history of smoking in 23 cases (65.7%). The rate of clinical improvement of intermittent claudication is 88.6% at 1 month after surgery, which decreased to 80% at 12 months. There is a significant correlation between the status of peripheral vessels and the degree of improvement, in which the rate of clinical improvement is 89.3% at 12 months after surgery in patients with good blood flow versus 42.9% in cases with poor blood flow, $p < 0.05$. Duration of hospitalization is longer than 7 days in 71.4% of patients, with the incidence of postoperative mortality is 5.7% within 30 days of surgery. Wound infection (11.4%) and sexual dysfunction (11.4%) represent the most frequent early complications, whereas thrombosis of graft (11.4%) represents the most frequent late complication. **Conclusion:** The current study reveals the beneficial effects of aortofemoral bypass on morbidity of AIOD patients' management regarding patency and improvement of clinical symptoms.

Keywords - Aortofemoral, Aortoiliac Occlusive Disease (AIOD), Bypass, Outcome, Syria.

1. Introduction

Aortoiliac Occlusive Disease (AIOD) is defined as an occlusive disease involving the infrarenal aorta and iliac arteries, which results most commonly from atherosclerotic plaques that lead to partial or total vascular occlusion [1,2,3,4]. Aortic bifurcation atherosclerosis was first described by John Hunter in the late 18th century and considered the base for the description of Leriche syndrome [5,6]. Patients share a common pattern of symptoms that range in severity from life-limiting claudication to limb-threatening ischemia [7,8,9,10]. The main indication of surgery is the presence of critical limb ischemia to achieve re-establishment of inflow to the pelvis and lower extremities which represents the main goal of treatment [11,12]. There are various surgical methods to consider when pondering reconstruction of AIOD, in which aortobifemoral bypass represents the most common open surgical intervention used to treat AIOD [13,14,15]. It is defined as the placement of a graft connecting the aorta and one of both femoral arteries in the pelvis to bypass a diseased vessel and increase blood to the legs. It may be performed via either a transperitoneal or retroperitoneal retroperitoneal approach, in which equipoise regarding an end-to-end versus an end-to-side proximal anastomosis must be considered

according to imaging findings of arteries [16,17,18]. Abdominal aorta diseases are encountered frequently in vascular practice, which is associated with significant morbidity as well as the financial burden of medical care. The optimal management of AIOD remains a matter of debate due to the associated operative morbidity and mortality, and aortobifemoral bypass proved to have durable results [19,20]. Therefore, the aims of the study were: 1- to assess the final outcome of patients regarding graft patency rates and clinical improvement. 2- to evaluate short and long-term complications of surgery.

2. Patients and Methods

2.1. Study Population

This was a prospective study of patients with bilateral chronic AIOD attending the Department of Vascular Surgery at Tishreen University Hospital in Lattakia-Syria during two years period (2021-2023). The inclusion criteria were patients of both sexes and from all ages who were candidates for aortobifemoral bypass surgery. The exclusion criteria were the presence of one of the following: acute ischemia, concomitant aneurysm, unilateral AIOD, and only abdominal aorta occlusion. The following workup included a history and physical examination were performed.



Diagnosis of AIOD was made based on the findings of echo-Doppler, computed tomography angiography CTA, and/or contrast aortography. Clinical outcomes included rates of patency at 1, 6, and months after surgery, as well as early complications that occurred during the first month of surgery, late complications that occurred after that, duration of hospitalization and the rate of mortality.

2.2. Ethical Consideration

After discussing the study with the patients, all of them gave complete and clear informed consent to participate in the study. This study was performed in accordance with the Declaration of Helsinki, and approval for the study was obtained from the institutional ethics committee.

3. Statistical Analysis

Statistical analysis was performed by using the IBM SPSS version25. Continuous variables were expressed as mean± standard deviation (SD), and categorical data were reported as frequency and percentages. An Independent student test was used to compare 2 independent groups, and a chi-square test was used to examine the relationships and comparisons between the two groups. Differences were considered statistically significant when p<0.05.

4. Results

4.1. Baseline Characteristics

The ages of the study population range from 40 to 75 years, with a mean age of 53.29±5.3 years. Age group 51-60 years represented the most frequent age group (48.6%), followed by 61-70(25.7%),40-50 years (20%) and >70 (5.7%).

Patients were being predominantly males (82.9%), with the presence of a smoking history in 65.7% of the patients. Arterial hypertension was the most frequent risk factor (48.6%), followed by dyslipidemia (40%) and diabetes

mellitus (34.3%). Patients presented some comorbidity as follows: cardiovascular disease in 5 cases (15.3%), renal failure in 3 cases (8.6%) and chronic obstructive pulmonary disease (COPD) in 1 case (2.9%).

Table 1. Demographic characteristics of the study population

Variable	Result
Age (years)	53.29±5.3
<u>Age groups (n.%)</u>	
40-50	7(20%)
51-60	17(48.6%)
61-70	9(25.7%)
>70	2(5.7%)
<u>Sex (n.%)</u>	
Male	29(82.9%)
Female	6(17.1%)
<u>Smoking (n.%)</u>	
	23(65.7%)
<u>Risk factors (n.%)</u>	
Arterial hypertension	17(48.6%)
Dyslipidemia	14(40%)
Diabetes mellitus	12(34.3%)
<u>Comorbidities (n.%)</u>	
Cardiovascular disease	5(14.3%)
Renal failure	3(8.6%)
Chronic obstructive pulmonary disease (COPD)	1(2.9%)

4.2. Outcomes of Patients

As shown in Table 2, the overall improvement in intermittent claudication and patency rates at 1, 6, and 12 months were 88.65%, 85.7% and 80%, respectively. In contrast, persistent impairment was recorded in 5.7%,8.6% and 14.3% at 1,6 and 12 months, respectively, with an overall mortality rate was 5.7% in the first month after the procedure.

Table 2. Outcomes of the patients and bypass patency during follow-up periods

Time after surgery	Intermittent claudication		Death
	Improved	Not- improved	
1 month	31(88.65%)	2(5.7%)	2(5.7%)
6 months	30(85.7%)	3(8.6%)	2(5.7%)
12 months	28(80%)	5(14.3%)	2(5.7%)

Table 3. Association between outcome and the status of peripheral vessels

Time after surgery	Good blood flow (28 cases)			Poor blood flow (7 cases)	
	Improved	Not- improved	Death	Improved	Not- improved
1 month	26(92.9%)	0(0%)	2(7.1%)	5(71.4%)	2(28.6%)
6 months	26(92.9%)	0(0%)	2(7.1%)	5(71.4%)	2(28.6%)
12 months	25(89.3%)	1(3.6%)	2(7.1%)	3(42.9%)	4(57.1%)

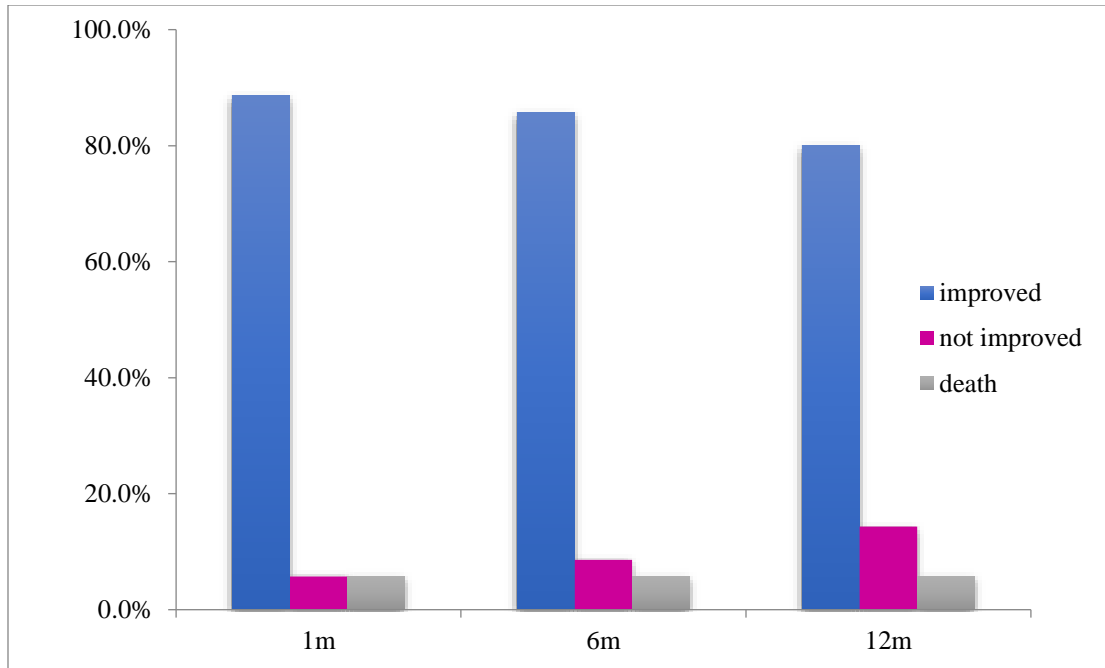


Fig. 1 Outcomes of the patients during follow-up periods

Quality of peripheral vessels affected the final outcome of patients, in which the rates of improvement of intermittent claudication in patients with good vessels versus poor

peripheral vessels at 1, 6, and 12 months were as follows (92.9% vs 71.4%, p:0.002), (92.9% vs 71.4%, p:0.002) and (89.3% vs 42.9%, p:0.001) respectively.

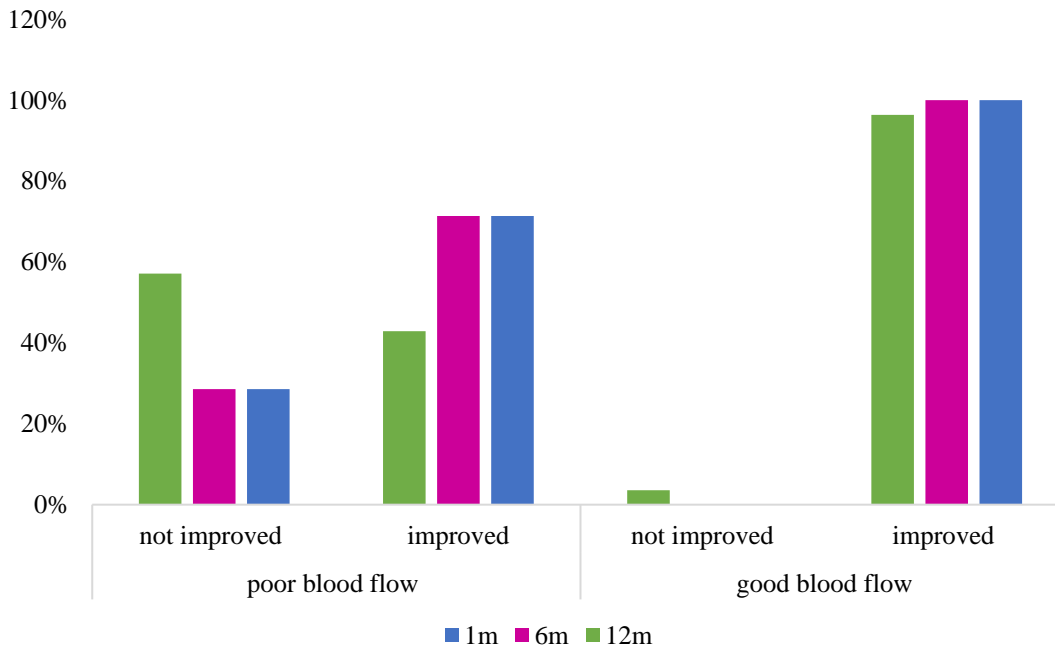


Fig. 2 Association between final outcome and the status of peripheral vessels

10 patients (28.6%) were admitted for less than 7 days in hospital and 25 cases (71.4%) with duration of hospitalization longer than 7 days

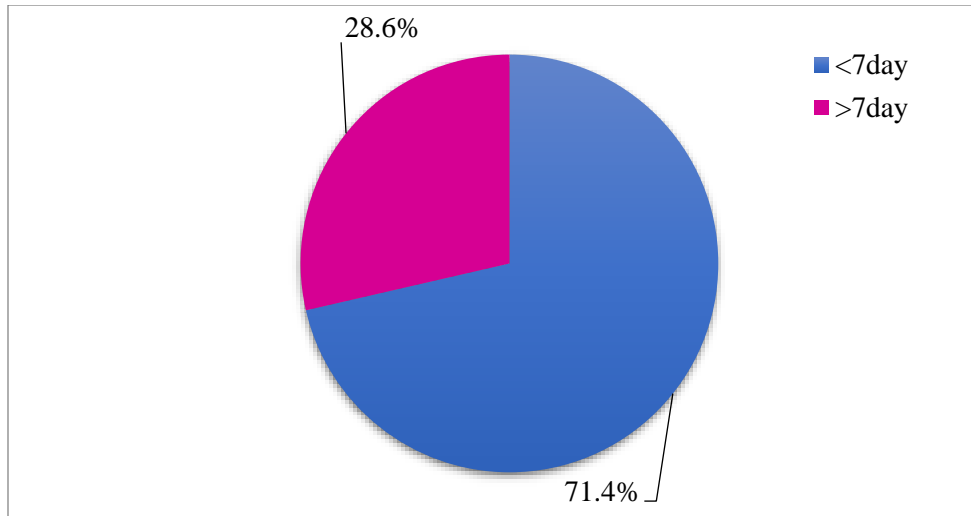


Fig. 3 Duration of hospitalization of the study population

Surgical complications were divided into 2 subgroups according to the time of occurrence, either early or late. Wound infection (11.4%) and sexual dysfunction (11.4%) represented the most frequent early complications, followed

by bleeding (8.6%), acute graft occlusion (8.6%), cardiovascular complications (5.7%), respiratory dysfunction (5.7%), lymphocele (2.9%), and renal dysfunction (2.9%).

Table 4. Early complications of aortobifemoral bypass

Variable	Result
<u>Early complications</u>	
Wound infection	4(11.4%)
Sexual dysfunction	4(11.4%)
Bleeding	3(8.6%)
Acute graft occlusion	3(8.6%)
Cardiovascular complications	2(5.7%)
Respiratory dysfunction	2(5.7%)
Lymphocele	1(2.9%)
Renal dysfunction	1(2.9%)

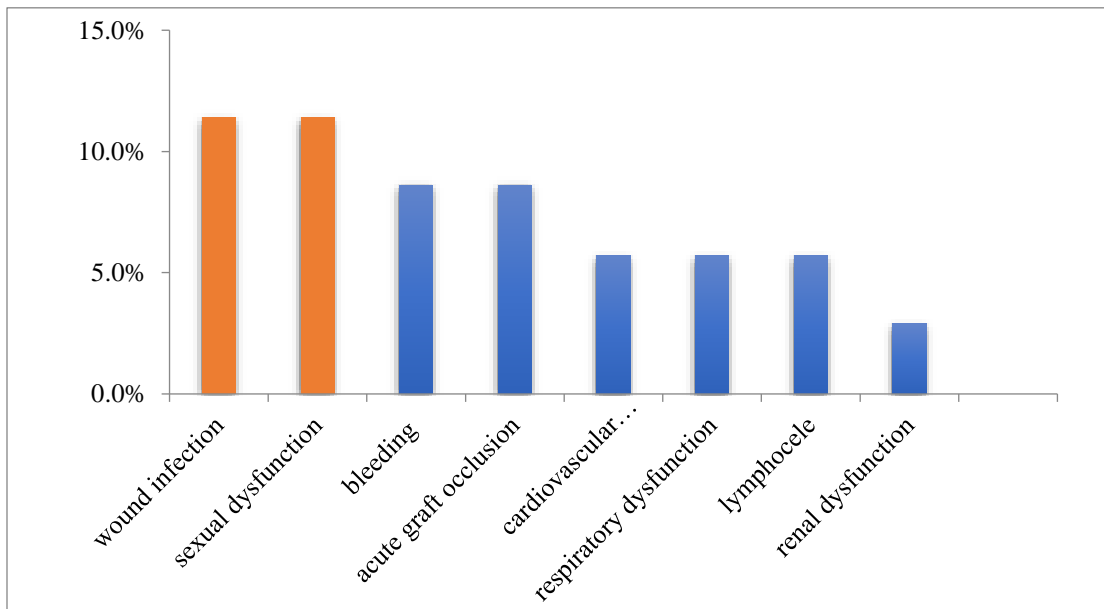


Fig. 4 Early complications of the study sample

Late complications included graft thrombosis (11.4%), graft infection (5.7%), and anastomotic pseudoaneurysm (2.9%).

Table 5. Late complications of aortobifemoral bypass

Variable	Result
<u>Late complications</u>	
Graft thrombosis	4(11.4%)
Graft infection	2(5.7%)
Anastomotic pseudoaneurysm	1(2.9%)

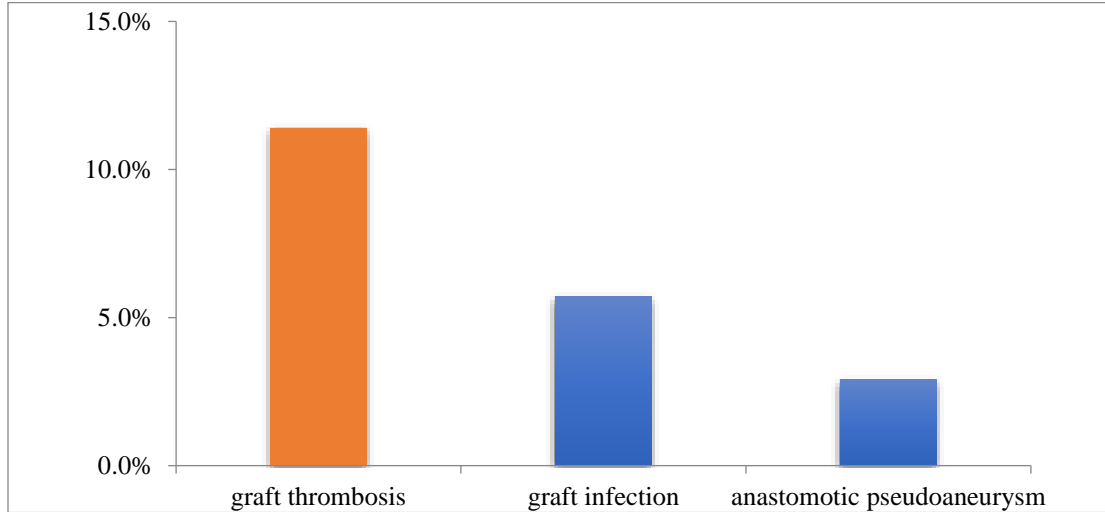


Fig. 5 Late complications of the study population

5. Discussion

Aortobifemoral bypass has been considered the gold standard in the management of patients with AIOD due to its efficacy and safety. The current study revealed the main findings: first, the majority of the patients were males and in the age group 51-60 years, which might be explained by a high frequency of atherosclerosis in this group that represents the main etiology of obstructive lesions in the aorta and iliac arteries. This finding is in agreement with Kalko et al. (21), Sen et al. (22), Ozcan et al. (23), Kim et al. (24), and Raad et al. (25). Second, patients had various rates of risk factors for AIOD, in which hypertension represented the most frequent one, as well as the presence of a history of smoking in approximately two-thirds of patients. These findings are in agreement with Kalko et al. (21), Sen et al. (22), Ozcan et al. (23), Kim et al. (24), and Raad et al. (25). Third, clinical improvement in intermittent claudication was recorded in 88.6% of the patients after one month of surgery which decreased to 80% after 12 months. Raad et al. study demonstrated that the rate of clinical improvement was 92.7% after one month which decreased to 85.4% after 12 months of intervention. Ozcan et al. (23) demonstrated that the patency rate was 100% at discharge without the presence of periods of follow-up. In addition, there was a significant correlation between the degree of improvement and the status of peripheral vessels, in which the rate of improvement was 89.3% in patients with good blood flow versus 42.9% in the cases with poor blood flow. Fourth, many complications occurred in the early stages after surgery, in which wound

infection, sexual dysfunction, bleeding, and acute graft occlusion represented the most frequent complications. Bleeding was due to heparin-induced thrombocytopenia in two cases, whereas other cases resulted from technical errors in aortic anastomosis.

Additionally, sexual dysfunction occurred in four patients, which resulted from injury to the periaortic autonomic nervous. One case of acute graft occlusion was in a patient with poor blood flow, and two cases were in patients with good blood flow, which resulted from aorta embolism in one case and from technical error in distal anastomosis in another case. Graft thrombosis represented the most frequent late complication, in which abnormalities of anastomosis, such as atherosclerotic deterioration and intimal hyperplasia, represented the principal etiologies for this complication.

Kalko et al. reported the following early complications: bleeding (1.2%), respiratory injuries (7.2%), and renal complications (17.7%).

Sen et al. recorded various early complications as follows: wound infection (7%), bleeding (2%), acute graft occlusion (15.2%), as well as complications related to cardiovascular (3%), respiratory (5%) and renal (2%) systems. Late complications included graft thrombosis (4%) and graft infection (2%).

Kim et al. reported the following early complications as follows; wound infection (13%), bleeding (2%), acute graft occlusion (1.9%), as well as complications related to cardiovascular (6.2%), respiratory (7.1%) and renal (0.9%) systems. In addition, late complications included only graft infection (0.6%).

Raad et al. reordered the following early complications as follows: sexual dysfunction (5.5%), bleeding (3.6%), acute graft occlusion (7.3%), and complications related to cardiovascular (3.6%), respiratory (1.8%) and renal (1.8%) systems, as well as late complications included graft thrombosis (7.3%) and graft infection (1.8%).

Duration of hospitalization was longer than 7 days in 28.6% of the patients in the current study versus 63.6% in the Raad et al study. Finally, the mortality rate in the current study was 5.7% (one case was due to myocardial infarction, and the

another resulted from idiopathic hemolysis). By comparison with the previous studies, Mortality rates were as follows: Kalko et al. (1.2%), Sen et al. (3%), Kim et al. (3.6%) and Raad et al. (3.6%).

6. Conclusion

The current study revealed an improved one-year outcome of aortobifemoral bypass in the management of AIOD patients, which became a successful technique. It is essential to do a thorough evaluation of patients to detect modifiable risk factors in all patients with established PAD, as well as good attention to sterilization to prevent infection to improve the final outcome of patients.

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