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The role of axillofemoral bypass in current vascular surgery practice



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Abstract

BACKGROUND: In the era of increasing endovascular approaches for aortoiliac disease, we sought to determine the role of axillofemoral bypass in contemporary practice.

METHODS: All axillofemoral bypasses performed at our institution from 2006 to 2013 were reviewed for indication, patency, and survival and compared with our prior published series before the widespread use of endovascular techniques (1996 to 2001).

RESULTS: During the study period, 90 bypasses (29 axillofemoral and 61 axillobifemoral) bypasses were performed. The number of procedures performed decreased from an average of 24 to 12 procedures per year in historical and contemporary groups, respectively. Indications have changed significantly with more urgent or emergent procedures. Overall patency at 1 and 2 years was 74.6% and 67.8%, respectively. Median survival was 40.3 months, with overall survival 67.0% and 54.2% at 1 and 2 years, respectively.

CONCLUSIONS: Axillofemoral bypass is an increasingly uncommon procedure and more likely performed for limb salvage in urgent or emergent settings.

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Axillofemoral and axillobifemoral bypasses, previously integral components of vascular surgery offered primarily to patients with severe aortoiliac occlusive disease who were not candidates for an aortic-based repair¹ have largely been replaced by endovascular revascularizations in the

atherosclerotic patient population. Traditionally, axillofemoral or axillobifemoral bypass has been an approach to treat patients with high open surgical risk with threatened limbs due to aortoiliac occlusive disease, infected in situ aortic grafts, or intra-abdominal sepsis. In addition to high-risk patients with significant medical comorbidities limiting an open surgical approach, axillofemoral, and axillobifemoral bypass grafts are also be considered in patients with multiple prior abdominal surgeries, abdominal hernia reconstruction with mesh, colostomy or ileostomy, extensive intra-abdominal adhesions, or previous pelvic radiation therapy.

Despite endovascular revascularization options, axillofemoral bypass still finds utility in urgent and emergent situations where other forms of revascularization are not

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feasible or appropriate, such as cases of acute limb ischemia with aortoiliac thrombosis² or dissection,³ aortic graft infections,⁴⁻⁶ or poor access vessels limiting an endovascular approach. We sought to determine its role in contemporary vascular practice.

Methods

This retrospective study was approved by the Oregon Health & Science University (OHSU) Institutional Review Board. All axillofemoral and axillobifemoral bypasses performed at OHSU from 2006 to 2013 were reviewed for indication, patency, and survival. This current series was compared with prior published series from our group predating widespread use of endovascular techniques (1996 to 2001).⁷ Patient demographics including age, gender, smoking history, and medical comorbidities were reviewed. Indications for procedure were reviewed and categorized.

Patients are evaluated with a history and physical including a complete vascular examination. Preoperative assessment of the inflow vessel consists of bilateral upper-extremity blood pressure measurements and vascular examination of bilateral upper extremities. Equivalent blood pressures and pulse examination of bilateral upper extremities suggest sufficient inflow for axillofemoral bypass. An abnormal examination necessitates further work up with computed tomography angiography of the upper extremities.

Axillofemoral bypasses were performed under general anesthesia. Conduits for bypass include ringed polytetrafluorethylene graft, autologous femoral vein, and cryopreserved femoral vein. Routine graft surveillance with serial duplex ultrasonography is performed. A previously published review of axillofemoral bypasses performed at our institution showed that midgraft peak systolic velocities less than 80 cm/s were significantly correlated with thrombosis.⁷ At our institution, midgraft velocity remains the best predictor of long-term patency.

After axillofemoral bypass, all patients are placed on an antiplatelet unless otherwise contraindicated. In cases of recurrent graft thrombosis or if patients have other indications to be anticoagulated, warfarin, or newer direct oral anticoagulants are prescribed.

Postoperatively, axillofemoral bypasses are evaluated with duplex ultrasonography before discharge from the hospital. We perform grafts surveillance of axillofemoral bypasses every 3 months in the 1st year and then biannually in the 2nd year and then usually annually thereafter.

Statistical analyses were performed using IBM SPSS Statistics (version 22) and Student's *t*-test, chi-square, and Kaplan–Meier analyses were applied as appropriate. A *P* value of .05 was set as the level of significance.

Results

During the study period, 90 axillofemoral bypasses (29 axillofemoral and 61 axillobifemoral) bypasses were

performed. There has been a significant decrease in number of procedures performed in the contemporary series as compared with the previously published series, with an average of 24 procedures per year from 1996 to 2001, and only 12 procedures per year from 2006 to 2013 ($P < .05$).

Indications for bypass have changed significantly (Table 1). Previously, approximately three-fourth of patients had chronic atherosclerotic disease and presented with either claudication or critical limb ischemia. In the current series, the proportion treated for chronic conditions was less than half, with greater than half having urgent or emergent problems, such as aortic graft infections and acute limb ischemia. No significant differences were noted demographically between current and prior patient cohorts (Table 2), although there was a trend for increased coronary artery disease in the older series (54% vs 39%, $P = .06$), which may reflect the change in indications away from the atherosclerotic population.

Overall patency at 1 and 2 years was 74.6% and 67.8%, respectively. Patency rates at 1 and 2 years were similar for chronic (72.1% and 72.1%, respectively) and acute (75.8% and 50.5%, respectively) ischemia, whereas, for infection, patency rates were significantly higher (93.8% and 93.8%, respectively, $P < .05$).

Median survival was 40.3 months, with overall survival 67.0% and 54.2% at 1 and 2 years, respectively. This was similar for all indications (chronic ischemia 73.2% and 54.3%, respectively, median 33.0 months; acute ischemia 55.9% and 55.9%, respectively, median 40.3 months; infection 67.7% and 58.0%, respectively, median 45.8 months, $P = .25$).

Comments

Axillofemoral bypass is gradually being relegated to an emergent bail out procedure for conditions such as limb ischemia secondary to aortic thrombosis,² dissection,³ or graft infections.^{4,5} In addition, the total volume of this procedure has decreased from an average of 12 procedures per year during the period between 2006 and 2013 as compared with an average of 24 procedures per year from 1996 to 2001. The overall patency⁸⁻¹¹ and survival^{12,13} rates of axillofemoral bypass in this series are comparable with previously published rates.

Table 1 Indications for axillofemoral bypass

Indication	2006–2013	1996–2001	Difference (<i>P</i>)
	(n = 90), n (%)	(n = 78), n (%)	
Claudication	6 (6.7)	15 (19)	.01
Critical limb ischemia	37 (41.1)	43 (55)	.07
Acute limb ischemia	29 (32.2)	11 (14)	.006
Graft infection	16 (17.8)	9 (12)	.25
Other	2 (2.2)	0 (0)	.18

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