Outcomes Comparison of Chest Wall Arteriovenous Grafts and Lower Extremity Arteriovenous Grafts in Patients with Long-standing Renal Failure

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Disclosure

Speaker name: .................................................................................

I have the following potential conflicts of interest to report:

☐ Consulting
☐ Employment in industry
☐ Stockholder of a healthcare company
☐ Owner of a healthcare company
☐ Other(s)

☑️ I do not have any potential conflict of interest
The Kidney Disease Outcomes Quality Initiative (KDOQI) guidelines provide an **algorithm** for placement of various fistulas and grafts, but it does not provide definitive instructions for patients with exhausted arm access.


Clinical Approach

- Complex AVG
  - Upper arm
  - Chest
  - Thigh
• **Objective**

  The chest wall arteriovenous grafts (CWAVG) is becoming an alternative option for patients who have exhausted traditional upper extremity access which used to be lower extremity arteriovenous grafts (LEAVG); however, which should be applied preferentially is unclear.

• **Methods**

  A retrospective review of chest wall arteriovenous grafts and lower extremity arteriovenous grafts implants from August 2010 to January 2015 was performed. Patient demographics, medical history, procedural data, and outcomes were evaluated.
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<th>Variable</th>
<th>CW AVG</th>
<th>LE AVG</th>
<th>P value</th>
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<tbody>
<tr>
<td>N</td>
<td>27</td>
<td>12</td>
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<tr>
<td>Age</td>
<td>58.3</td>
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<tr>
<td>Gender (Female)</td>
<td>60.9</td>
<td>65.4</td>
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<td>Diabetes</td>
<td>42.3</td>
<td>46.5</td>
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<td>No. of previous accesses</td>
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<td>Years on dialysis</td>
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<td>Previous ipsilateral dialysis catheter (%)</td>
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<tr>
<td>CAD (%)</td>
<td>1.24</td>
<td>1.26</td>
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</tr>
<tr>
<td>PVD (%)</td>
<td>1.89</td>
<td>1.45</td>
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术后一个月复查
• 12 month
• primary patency 83.3%,
• second patency 100%. 

<table>
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<td>2013</td>
<td>Otani, M</td>
<td>Anterior chest wall arteriovenous graft for dialysis</td>
<td>J Vasc Access</td>
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<td>2010</td>
<td>Park, B J</td>
<td>Percutaneous intervention in axillary loop-configured arteriovenous grafts for chronic hemodialysis patients</td>
<td>Korean J Radiol</td>
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<td>2008</td>
<td>Morsy, M</td>
<td>Prosthetic axillary-axillary arteriovenous straight access (necklace graft) for difficult hemodialysis patients: a single-center study</td>
<td>J Vasc Surg</td>
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<td>Axillary loop grafts for hemodialysis access: midterm results from a single-center study</td>
<td>J Vasc Surg</td>
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<td>2008</td>
<td>Kendall, T</td>
<td>The role of the prosthetic axilloaxillary loop access as a tertiary arteriovenous access procedure</td>
<td>J Vasc Surg</td>
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<td>1996</td>
<td>McCann, R L</td>
<td>Axillary grafts for difficult hemodialysis access</td>
<td>J Vasc Surg</td>
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Percutaneous Intervention in Axillary Loop-Configured Arteriovenous Grafts for Chronic Hemodialysis Patients

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Hyoung Rae Kim, MD2
Hwan Hoon Chung, MD1
Deuk Jae Sung, MD1
Sang Joon Park, MD1
Ho Sung Son, MD1
Sang Kyung Jo, MD1
Yun Hwan Kim, MD1
Sung Bom Cho, MD1

Objective: The purpose of this study was to evaluate the fistulographic features of malfunctioning axillary loop-configured arteriovenous grafts and the efficacy of percutaneous interventions in failed axillary loop-configured arteriovenous grafts.

Materials and Methods: Ten patients with axillary loop-configured arteriovenous grafts were referred for evaluation of fistulography and percutaneous interventions. Fistulography and percutaneous transluminal angioplasty and stenting were performed in eight patients (average: 2 sessions). An interventional procedure was not done in two patients. The overall procedure success rate was 80%. The overall primary and secondary post-intervention primary and secondary patency rates were 38% and 63% at six months, respectively.

Conclusion: Dysfunctional axillary loop-grafts always had subclavian venous and graft-related stenoses. Percutaneous transluminal angioplasty is helpful to overcome this and the major role in restoring and maintaining the function of loop grafts.

Fig. 1. A 43-year-old female patient (case no. 1) was referred for evaluation of graft patency due to clot aspiration. Initial fistulogram showed stenosis at arterial and venous anastomoses (A). Percutaneous transluminal angioplasty was performed with 7 mm x 4 cm sized balloon catheter (B, C). Final fistulogram showed improvement of stenosis and no flow disturbance (D). Hemodialysis has been performed with this axillary to axillary autogenous arteriovenous fistula graft for 262 days after percutaneous intervention.
Fig. 2. 54-year-old female patient (case no. 10) was referred for evaluation of upper arm swelling. Venography and fistulography showed stenosis in subclavian vein with multiple collateral veins and normal fistulogram (A). After conventional balloon angioplasty, waist of stenosis did not disappear. We used 8 mm × 2 cm sized cutting balloon (B) and we performed repeated percutaneous transluminal angioplasty with 14 mm × 4 cm balloon catheter. Waist then disappeared (C). Immediate elastic recoil was found on post-procedural venography (D). Three days after percutaneous transluminal angioplasty, 14 mm by 6 cm sized Hercules stent was placed (E), and venogram showed no flow disturbance in arteriovenous graft and subclavian vein.
Axillary loop grafts for hemodialysis access: Midterm results from a single-center study

Elixène Jean-Baptiste, MD, Réda Hassen-Khodja, MD, Pierre Haudebourg, MD, Serge Declemy, MD, Michel Batt, MD, and Pierre Jean Bouillanne, MD, *Nice, France*

**Purpose:** This study reports our midterm results with arteriovenous axillary loop grafts (AVALG) and evaluates their role in construction of vascular access for patients on chronic hemodialysis.

**Methods:** The clinical data of 27 patients who underwent construction of an AVALG for hemodialysis access at our institution between July 2002 and December 2006 were analyzed retrospectively. Outcome measures included graft patency, the complication rate, and the frequency and morbidity of secondary procedures after AVALG creation. The Kaplan-Meier method was used to calculate the primary and secondary patency curves.

**Results:** AVALG was constructed as the first access procedure in eight patients: five patients with no suitable vein to construct an adequate angioaccess on the upper limbs, and three patients with elbow and forearm arteritis. The 19 other patients had all had two to five failed prior vascular accesses leading to exhaustion of venous access sites on the upper extremities (18 cases), or a steal syndrome (one case). No postoperative death occurred, but four patients died of causes unrelated to the intervention between the second and the tenth postoperative months. The mean follow-up was 15 months (range, 2-48 months). The primary patency rate at 12 months and the secondary patency rate at 18 months were 51% and 80%, respectively. Infection (three cases), thrombosis (seven cases), and stenosis of the outflow vein (two cases) were the main complications, occurring in 10 of the 27 patients (41%). Twelve secondary procedures were performed in these 10 patients with little additional morbidity. Five of the 27 patients developed irreversible AVALG occlusion leading to access loss: two patients with concomitant graft infection and three patients with a history of subclavian vein catheterization.

**Conclusion:** AVALG may represent a supplementary option for chronic hemodialysis patients with vascular steal or inadequate upper extremity venous access sites. *(J Vasc Surg 2008;47:138-43.)*
Prosthetic axillary-axillary arteriovenous straight access (necklace graft) for difficult hemodialysis patients: A prospective single-center experience

Mohamed A. Morsy, MD, PhD, Asif Khan, MBBS, and Eric S. Chemla, Bsc, MD, FRCS, London, United Kingdom

Background: It is not uncommon for all usual upper limb autogenous access sites to fail, often in patients for whom neither peritoneal dialysis nor transplantation is an appropriate option. Axillary-axillary arteriovenous bypass grafts could be used as the last option before a thigh autogenous access even in case of unilateral central venous stenosis or obstruction. We describe our experience with this procedure in a series of patients.

Methods: A consecutive series of 18 patients for whom all possible arm accesses had failed and neither peritoneal dialysis nor transplantation was possible underwent a necklace graft formation over a 2.5-year period. All grafts implanted were 6 mm, internally reinforced prostheses made of expanded polytetrafluoroethylene (PTFE, Gore-Tex Interlocking Vascular Graft, W. L. Gore and Associates, Inc, Flagstaff, Ariz) anastomosed end to side the axillary artery and contralateral vein, and tunneled straight in the subcutaneous space before the sternum. All patients had bimonthly clinical examinations in which the thrill, bruit, skin, cannulation sites, and dialysis adequacy were reviewed. They also had at the same time a transonic assessment where graft flows and recirculation rates were measured. In case of low flow (<600 mL/min) or drop of 20% between two measurements or recirculation >5% a fistulogram was obtained, and an intervention was performed to restore patency.

Results: We operated on 10 males and 8 females; mean age was 55.1 years. The primary patency was 83% and 72.2%, and the secondary patency was 94.4% and 88.9% at 6 months and 1 year, respectively. Five successful surgical revisions were carried out for four clotted grafts and one post dialysis rupture. One surgical revision for thrombosis failed and one local infection lead to thrombosis and was not amenable to surgical revision. Three patients died of causes unrelated to their vascular access during the study period.

Conclusion: The reasonable patency and minimal complications associated with these bypasses show that they are a valid option for complex patients. We advocate the use of this bypass in patients with exhaustion of all access possibilities in both arms with a patent superior vena cava, subclavian, and brachiophallic veins. We also indicate it in case of unilateral central venous stenosis or obstruction with complete exhaustion of all other access possibilities on the contralateral side.

(J Vasc Surg 2008;48:1251-4.)

Fig. Kaplan-Meier curves showing primary and secondary patencies.
The role of the prosthetic axilloaxillary loop access as a tertiary arteriovenous access procedure


Purpose: In the last decade, the Dialysis Outcome Quality Initiative (DOQI) Guidelines have enhanced the longevity of patients with end-stage renal disease (ESRD) on hemodialysis. Consequently, surgeons are increasingly challenged to provide vascular access for patients in whom options for access in the upper extremity have been expended. This situation is even more problematic in the morbidly obese patient on hemodialysis. Our group previously reported a high rate of infection and need for secondary interventions in obese patients with prosthetic femorofemoral access. We now report a series of patients who underwent placement of a prosthetic axilloaxillary loop access. This study presents our technique and evaluates our results, particularly as they relate to the obese patient.

Methods: From January 1998 to May 2006, 34 prosthetic axilloaxillary loop accesses were placed in 32 patients with ESRD. Eleven patients (12 accesses) were obese, as defined by a body mass index ≥30 kg/m². Median follow-up was 16 months. Kaplan-Meier analysis was used to determine primary and secondary patency as well as patient survival for the entire cohort and for the obese and nonobese patient cohorts. Survival curves were compared using the log-rank test for equality over strata.

Results: The secondary patency rate was 59% at 1 year (median, 18 months). The 1-year patient survival was 69%. Infection occurred in 15% of patients. Comparison of the obese vs nonobese cohorts demonstrated no statistically significant difference in 1-year primary patency (36% vs 10%, P = .17) or secondary patency (71% vs 65%, P = .34). There were no infections in the obese cohort.

Conclusion: These data show that the prosthetic axilloaxillary loop access has acceptable outcomes and should be considered the tertiary vascular access procedure of choice in the obese patient on hemodialysis. (J Vasc Surg 2008;48: 889-93.)
Axillary grafts for difficult hemodialysis access

Richard L. McCann, MD, Durham, N.C.

Purpose: This study describes the largest reported experience to date with axillary artery–to–axillary vein or axillary artery–to–jugular vein polytetrafluoroethylene bridge fistulas for hemodialysis access. The purpose of the study was to determine the incidence of complications and the durability of the access to better determine the role of this procedure in the dialysis access algorithm.

Methods: A single center’s experience over a period of 5 years was retrospectively reviewed.

Results: Twenty-six axillary grafts were placed in 24 patients. All but one were used for dialysis. At the time of access creation, the patients had been undergoing dialysis for a mean of 77 months (range, 5 to 256 months), had had a mean of 9.4 previous access procedures, and had exhausted all arm sites. The life-table patency rate at 3 years was 60%. The incidence of infection and thrombosis were comparable with conventional arm bridge fistulas. Neither vascular steal phenomenon nor neurologic injury occurred in this series.

Conclusions: Axillary artery–to–axillary vein or axillary artery–to–jugular vein polytetrafluoroethylene bridge fistula is an excellent and durable secondary access strategy. We recommend that it be used after exhaustion of conventional arm sites. (J Vasc Surg 1996;24:457–62.)

1996年McCann报道了一组26例胸壁人工血管通路的结果
自腋动脉至对侧腋静脉或颈内静脉采用直形人工血管
动静脉通路2年时的二期通畅率为60%
TRADITIONAL LE AVG

- INFECTION

- ISCHEMIA

改良下肢AVG术前评估
AVG PATENCY
<table>
<thead>
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<th>Type of intervention</th>
<th>CW AVG</th>
<th>LE AVG</th>
<th>P value</th>
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<tbody>
<tr>
<td>PTA</td>
<td>0.52</td>
<td>0.28</td>
<td>0.32</td>
</tr>
<tr>
<td>Thrombectomy</td>
<td>1.77</td>
<td>2.15</td>
<td>0.40</td>
</tr>
<tr>
<td>Surgical revision</td>
<td>0.20</td>
<td>0.29</td>
<td>0.79</td>
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## Frequency of AVG interventions

<table>
<thead>
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<th>CW AVG</th>
<th>LE AVG</th>
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<td>0.29</td>
<td>0.79</td>
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</table>
• **Results**

• Within the time periods, 27 chest wall arteriovenous grafts were placed in 27 patients and 12 LEAVGs were placed in 12 patients. Demographics were similar between the two groups for many factors; Mean follow-up was 12.1 months for the CWAVG group and 13.5 months for the LEAVG group. The principal difference was the number of interventions to maintain patency, which was 2.21 per year in the CWAVG group and 1.17 per year in the AVG group ($P < 0.05$). Secondary patency at 6 months was 77% for the CWAVG patients and 83% for the LEAVG patients ($P > 0.05$). The CWAVG and LEAVG groups had no difference in infection rate per 1000 days (0.56 vs 0.61 $P > 0.05$) or mortality rate at 6
• **Conclusions**

• In access challenged patients, LEAVG and CWAVG offer similar rates of secondary patency, infection, and all-cause mortality. The LEAVG required fewer interventions to maintain patency, and the CWAVG maintains the benefit of utilizing the upper extremity site of venous drainage.

• In our practice, we prefer the CWAVG to LEAVG, especially in patients with peripheral arterial disease and in the obese population, because it preserves lower extremity access options.
Thanks!