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The Natural History of Upper Arm Vessels After Placement of a Forearm Arteriovenous Graft: A Pilot Study

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Mentor: Ryan Mullane

Program: Nephrology

Type: Original Research

Background: Arteriovenous fistulas (AVF) are the preferred vascular access in hemodialysis (HD) patients. Smaller pre-operative vessel diameters decrease subsequent AVF patency and often leads to avoidance of AVF for initial HD access. Among patients with marginal vessel diameters, arteriovenous grafts (AVG), including forearm arteriovenous grafts (fAVG), may be a preferred alternative. Prior studies demonstrated proximal vessel remodeling after fAVG creation, but timing of these changes is unknown. In this pilot study, we aimed to determine the timing and degree of vessel remodeling following fAVG creation.

Methods: We prospectively evaluated the basilic and cephalic veins, and brachial artery in 10 patients undergoing fAVG placement. Vessel diameter was assessed by ultrasound prior to surgery and at 1, 4, 12 and 27 weeks post- fAVG, and compared across the respective time points. The brachial artery was measured near the antecubital fossa, while the cephalic and basilic vein were measured at the antecubital fossa (AC), mid upper-arm (MID), and proximal upper-arm (UP).

Results: Basilic vein diameter increased at week one across all sites and continued to increase through week 12. The change in the cephalic vein was less than the basilic vein, but the AC location increased from baseline to week 12. The increase in mean brachial artery diameter reached significance at week 12.

Conclusion: In our pilot cohort, we observed substantial increases in basilic vein diameter, and cephalic vein diameter following fAVG creation. The rapid increase in size of upper arm vessels may improve the success of secondary upper arm fistula formation. ■

Table 1.
Mean vessel diameters from preoperative baseline to 27 weeks post-operative f-AVG placement.

	Baseline (cm)	1 Week (cm)	4 Weeks (cm)	12 Weeks (cm)	27 Weeks (cm)
Basilic Vein					
Antecubital	0.29	0.49	0.58	0.57	0.53
Mid Upper Arm	0.36	0.59	0.62	0.65	0.62
Prox Upper Arm	0.37	0.74	0.72	0.65	0.64
Cephalic Vein					
Antecubital	0.30	0.37	0.34	0.45	0.50
Mid Upper Arm	0.22	0.31	0.33	0.37	0.45
Prox Upper Arm	0.29	0.32	0.35	0.32	0.40
Brachial Artery					
	0.41	0.49	0.50	0.53	0.49

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Cost Analysis of Reducing Peri-Operative Eye Drop Regimen at the VA Health System

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Mentor: Millicent Palmer-Johnson

Program: Ophthalmology

Type: Original Research

Background: Eye surgeries are one of the most commonly performed procedures worldwide. Improved surgical techniques and instrumentation have significantly decreased the number of complications and provided the opportunity to reduce the need for topical eye medications. We aim to examine the potential financial benefits to the VA health care system after implementing a reduced peri-operative eye drop schedule.

Methods: After reviewing the costs of various peri-operative eye drops obtained through the Veteran's Administration Hospital, analysis was conducted on the potential risks and benefits of each medication. It was determined that dexamethasone 0.1%, neomycin sulfate 3.5mg/mL and polymyxin B sulfate 10,000 U/mL (Maxitrol®) can act to prevent post-operative complications while allowing for simpler instruction to patients, which would reduce confusion and potentially improve medication compliance. Ketorolac 0.5% would only be used in patients at increased risk of developing cystoid macular edema (previous history of diabetic retinopathy or uveitis). A cost-analysis was then performed for the current and proposed drop regimens. A pre- and post-implementation survey will be given to the ancillary staff and physicians to determine the effects of the implementation.

Results: The costs of the current and reduced peri-operative drop regimen were calculated (Table 1). A cost reduction of 58.6% to 81.5% was calculated depending on the optional addition of Ketorolac.

Conclusion: A consolidated peri-operative drop regimen for routine ophthalmic surgery confers a substantial cost benefit while reducing eye drop burden to the patient and simplifying patient instruction. ■

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Table 1.
Total costs for the Omaha VA Hospital of current peri-operative drop regimen compared with total costs for the reduced peri-operative drop regimen.

Current Peri-operative Drop Regimen				
Medication	**Instructions**	**Application**	**Phase of care**	**Cost**
Lidocaine gel 3.5%	Once. Prior to surgery, administered by pre-op nurses.	Topical anesthesia	Pre-operative	$2.71
Cyclopentolate 1%	The night before surgery use 2 times, 5 minutes apart just before bedtime. The morning of surgery use 3 times 5 minutes apart just prior to leaving home for the hospital.	Pupillary dilation	Pre-operative	$1.10
Ketorolac 0.5%	QID. Start 2 days prior to surgery and continue for 2 weeks after surgery.	Prevention of cystoid macular edema	Pre- and post-operative	$4.69
Prednisolone acetate 1%	QID. Start after surgery and decrease by 1 drop each week for 4 weeks.	Control of intraocular inflammation	Post-operative	$11.52
Polytrim 0.1%:	QID. Start 2 days prior to surgery and continue after surgery for 1 week.	Prevention of infection	Pre- and post-operative	$0.01
Total cost per surgery				**$20.03**
Total cost per year (800 surgeries)				$16,024.00

Reduced Peri-operative Drop Regimen				
Medication	**Instructions**	**Application**	**Phase of care**	**Cost**
Cyclopentolate 1%	The morning of surgery just prior to leaving home for the hospital.	Pupillary dilation	Pre-operative	$1.10
Maxitrol	TID. Start after surgery for two weeks, then stop.	Prevention of infection and inflammation	Post- operative	$2.61
Ketorolac 0.5%	TID. For patients with diabetic retinopathy or uveitis. Use for 2 weeks after surgery, then stop.	Prevention of cystoid macular edema	Pre- and post-operative	$4.69
Total cost per surgery				**$8.40**
Total cost per year with ketorolac				**$6,720.00**
Total cost per year without ketorolac				$2,968.00

Patient and Surgical Characteristics of Lumbar Spinal Fusions involving Methadone Analgesia

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Mentor: Chris A. Cornett

Program: Orthopaedic Surgery

Type: Original Research

Background: Randomized controlled trials have demonstrated that administration of methadone during lumbar spinal fusion surgery decreases pain scores and narcotic consumption in the immediate post-operative period. The purpose of this study is to report patient and surgical characteristics in cases of lumbar spinal fusion where methadone was used as an adjunct analgesic on the day of surgery.

Methods: This is a single institution retrospective review of patients undergoing lumbar posterior spinal fusion (PSF) or transforaminal lumbar interbody fusion (TLIF) over a two-year period from 7/1/2019 – 7/1/2021. Patients were identified using the CPT codes for PSF and TLIF. The electronic medical records of these patients were queried to identify patients who had received methadone on the day of their surgery. Patient characteristics that were collected include opioid consumption within 6 months prior to surgery, history of prior lumbar spine surgery, age, body mass index (BMI), sex, smoking status, ASA class, and opioid consumption status at three weeks and six months post-operatively. Operative data collected included surgeon's details, adjunctive use of ketamine, type of procedure, and estimated blood loss (EBL).

Results: A total of 527 patients were identified of whom 29 (5.5%) received methadone on the day of surgery. The male/female ratio was 15:14 with an average age of 63 years and an average BMI of 31.5. Six patients (21%) were current smokers during the time of their surgery and 11 patients (38%) were using opioids pre-operatively. Most patients were categorized as ASA class 3 (24/29, 83%), and the rest were ASA class 2. Notably, 18 patients (62%) had a history of prior lumbar spine surgery. The average number of levels fused was 3.3 (SD 2.4, range 1-10), with an average EBL of 422 mL. Overall, the number of patients using opioids at three weeks and 6 months post-operatively were 19 (66%) and 5 (17%) respectively.

Conclusion: A small percentage of lumbar fusion procedures received methadone analgesia at our institution. Most patients who received methadone analgesia had a history of prior lumbar spine surgery and were undergoing multi-level surgery. The main limitation of this study is its retrospective nature. Future research should include comparative studies to assess the differences in outcomes between patients who receive methadone versus those who do not. ■

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