

Flow-assisted Surgical Technique during Popliteal to Popliteal (Pop - Pop) Bypass

Drawn from the surgical expertise of Dr. med. Tanja Frieß, MHBA, Clinic for Vascular Surgery, Mainz, Germany

*Flow-Assisted Surgical Techniques ("F•A•S•T") and Protocols are drawn from surgical experiences by transit-time flow measurement users and passed along by Transonic for educational purposes. They are not intended to be used as sole basis for diagnosis. Clinical interpretation of each patient's individual case is required.

Introduction

Popliteal artery aneurysms (PAA), while rare, are the most common peripheral aneurysms.¹ One treatment is open surgical repair with a harvested saphenous vein used as a bypass graft from the Arteria poplitea P1 (above the knee joint) to the Arteria poplitea P3 (below the knee joint) (Fig. 1). During open repair, blood flow is measured intraoperatively at points A and B to assure adequate flow through the bypass to the lower extremity.

Saphenous Vein Bypass Graft Flow Measurement

(Excerpted from Transonic Peripheral Vascular Medical Note (VS-401-mn) RevE 2023, Courtesy of Ian Gordon, MD, PhD, Professor, Dept. of Surgery, Univ. of CA, Irvine, CA)

Proximal Flow: To measure flow in a saphenous vein bypass graft, the Flowprobe is placed just distal to the proximal anastomosis (Fig. 1: A). Flow is documented and a representative flow waveform is generated. An artifact in the flow versus time waveform indicates the presence of a hemodynamically significant stenosis causing turbulence.

Distal Flow: The distal anastomosis is similarly assessed for turbulence by placing the Flowprobe on the target vessel for the bypass just distal to the distal anastomosis (Fig. 1: B).

Bypass Flow: If there are no technical problems requiring graft revision, we perform our definitive flow measurement by positioning the Flowprobe on the bypass at any convenient position and measuring flow. We customarily measure flow, first with the graft temporarily clamped to confirm an accurate zero flow. Then graft flow [F_{graft}] is measured with the clamp released, and recorded.

References

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- 7 Transonic Peripheral Vascular Medical Note(VS-401-mn)RevE 2023

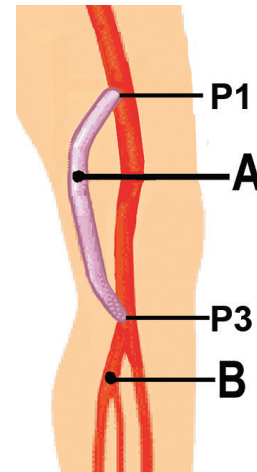


Fig. 1: Proximal P1 and distal P3 sites for Pop-Pop saphenous vein bypass and sites for intraoperative flow measurements.

Measuring Bypass Blood Flow⁷

- 1. Select Correct Perivascular Flowprobe Size**
Measure the diameters of the vessel(s) to be measured with a gauge before opening the Flowprobe package. Select a Flowprobe size (poplitea a: 4mm, 6mm) so that the vessel/graft will fill between 75% - 99% of the probe's ultrasonic sensing window.
- 2. Prepare Vessel for Flowprobe**
Determine the optimal site for applying the Flowprobe by selecting a site wide enough to accommodate the probe's acoustic reflector. Clear approximately 1 cm of the vessel/graft to be measured of extraneous tissue (i.e. fascia, fat).
- 3. Add Couplant to Flowprobe**
Fill the Flowprobe's window with ultrasonic gel.
- 4. Apply Flowprobe**
Apply the Flowprobe at right angles to the vessel taking care not to "twist" or "lift" the vessel/graft with the probe. Apply the probe so that the entire vessel lies within the ultrasonic sensing window of the probe
- 5. Check Signal Strength**
Check the probe's ultrasonic signal strength on the the Flowmeter's Signal Quality Indicator. If acoustic contact falls below an acceptable value, an acoustic error message will be displayed.
- 6. Measure Flow**
- 7. Document Flows for Case Record, if Desired**
Document flow values. If the a negative flow is displayed, press the INVERT button to change the polarity before printing the waveform.

Photo Essay: Saphenous Vein Pop - Pop Bypass for Thrombosed Popliteal Artery Aneurysm

Photos courtesy of Dr. med. Tanja Frieß, MHBA, Dr. med. Patrick Ewald, Clinic for Vascular Surgery, Mainz, Germany

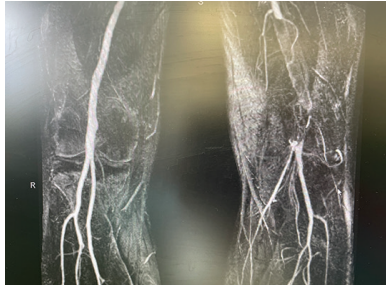


Fig. 1: Blockage of popliteal a in right leg.



Fig. 2: Proximal bypass site

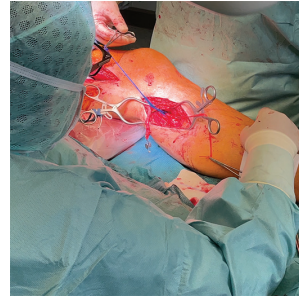


Fig. 3: Distal incision for bypass below the knee

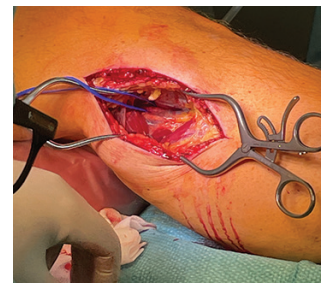


Fig. 4: Exposing & prepping distal site

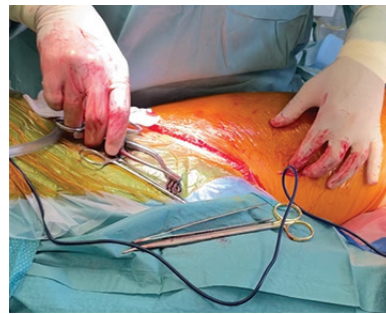


Fig. 5: Proximal site incision.

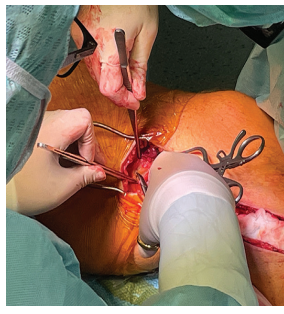


Fig. 6: Exposing proximal site



Fig. 6: Prepping proximal site

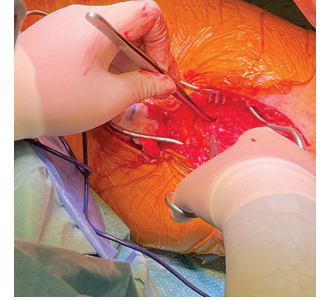


Fig. 7: Isolating popliteal artery



Fig. 8: Prepping saphenous vein graft

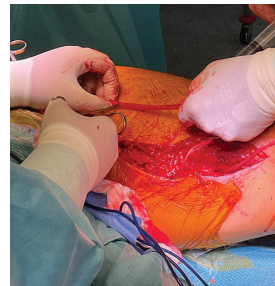


Fig. 9: Sizing graft

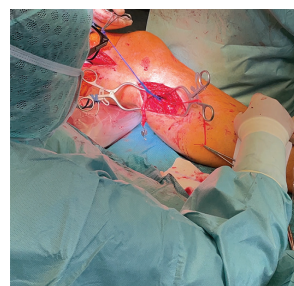


Fig. 10: Isolating distal popliteal a

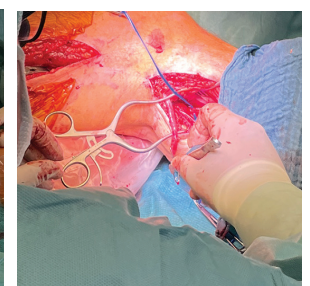


Fig. 11: Attaching bypass graft

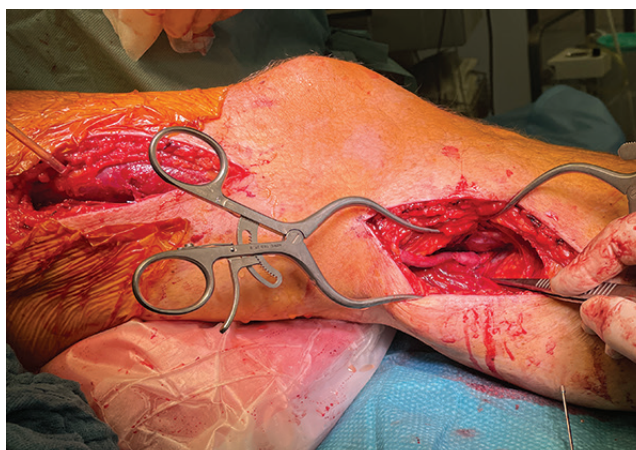


Fig. 12: Pop-Pop Saphenous vein bypass completion

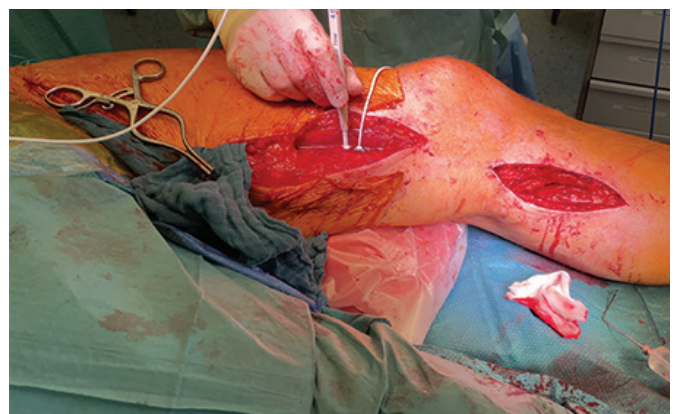


Fig. 13: Measuring flow intraoperatively at proximal site before closure