Novel Use of the Clarivein catheter for Pharmaco-Mechanical Thrombolysis of Thrombosed AV Grafts

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Conflict of interest

• Proctorship: Boston Scientific
• Honorarium: Boston Scientific, BD

PATENCY OF AV ACCESS

Incidence of Stenosis/Thrombosis @ 1 year for AV grafts1,2 62-77%

Patency @ 2 years3
For AV fistulas:
• Primary patency: 55%
• Secondary patency: 63%
For AV grafts:
• Primary patency: 40%
• Secondary patency: 60%

Common sites of stenosis for AV grafts:
• Venous anastomosis (~60%)
• Intra-graft stenosis (~20-30%)
• Central vein (~10%)
• Arterial anastomosis (5%)


Treatment Options?

Several treatment modalities have been described over the years, each with varying:
• Costs
• Time taken for procedure
• Amount of thrombolysis administered
• Operator/institution experience and device availability

- Open thrombectomy ± graftoplasty
- “Lyse and Wait”
- Percutaneous thrombolysis/thrombectomy devices:
  - Arrow-trerotola, angijet, rotarex, castaneda brush catheter

CGH Experience- Pharmacomechanical Thrombolysis with the ClariVein Catheter

clarivein catheter under ultrasound guidance
Central venogram performed to ascertain patency of central veins. Heparin 2000-3000u, IV Cefazolin administered.

Pullback cine to identify stenosis at venous anastomosis end of graft.

Tip is first "sheathed" while passing catheter up graft. After "unsheathing" tip, activate catheter and start thrombolysis.

Urokinase (mixed with visapaque) administered via infusion port. Catheter pullback = 1cm every 3sec.

Thrombus stuck to rotating tip is removed.

Total 90,000U Urokinase administered.
Aspiration of microclots into 6Fr sheath

Microclots aspirated from graft

7x40 balloon to stenosis at venous anastomosis

Post Thrombolysis Angiogram

Close "a" puncture site with figure-of-8 stitch

"v" side puncture under USG 6Fr Brite tip sheath

Thrombectomy with 5.5F OTW Fogarty catheter across AV anastamosis

Gentle finger pressure applied to anastomosis to prevent dislodgement of thrombus cap into brachial artery
Completion angiogram with antegrade flow reestablished

**Post-op**

- Routinely start short-term prophylactic anticoagulation (for duration of hospital stay).
- SC Enoxaparin 40mg 2 hours post-op.
- Another 40mg dose next morning. Not continued on discharge.
- AVG can be used immediately post-op as required
- Patients kept for one session of inpatient dialysis to ascertain procedural clinical success before discharge

**CGH Experience- Clarivein PMT**

- 1st July 2016 to 31st Dec 2017
- Number of cases: 37 (25 pts- 6 patients had 2 procedures, 3 patients had 3 procedures)
- Technical/Clinical success: 100%
- Mean graft age of 32.3 months (range, 1.5 to 45 months)
- Mean duration of thrombosis before the intervention: 2 days (range 1 to 4 days)
- All procedures were performed within 24 hours of referral

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**Baseline Characteristics**

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>No or Mean ± SD (n = 25)</th>
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</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Male 12, Female 13</td>
</tr>
<tr>
<td>Total procedures</td>
<td>37</td>
</tr>
<tr>
<td>Patient age, y</td>
<td>63.7 ± 16</td>
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<tr>
<td>Type of AV graft</td>
<td>Conventional 15, Hybrid 10</td>
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<tr>
<td>Configuration of AV graft</td>
<td>Straight 24, Loop 1</td>
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<tr>
<td>Location of underlying lesion</td>
<td>V-side anastomosis/Edge of stent 22, A-side juxta-anastomotic region 3, Central vein 6 (only 3 required central venoplasty)</td>
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<tr>
<td>Cannulation sites</td>
<td>18</td>
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</tbody>
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**CGH Experience- Clarivein PMT**

- Mean Urokinase dose: 87,000 Units
- Mean Procedure Time (from time of puncture to end of hemostasis): 64 mins
- Patency Rates: 1 and 3 month primary rates of 29/37 (78.3%) and 23/37 (62.1%) (comparable or better than historical data)
- Complication rate:
  - Major: Nil
  - Minor: Perforation in 1/37 (2.7%) at "v" anastomosis Perforation in 2/37 (5.4%) at cannulation site stenoses Both from aggressive angioplasty rather than thrombolysis "v" anastomosis perf managed with covered stenting cannulation site minor perf self-limited
Goals following treatment for graft thrombosis, as specified by the 2006 Kidney Disease Outcomes Quality Initiative (K/DOQI) guidelines are as follows:

- A success rate, defined by the ability to use the graft at least once post-procedure, of 85 percent
- Primary patency of 40 percent @ 3 months after percutaneous thrombectomy
- Primary patency of 50 and 40 percent @ 6 and 12 months after surgical thrombectomy, respectively


Comparison of time taken for procedure

- Mean procedure time: 64 mins (time from first puncture to time of sheath removal/completion of hemostasis)
- Tretotola et al\(^2\) (arrow-tretotola PTD)- median time 75 mins
- Rocek et al\(^2\) (arrow-tretotola PTD)- mean procedure time 126 mins
- Vogel et al\(^3\) (lyse and wait)- mean procedure time 39 mins + mean hemostatic compression time 44 mins
- Heye et al\(^4\) (Castaneda brush catheter)- mean procedure time 73 mins

Comparison of thrombolysis used

- Mean urokinase dose administered: 87,000U
- Lyse and wait technique: 250,000U
- Lower dose of urokinase = lower risk of systemic and local bleeding (?shorter hemostatic compression time), lower cost


Comparison of primary patency

Primary patency rate of Clarivein PMT:
- 1 month: 78.3%
- 3 months: 62.1%

Adequacy of removal of clot burden- likely essential to short term patency
Longer term patency rates dependent on method of thrombolysis?

Table 5. Comparison of the success in percutaneous graft thrombectomy


SUMMARY

- First reported use of the Clarivein device for AV access intervention
- PMT with Clarivein device is safe and efficacious in the management of thrombosed AVGs
- Easy to use catheter, simple technique, no additional installation of equipment required
- Minimal significant residual thrombus
- Short procedure time, low dose of Urokinase are potential benefits

Questions?
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