Pregnancy is a Prothrombotic Condition!

Iliofemoral DVT of Pregnancy
Anticoagulation Alone Is No Longer Acceptable in Most Patients

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Disclosures
– None –

VTE of Pregnancy

Pregnancy is Prothrombotic

I. Increased coagulation factors
Factor VII  Factor XII  Factor VIII
Factor IX  Factor X  Fibrinogen
vWF  Thrombin

II. Decreased anticoagulant activity
Protein C  Protein S

III. Decreased fibrinolytic activity
PAI-1 (progressive increase to 5X)
PAI-2 (from placenta; esp. 3rd trimester)

IV. Venous stasis increases
Volume increase
Gravid uterus on IVC and pelvic veins

Lusuardi F et al
Thromb Res 2012; 129:673

Acute DVT

Outcomes After Anticoagulation Alone

Determinants and Time Course of the Postthrombotic Syndrome after Acute Deep Venous Thrombosis
Vasav A. Vora, MD, DO, Joaquin, MD, PhD, Joe A. Vora, MD, PhD, G. Thomas Dackiw, MD, Lucile Ansanelli, BA, Walter-Elkin-Wilke, MD, Andrea Ricciardi, MS, Yvonne Demoanas, MD, Piray, Auy, MD, Joaquin, PhD, Susan Hickey, MD, Susan Sehvern, MD, Louis DeRycker, MD,” Abner, 1, Lemay, MD, Alia-Li, PhD and Jeffrey T. Gomes, MD

Predictors of Post-Thrombotic Syndrome

• Common femoral or iliac veins (OR 2.23 p<0.001)
• Post-thrombotic morbidity at 1 month (p<0.001)

Post-thrombotic morbidity alters life and increases subsequent risk of recurrence!
Iliofemoral DVT of Pregnancy

Strategy of Thrombus Removal

Why treat pregnant women differently?

• Not many vascular surgeons are willing to perform thrombectomy.
• Most physicians fear thrombolytic therapy in the pregnant patient.
• Fear of radiation to fetus

Major Concern of Thrombolysis

Fetal and Maternal Bleeding!

Rate of major hemorrhage with lysis in pregnant women remains unknown...

...but no indication that risk is higher

Placental transfer of SK, UK and rt-PA is negligible and does not cause a fibrinolytic effect in the fetus. 1, 2

Unquestionably...

…the availability of pharmacomechanical techniques of thrombolysis have:

• Accelerated our enthusiasm
• Strengthened our confidence that...

...this is an effective and safe strategy for extensive DVT during pregnancy.

Managing iliofemoral deep venous thrombosis of pregnancy with a strategy of thrombus removal is safe and avoids post-thrombotic morbidity

Sanjeev Bhatia, MD; Timothy J. Casey, MD; Robert T. Thaler, MD; Michael Stuhlfaut, MD; John Roush, MD; and Allen T. Yoon, MD

Background: Extensive deep venous thrombosis (DVT) during pregnancy is usually managed with anticoagulation alone. Given the high rates of post-thrombotic syndrome (PTS) in young patients, Catheter-directed thrombolysis (CDT) and pharmacomechanical thrombolysis (PTM) may be offered to treat extensive lower extremity DVT (ileofemoral DVT), especially in younger patients. The purpose of this study was to determine the safety and efficacy of pharmacomechanical thrombolysis for extensive DVT.

Methods: We performed a retrospective chart review of pregnancy-related DVT treated with CDT/PTM at a single center from January 2010 to June 2018. All patients with lower extremity DVT underwent imaging for proximal involvement before treatment. All patients undergoing CDT underwent iliofemoral venography (IFV) with or without anticoagulation. Anticoagulation was continued until IFV revealed no residual thrombus or clinical improvement was observed. All patients undergoing PTM were treated with ultrasound-guided catheter-based thrombolysis, and no patient underwent anticoagulation for up to 1 year for clinical indications. The primary endpoint was the duration of anticoagulation and occurrence of complications.

Results: There were 13 patients with extensive iliofemoral DVT. Three patients had third trimester, two second trimester and one first trimester pregnancy. Of the 12 patients with iliofemoral DVT, 11 received abciximab, and one received recombinant tissue plasminogen activator (rt-PA) for 24 hours. Ten patients had a single vessel thrombus, and two patients had a complex multiphasic thrombus involving iliac, common, and superficial femoral arteries. The median number of days on anticoagulation was 13 (range 5-118) days. There were no cases of fatal or major bleeding. Of the 13 patients, one patient experienced a minor bleed of the femoral artery requiring transfusion. There were no cases of maternal or fetal complications.

Conclusion: Pharmacomechanical thrombolysis is a safe and effective strategy for extensive DVT during pregnancy.

J VASC SURG 2014; 59:456-64
Iliofemoral DVT of Pregnancy
Strategy of Thrombus Removal

Case R.B.

- 28yo G1 P0 Ab0; 32 weeks gestation
- Swollen, blue, painful left leg (couldn’t ambulate)
- Treated with LMWH x1 week no improvement
- No respiratory symptoms
- Repeat duplex: iliofemoral DVT

Iliofemoral DVT of Pregnancy: RB

32 Week Pregnancy

32 Week Pregnancy

32 Week Pregnancy

32 Week Pregnancy

Trellis® Catheter

Result: Residual Thrombosis

EkoSonic® System
rt-PA infusion overnight

Post Trellis®, LysUS®, AngioJet®

Residual (Resistant) Thrombus

- Trellis
- AngioJet
- EKOS
- Balloon
- Suction

Decision to perform operative venous thrombectomy

Resistant to: Trellis ® AngioJet ® EKOS ®

Platelet fibrin thrombus… …not coagulation thrombus
**Iliofemoral DVT of Pregnancy: RB**

Completion Phlebogram: Prone Position

- Patient Asymptomatic
- Rx’ed with SQ LMWH (Anti-Xa monitored)
- Normal vaginal delivery
- Healthy baby

4 Years Post Rx

- Asymptomatic
- Interim pregnancy
- Venous duplex
  - Veins patent
  - Normal valve fct.
- Marathon runner

**Extensive DVT of Pregnancy**

**Strategy of Thrombus Removal**

**Treatment Methods**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operative Thrombectomy Only</td>
<td>2</td>
</tr>
<tr>
<td>Endov. Urokinase – 1 (2.5M units)</td>
<td>0</td>
</tr>
<tr>
<td>Endov. rt-PA – 12 (10 - 30mg)</td>
<td>0</td>
</tr>
<tr>
<td>Comp</td>
<td>0</td>
</tr>
<tr>
<td>Antepartum (Lysis) + Postpartum (Stent)</td>
<td>3</td>
</tr>
</tbody>
</table>

**Complications**

- In-utero death (Antiphospholipid Ab) 1
- Hematuria/transfusion 1
- Popliteal artery pseudoaneurysm (Correct with compression U.S.) 1

**Post-Thrombotic Symptoms**

<table>
<thead>
<tr>
<th>Location</th>
<th>Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>SVC/Innom./Subclav.</td>
<td>None</td>
</tr>
<tr>
<td>Iliofemoral/Cava</td>
<td>None – 10 (C0) Mild – 3 (C1,3)</td>
</tr>
<tr>
<td>Recurrent DVT/PE</td>
<td>2*</td>
</tr>
</tbody>
</table>

*Stopped anticoagulation 2 weeks after delivery
*Did not take Lovenox @ subsequent pregnancy -1

**Pregnancy Outcomes**

<table>
<thead>
<tr>
<th>Outcome</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aborted (2nd Trimester)</td>
<td>1</td>
</tr>
<tr>
<td>Prior Unsuccessful Pregnancy - APL-Ab</td>
<td></td>
</tr>
<tr>
<td>C-Section</td>
<td>4</td>
</tr>
<tr>
<td>Routine Vaginal Delivery</td>
<td>8</td>
</tr>
<tr>
<td>Subsequent Successful Pregnancies</td>
<td>4</td>
</tr>
</tbody>
</table>
Conclusions

1. Pregnant patients can be treated safely
2. Good short and long term outcomes
3. Venous function is preserved
4. Pharmacomechanical techniques shorten treatment and reduce dose of lytic agent