CATHETER DIRECTED THROMBOLYSIS FOR ACUTE DVT

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OBJECTIVES OF TREATMENT IN ACUTE DVT

1 - Prevent thrombus extension, early recurrence, and death from PE.

2 - In addition, to prevent late recurrences and long-term consequences such as the development of Post Thrombotic Syndrome (PTS) and chronic pulmonary hypertension.

VALVE FUNCTION PRESERVATION ➔ VITAL
Historically, the standard of care for patients with DVT has been **Anticoagulation with heparin and coumadin**.

Although anticoagulation is successful in preventing further propagation of thrombus, this form of therapy does not effectively treat the existing thrombus .... Nor preserve valve function !
Several clinical trials (last 2 decades) have shown the beneficial effects of Systemic thrombolytic therapy in reducing PTS.

Subsequently, Catheter-directed drug delivery was introduced to Maximize the drug effects and minimize systemic complications.
AVAILABLE THERAPIES ..... that address the existing thrombus include

Surgical Thrombectomy

Systemic Thrombolysis

& Catheter-Directed Thrombolysis CDT

Catheter-directed thrombolysis is particularly appealing because it is effective in achieving patency of the lumen and removal of thrombus lining the venous valves.
CATHETER DIRECTED THROMBOLYSIS - CDT FOR ACUTE DVT

• The objective of CDT is to restore venous patency, reduce the pain and edema of the extremity, preserve venous valve function, and reduce the incidence of PTS .................

While reducing major bleeding risks of systemic thrombolysis
DVT DEFINITION

According to the classification system for symptom duration published in the *Society of Interventional Radiology* reporting standards for endovascular treatment of lower extremity DVT

DVT Symptom Duration is defined as

- **Acute** (14 days or less)
- **Subacute** (15–28 d) ..... *Both Favorable for CDT*
- **Chronic** (longer than 28 d) ➔ *Unfavorable*
CDT - INDICATIONS

- Acute Circulatory Limb Threat (Phlegmasia)
- Selected Cases of acute iliofemoral dvt
- In case of no response to initial anticoagulation

Vedanthan S et al. J Vasc Interv Radiol 2006; 17 (4): 613-6
ACCP Guidelines 2012

Catheter-directed thrombolysis CDT is an alternative to anticoagulation in patients with

Massive, symptomatic DVT of the extremity.  
With Good Life Expectancy ( > 1 yr )  
And No Contraindications to Thrombolysis

Further recommended

Mechanical Thrombolysis MTL + Adjuvant Stenting for Any Underlying lesion / Cause for thrombus
THROMBUS SCORE
SOCIETY OF INTERV RADIOLOGY GUIDELINES

• 7 VENOUS SEGMENTS
  IVC / CIV / EIV / CFV / SFV / DISTAL SFV / POP V

  FOR EACH SEGMENT

  SCORE  0 = VEIN TOTALLY PATENT
          1 = NONOCCLUSIVE THROMBUS
          2 = OCCLUDED BY THROMBUS
TOTAL THROMBUS SCORE BEFORE AND AFTER THROMBOLYSIS

DIFFERENCE / SCORE BEFORE LYSIS = % LYSIS

GRADE 1 = LYSIS LESS THAN 50 %
  2 = 50 – 99 %
  3 = 100 % OR COMPLETE LYSIS
After the thrombus is cleared, **Adjunctive Procedures** and / or surgical therapies, including

**Percutaneous Transluminal Angioplasty and Stent placement**

may be performed to treat any underlying lesions.

Patients receive Thrombolytic Therapy in an intermediate care unit and remain hospitalized until the condition is stabilized with anticoagulant therapy.
2 Hospitals (Demerdash + ASUSH)

19 Cases (6 ULS + 13 LLs)

Global Technical Success 17 / 19 (89.4%)

rTPA Complete lysis 13 Partial Lysis 4

Adjuvant Stenting 12 Cases

Major Bleeds → 2 Cases (Abort + Resuscitate)
NIH Guidelines

Contraindications for Thrombolysis

1. Bleeding diathesis / thrombocytopenia

2. Organ specific bleeding risk (recent MI, CVA, GI bleed, Recent Surgery 15 d or Trauma)

3. Renal or hepatic failure OR Peptic Ulcer

4. Malignancy (e.g. brain metastases increase risk of bleeding)

5. Pregnancy
OUTCOME MEASURES FOR THROMBOLYTIC TRIALS

ATTRACT (CAMEROTA AJ) ; CAVENT

Vein Patency (CLEARANCE)
Bleeding
Clinical Improvement & Control of Pts

MEWISSEN M ET AL. RADIOLoGY 1999 ; 211 (1) : 39-49
WITH HEPARIN THERAPY

RISK OF BLEEDING  5 %
PE  2 %
RECURRENT DVT  4 %
PTS WITH PROXIMAL DVT  50 %
WITH CDT

BLEEDING  5-11 %

ANATOMIC SUCCESS  83 %

PTS  13 %

PRANDONII P ET AL. ANN INTERV MED 2004; 141 ( 4 ) : 249-56
PHARMACO MECHANICAL THROMBOLYSIS
PMT

MAKE THROMBUS SOFTER OR FRAGMENTED
DIMINISH DOSE OF DRUG
FASTER + MORE COMPLETE CLEARANCE

ASPIREX / ROTAREX ETC ..... 

OR RECENTLY US HEAT ENERGY

EKOS CATHETER SYSTEM ➔ FIBRIN THREADS MORE
READILY LYSED BY DRUG DUE TO US ENERGY
WHICH THROMBOLYTIC AGENT?

- **Tissue - Type Plasminogen Activator (TPA, Alteplase)**
- **Recombinant TPA (R – TPA, Reteplase)**
- **Urokinase (Extensively used till late 1990s)**

**Average dose Alteplase 0.5 – 1 mg/hr**

*For 12-24 hrs - up to 48 hrs*
Which thrombolytic agent?

Retrospective analysis of CDT for DVT

- No differences observed between the different thrombolytic agents with regard to
  - Success rate (90% +/−)
  - Major bleeding complications (3−8%)

Grunwald HR, Hofmann LV. J Vasc Interv Radiol 2004;15(4) 347−52
TAKE HOME MESSAGES

1 – BOTH ANTICOAGULATION & CDT EFFICIENT IN ACUTE PHASE TREATMENT OF DVT

2 – BUT ....→ CDT HAS THE ADVANTAGE OF PRESERVING VALVE FUNCTION & MOST AGENTS SIMILAR EFFICACY & COMPLICATION RATES

3 – PMT ENHANCES ACTION OF CDT & REDUCES OP TIME + LOWER DOSE OF DRUG

4 – LONG TERM TOTAL PREVENTION OF PTS → FURTHER RCT ON LARGER NUMBER OF PATIENTS
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