After the ATTRACT study, has the management of acute deep vein thrombosis of the iliofemoral veins changed?

IS STILL POSSIBLE TO RECOMMEND PHARMACOMECHANICAL THROMBOLYSIS?

Peter Gloviczki, MD.

Joe M. and Ruth Roberts Emeritus Professor of Surgery,
Chair, Emeritus, Division of Vascular and Endovascular Surgery,
Mayo Clinic Rochester, MN, USA
Editor-In-Chief,
Journal of Vascular Surgery

MAYO CLINIC

After the ATTRACT study, the management of acute deep vein thrombosis of the iliofemoral veins DID NOT CHANGE!

YES! IT IS STILL POSSIBLE TO RECOMMEND PHARMACOMECHANICAL THROMBOLYSIS!

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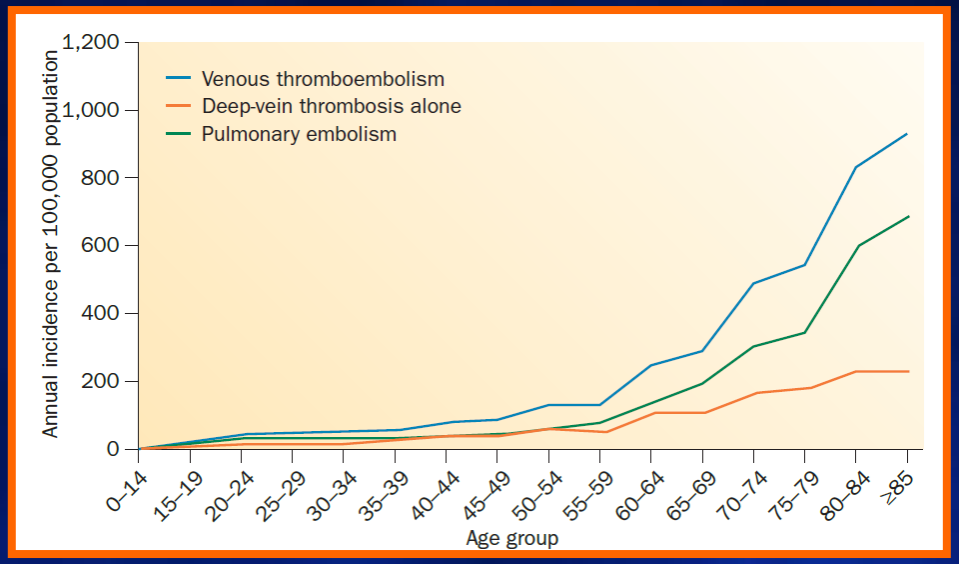
No Conflict of Interest

ACUTE VENOUS THROMBOEMBOLISM
DVT & PE



Heit, J. A. *Nat. Rev. Cardiol.* **12**, 464–474 (2015)

- Occurs as often as stroke (1 per 1000/year)
- Death due to PE: > 100,000/year
- ~ 30% of VTE patients have recurrence
- 28% to 49% will develop post-thrombotic syndrome

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Pharmacomechanical Catheter-Directed Thrombolysis for Deep-Vein Thrombosis

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ABSTRACT

BACKGROUND

The post-thrombotic syndrome frequently develops in patients with proximal deep-vein thrombosis despite treatment with anticoagulant therapy. Pharmacomechanical catheter-directed thrombolysis (hereafter "pharmacomechanical thrombolysis") rapidly removes thrombus and is hypothesized to reduce the risk of the post-thrombotic syndrome.

METHODS

We randomly assigned 692 patients with acute proximal deep-vein thrombosis to receive either anticoagulation alone (control group) or anticoagulation plus pharmacomechanical thrombolysis (catheter-mediated or device-mediated intrathrombus delivery of recombinant tissue plasminogen activator and thrombus aspiration or maceration, with or without stenting). The primary outcome was development of the post-thrombotic syndrome between 6 and 24 months of follow-up.

RESULTS

Between 6 and 24 months, there was no significant between-group difference in the percentage of patients with the post-thrombotic syndrome (47% in the pharmacomechanical-thrombolysis group and 48% in the control group; risk ratio, 0.96; 95% confidence interval [CI], 0.82 to 1.11; P=0.56). Pharmacomechanical thrombolysis led to more major bleeding events within 10 days (1.7% vs. 0.3% of patients, P=0.049), but no significant difference in recurrent venous thromboembolism was seen over the 24-month follow-up period (12% in the pharmacomechanical-thrombolysis group and 8% in the control group, P=0.09). Moderate-to-severe post-thrombotic syndrome occurred in 18% of patients in the pharmacomechanical-thrombolysis group versus 24% of those in the control group (risk ratio, 0.73; 95% CI, 0.54 to 0.98; P=0.04). Severity scores for the post-thrombotic syndrome were lower in the pharmacomechanical-thrombolysis group than in the control group at 6, 12, 18, and 24 months of follow-up (P<0.01 for the comparison of the Villalta scores at each time point), but the improvement in quality of life from baseline to 24 months did not differ significantly between the treatment groups.

CONCLUSIONS

Among patients with acute proximal deep-vein thrombosis, the addition of pharmacomechanical catheter-directed thrombolysis to anticoagulation did not result in a lower risk of the post-thrombotic syndrome but did result in a higher risk of major bleeding. (Funded by the National Heart, Lung, and Blood Institute and others; ATTRACT ClinicalTrials.gov number, NCT00790335.)

The authors' full names, academic degrees, and affiliations are listed in the Appendix. Address reprint requests to Dr. Vedantham at Washington University in St. Louis, Mallinckrodt Institute of Radiology, 510 S. Kingshighway Blvd., St. Louis, MO 63110, or at vedanthams@wustl.edu.

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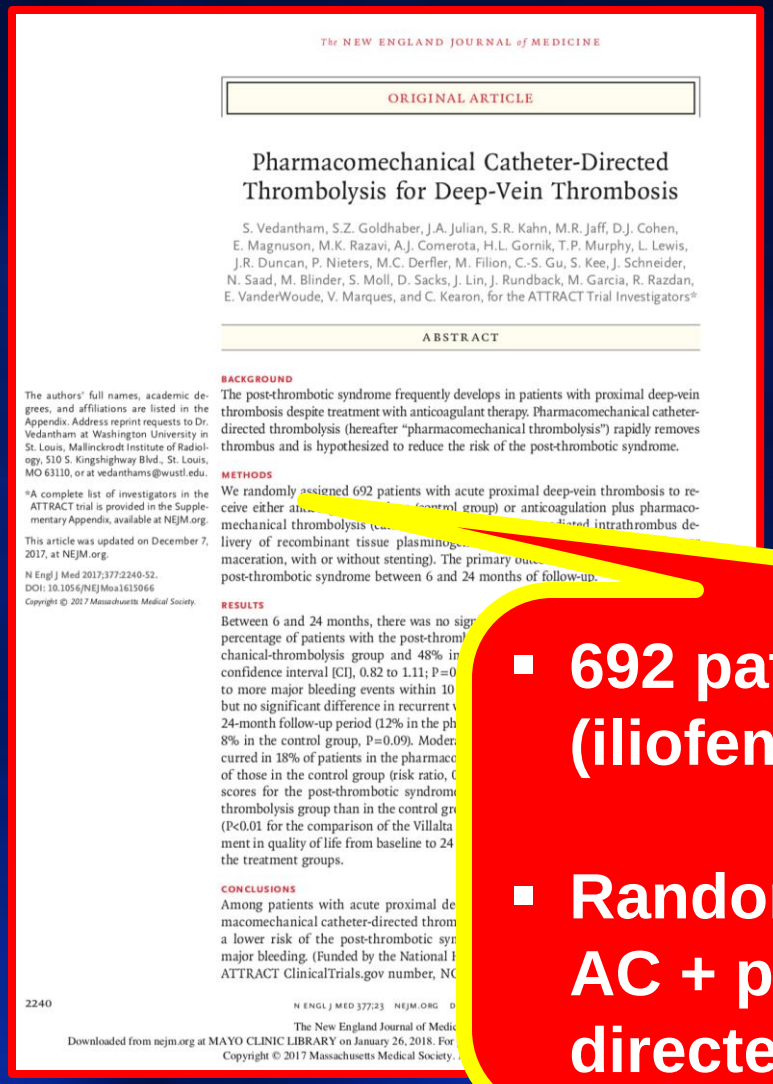
DOI: 10.1056/NEJMoa1615066

The NEW ENGLAND JOURNAL of MEDICINE

Acute Venous Thrombosis: Thrombus Removal with Adjunctive Catheter-Directed Thrombolysis (ATTRACT)

N ENGL J MED 377;23 NEJM.ORG DECEMBER 7, 2017



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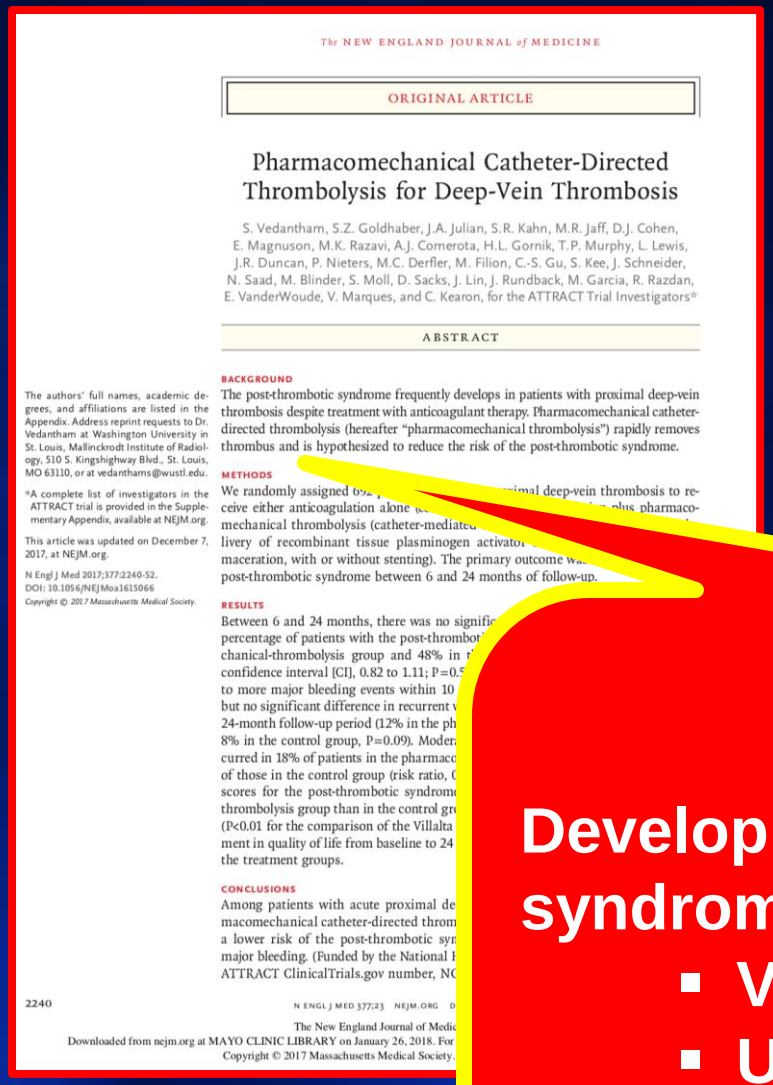
ATTRACT TRIAL

- **692 patients with acute proximal DVT (iliofemoral or femoro-popliteal)**
- **Randomized to anticoagulation (AC) vs. AC + pharmacomechanical catheter-directed thrombolysis (PCDT)**

N ENGL J MED 377;23 NEJM.ORG DECEMBER 7, 2017

ATTRACT Trial



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METHODS

We randomly assigned 692 patients with proximal deep-vein thrombosis to receive either anticoagulation alone (349 patients) or anticoagulation plus pharmacomechanical thrombolysis (catheter-mediated ultrasound-facilitated, low-dose infusion of recombinant tissue plasminogen activator followed by aspiration thrombectomy and maceration, with or without stenting). The primary outcome was the development of the post-thrombotic syndrome between 6 and 24 months of follow-up.

RESULTS

Between 6 and 24 months, there was no significant difference between the percentage of patients with the post-thrombotic syndrome in the pharmacomechanical-thrombolysis group and 48% in the control group (risk ratio, 0.95; 95% confidence interval [CI], 0.82 to 1.11; P=0.5). Pharmacomechanical thrombolysis led to more major bleeding events within 10 days after the procedure (1.7% vs. 0%) but no significant difference in recurrent venous thromboembolism during the 24-month follow-up period (12% in the pharmacomechanical-thrombolysis group and 8% in the control group, P=0.09). Moderate or severe post-thrombotic syndrome occurred in 18% of patients in the pharmacomechanical-thrombolysis group as compared with 24% of those in the control group (risk ratio, 0.[illegible]). Quality-of-life scores for the post-thrombotic syndrome were higher in the pharmacomechanical-thrombolysis group than in the control group at 6 months and 24 months (P<0.01 for the comparison of the Villalta scores and the Venous Clinical Severity Score). The improvement in quality of life from baseline to 24 months was greater in the pharmacomechanical-thrombolysis group than in the control group (P=0.02 for the comparison of the Villalta scores and P=0.03 for the comparison of the Venous Clinical Severity Score). There were no significant differences between the treatment groups.

CONCLUSIONS

Among patients with acute proximal deep-vein thrombosis, pharmacomechanical catheter-directed thrombolysis did not result in a lower risk of the post-thrombotic syndrome than anticoagulation alone but was associated with a higher risk of major bleeding. (Funded by the National Heart, Lung, and Blood Institute; ATTRACT ClinicalTrials.gov number, NCT00790309.)

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N ENGL J MED 377;23 NEJM.OR

Primary Outcome

Development of the post-thrombotic syndrome between 6 and 24 months:

- **Villalta score ≥5**
- **Ulcer**
- **Unplanned endovascular procedure beyond 6 months**

The NEW ENGLAND JOURNAL of MEDICINE

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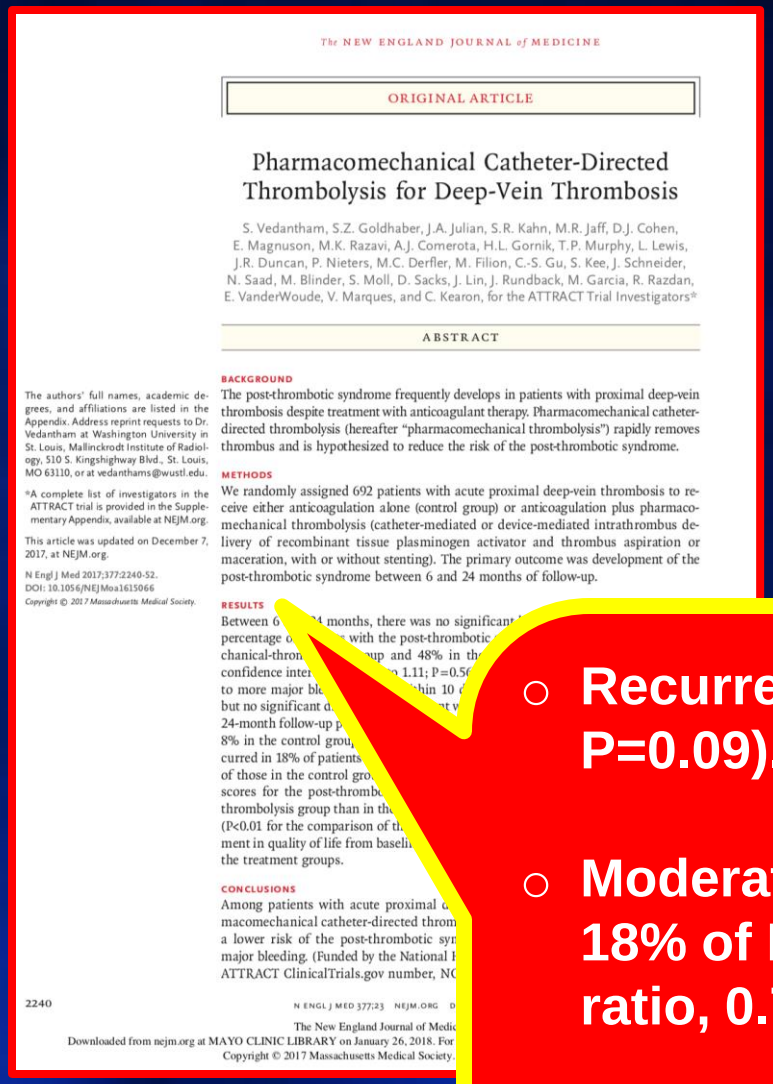
ATTRACT Trial

- **Post-thrombotic syndrome :NO difference (47% vs. 48%% P=0.56).**
- **Major bleeding: More with PCDT (1.7% vs. 0.3%, P=0.049),**
- **NO improvement in at 24 months**



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ATTRACT RCT

- **Recurrent VTE: NO difference (12% vs. 8%, P=0.09).**
- **Moderate-to-severe post-thrombotic syndrome: 18% of PCDT patients vs 24% of Controls(risk ratio, 0.73; 95% CI, 0.54 to 0.98; P=0.04).**
- **Severity scores for the post-thrombotic syndrome were lower in the PCDT group (P<0.01)**

The NEW ENGLAND JOURNAL of MEDICINE

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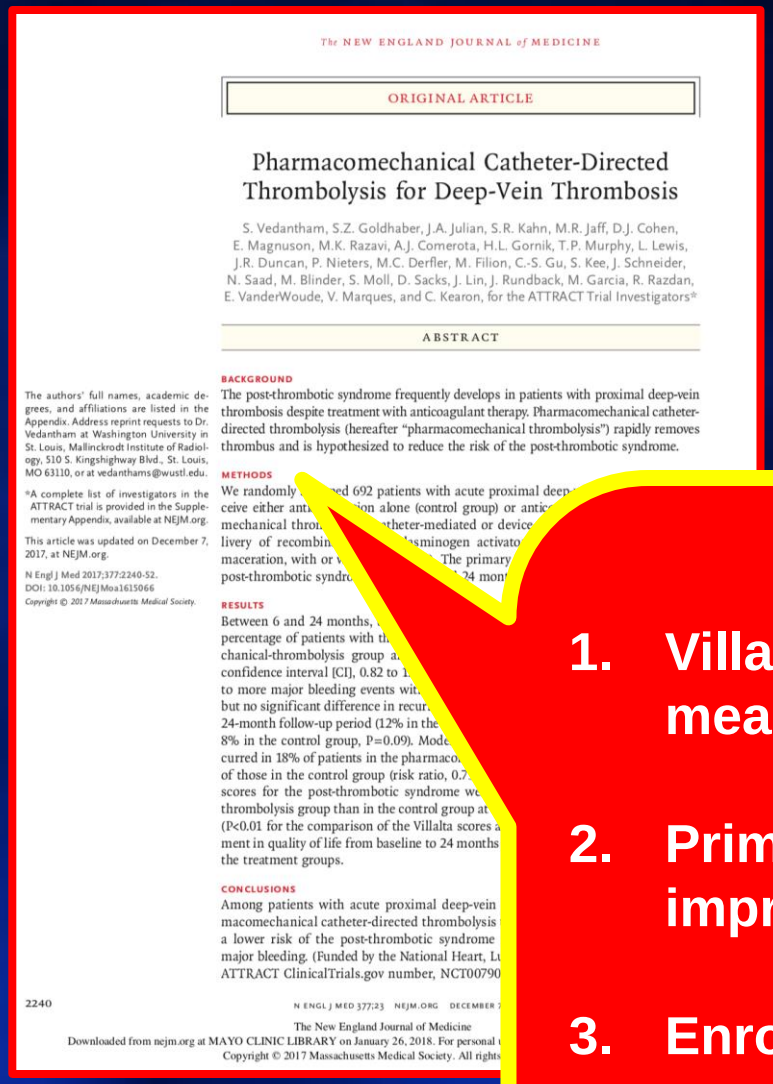
ATTRACT RCT

Conclusion

Among patients with acute proximal DVT, the addition of PCDT to AC did not lower the risk of the post-thrombotic syndrome but did result in a higher risk of major bleeding.



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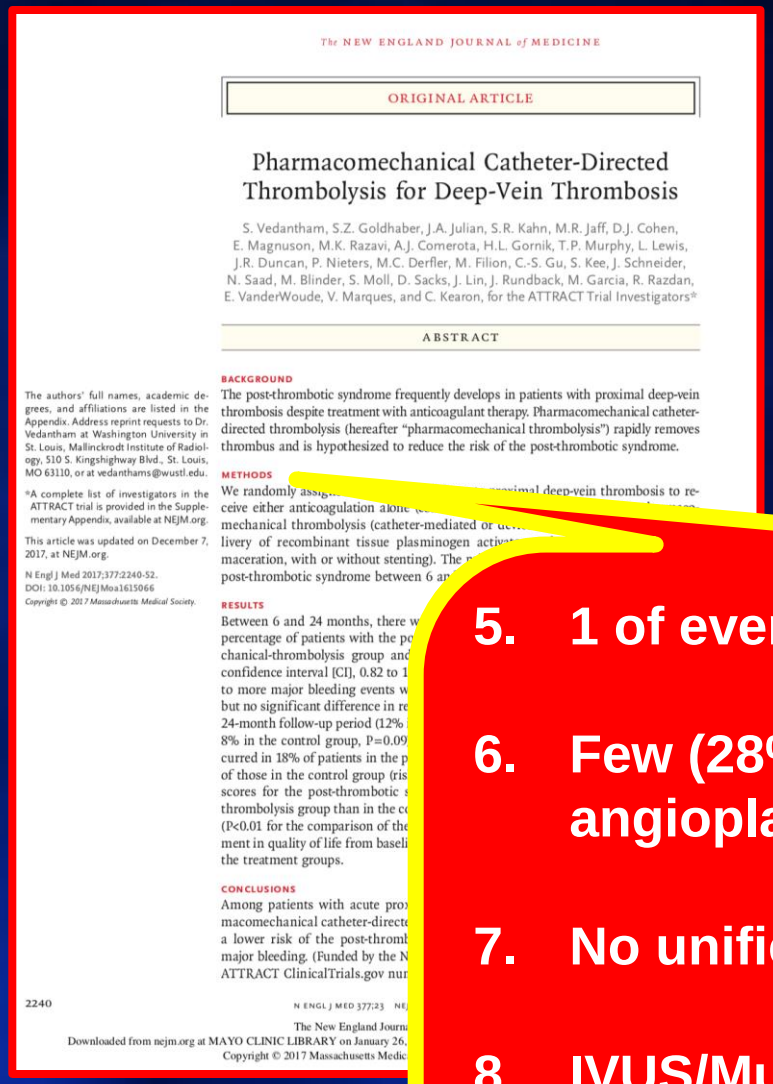
ATTRACT Trial

Problems

1. Villalta Scale (subjective scale, not good to measure changes in venous claudication)
2. Primary endpoint (did not focus on symptom improvement, used a binary method:yes/no)
3. Enrolled femoropopliteal DVT patients (43%)
4. Slow recruitment, few patients per center (1.2 treated patient/center /year).



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RESULTS

Between 6 and 24 months, there w... percentage of patients with the pc... chanical-thrombolysis group and... confidence interval [CI], 0.82 to 1... to more major bleeding events w... but no significant difference in re... 24-month follow-up period (12% ... 8% in the control group, P=0.09... curred in 18% of patients in the p... of those in the control group (ris... scores for the post-thrombotic s... thrombolysis group than in the c... (P<0.01 for the comparison of the... ment in quality of life from baseli... the treatment groups.

CONCLUSIONS

Among patients with acute pro... macomechanical catheter-directe... a lower risk of the post-thromb... major bleeding. (Funded by the N... ATTRACT ClinicalTrials.gov nu...

The authors' full names, academic degrees, and affiliations are listed in the Appendix. Address reprint requests to Dr. Vedantham at Washington University in St. Louis, Mallinckrodt Institute of Radiology, 510 S. Kingshighway Blvd., St. Louis, MO 63110, or at vedanthams@wustl.edu.

*A complete list of investigators in the ATTRACT trial is provided in the Supplementary Appendix, available at NEJM.org.

This article was updated on December 7, 2017, at NEJM.org.

N Engl J Med 2017;377:2240-52.
DOI: 10.1056/NEJMoa1615066

ATTRACT RCT

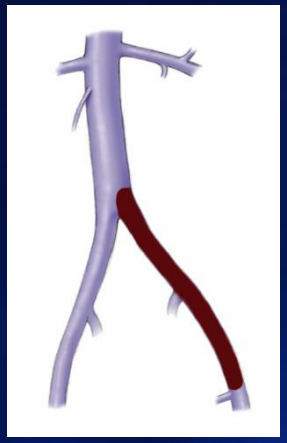
5. 1 of every 50 patients screened entered the trial
6. Few (28%) venous stenting (62% balloon angioplasty!
7. No unified protocol (Dose? Duration?)
8. IVUS/Multiplanar venography was not in the clinical protocol
9. 59% of PCDT only had CTD

Circulation

ORIGINAL RESEARCH ARTICLE

Endovascular Thrombus Removal for Acute Iliofemoral Deep Vein Thrombosis

Analysis From a Stratified Multicenter Randomized Trial



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February 26, 2019
Circulation.
2019;139:1162–1173

Circulation

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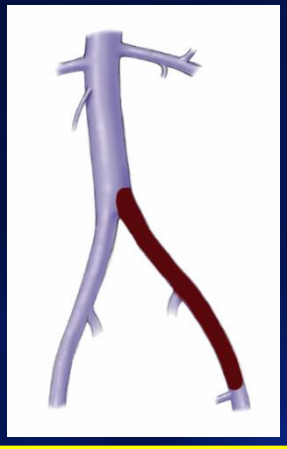

391 iliofemoral DVT patients randomized to PCDT with AC vs AC

- NO difference in PTS between 6 and 24 months
- PCDT significantly reduced
  - PTS severity
  - Number of patients with moderate-or-severe PTS
  - Number of patients with severe PTS

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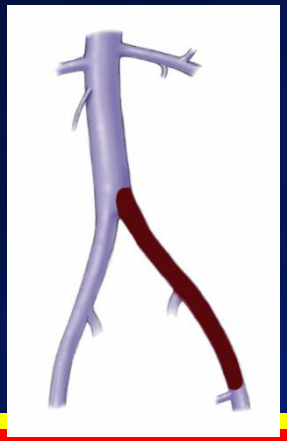

PCDT

- Decreased leg pain and swelling at 30 days
- Improved venous disease–specific quality of life through 24 months,
- NO difference in generic quality of life
- NO difference in major bleeding within 10 days (1.5% versus 0.5% (*P*=0.32)
- NO difference in recurrent VTE over 24 months

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Editors' Choice

Quality of life after pharmacomechanical catheter-directed thrombolysis for proximal deep venous thrombosis

Check for updates

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JVS-VL Journal of Vascular Surgery Venous and Lymphatic Disorders

- ✓ **In patients with proximal DVT, PCDT resulted in greater improvement in disease-specific QOL than no PCDT, at 1 month and 6 months, but not later.**

J Vasc Surg Venous Lymphat Disord, January 2020

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J Vasc Surg Venous Lymphat Disord, January 2020

The ATTRACTiveness of catheter-directed thrombolysis

Efthymios D. Avgerinos, MD, *and* Rabih A. Chaer, MD, MSc, *Pittsburgh, Pa*

The long-anticipated results of the Acute Venous Thrombosis: Thrombus Removal with Adjunctive Catheter-Directed Thrombolysis (ATTRACT) trial have challenged the expectations of catheter-directed thrombolysis (CDT) believers, demonstrating a relatively high post-thrombotic rate irrespective of treatment modality (47% for CDT vs 48% for anticoagulation at 2 years; $P = .56$).[1] In addition to the invasive nature of CDT, higher (although still low [1.7%]) major bleeding complications were seen. However, CDT reduced early deep venous thrombosis (DVT) symptoms and the severity of post-thrombotic syndrome (PTS). Whereas the study is unique and sets the benchmark for the treatment of acute iliofemoral DVT, there should be caution in the interpretation as selection bias and dilution of the sample with softly indicated cases may have skewed the results.

Who were the patients enrolled? It is rather likely that interventionalists avoided enrolling or randomizing patients that they "felt" would benefit from CDT (eg, patients with persistent symptoms despite being on anticoagulation). The study did not include consecutive eligible patients, and the ratio of presenting to screened DVTs was most likely too high. Interestingly, 1100 patients declined participation in the study, many of whom could have presented with severe symptoms and refused randomization.

Why were femoropopliteal DVTs included? The inclusion of patients with only a femoropopliteal DVT who still have good outflow through the common femoral vein may have influenced the outcome negatively, as conservative treatment in these patients is not expected to perform poorly. Partial or complete recanalization of the femoral segment is seen in almost 80% of patients after 6 months.[2] The iliofemoral segment, on the other hand, will recanalize only in 20% of cases at 5 years.[3] In a prospective study of patients with acute DVT treated with anticoagulation alone, the most powerful predictor of PTS was iliofemoral DVT, whereas femoral DVT was not.[4] Inclusion of the femoropopliteal DVTs in the ATTRACT trial may have given us the answer that femoropopliteal DVTs should not be lysed, which is what current clinical practice is, but they have diluted and skewed the study in favor of anticoagulation. The subgroup analysis for iliofemoral DVT did not show a difference, but ATTRACT was not powered for this analysis.

The significant reduction of PTS severity with CDT should not be underestimated (risk ratio, 0.73; 95% confidence interval, 0.54-0.98; $P = .04$). PTS was defined as Villalta score >4. As such, patients with mild symptoms (itching, mild edema) were as frequent in the CDT group as in the anticoagulation group. In assessing an invasive vs a noninvasive DVT treatment, moderate to severe PTS might have been a more appropriate primary end point. Secondary analysis of other data, such as the relation of PTS to the percentage of clot resolution after CDT (open vein hypothesis) and to the patency rates of the thrombosed segments, may be more informative, as well as the 5-year data.

Another randomized trial enrolling consecutive patients with iliofemoral DVT is under way, Catheter Versus Anticoagulation Alone for Acute Primary (Ilio)Femoral DVT (DUTCH CAVA-trial); despite being powered for any PTS and targeting a smaller sample, it may offer further insight into the role of CDT. Until then, catheter-directed interventions should still remain in the treatment armamentarium for patients with symptomatic iliofemoral DVT with good life expectancy and low bleeding risk.

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EDITORIAL

The ATTRACTiveness of catheter-directed thrombolysis

Efthymios D. Avgerinos, MD, *and* Rabih A. Chaer, MD, MSc, *Pittsburgh, Pa*

The long-anticipated results of the Acute Venous Thrombosis: Thrombus Removal with Adjunctive Catheter-Directed Thrombolysis (ATTRACT) trial have challenged the expectations of catheter-directed thrombolysis (CDT) believers, demonstrating a relatively high post-thrombotic rate irrespective of treatment modality (47% for CDT vs 48% for anticoagulation at 2 years; $P = .56$).[1] In addition to the invasive nature of CDT, higher (although still low [1.7%]) major bleeding complications were seen. However, CDT reduced early deep venous thrombosis (DVT) symptoms and the severity of post-thrombotic syndrome (PTS). Whereas the study is unique and sets the benchmark for the treatment of acute iliofemoral DVT, there should be caution in the interpretation as selection bias and dilution of the sample with softly indicated cases may have skewed the results.

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Eur J Vasc Endovasc Surg (2018) 56, 320–321

EDITORIAL

The Attract Trial: A Step Forward for Evidence Based DVT Care

The ATTRACT Trial was a 56 centre, randomised controlled trial (RCT) that evaluated pharmaco-mechanical catheter directed thrombolysis (PCDT) for prevention of post-thrombotic syndrome (PTS) in patients with acute proximal deep vein thrombosis (DVT).[1] The study found that PCDT (1) did not prevent PTS over 2 years (primary outcome); (2) increased major bleeding; (3) did not influence health related quality of life (QOL) or recurrent venous thromboembolism; (4) improved leg pain and swelling over 30 days; and (5) reduced the severity of PTS.

To understand these results, it is crucial to recall what question the study was designed to answer. In clinical practice, DVT patients are initially anticoagulated. Most patients improve, but some develop progressive symptoms, thrombus extension, and/or severe activity limitation, and may be referred for PCDT. Patients in this *highly selected sub-population* are more likely to (1) be poor responders to initial anticoagulation; (2) have severe symptoms and extensive iliofemoral DVT, with or without an iliac vein stenosis; and (3) receive PCDT many days after symptom onset, when acute and subacute clots are present.

In contrast, in ATTRACT, PCDT was offered as *first line treatment* for DVT along with anticoagulation. The severity of symptoms, initial response to anticoagulation, and thrombus burden were not used as study entry criteria. Hence, ATTRACT included many patients who are not typically referred for PCDT in clinical practice. Indeed, this was the whole point of the study: we were not seeking to validate the existing use of PCDT as "salvage" therapy; rather, ATTRACT was boldly intended to determine if PCDT should be extended as *routine first line therapy* to a much larger and broader cohort of DVT patients.

With this core understanding, the study's conduct and findings become clearer. Some physicians believe that iliac vein stenting was underused. In fact, the protocol *encouraged* stenting of iliac vein lesions causing ≥50% venous diameter narrowing, mean pressure gradient >2 mmHg, or robust collateral filling; operators were required to show experience and comfort with iliac vein stenting; and many were actually early advocates of a highly proactive posture towards stenting.[2] Rather, the use of stents in ATTRACT probably relates to the above noted differences between the study population and our clinical p
one would expect fewer patients to h
needing stents because (1) 43% had or

DVT; (2) we did not restrict enrollment only to poor responders to anticoagulation (which may predict a lesion); and (3) we lysed patients at a median of 6 days after symptom onset, when very few patients would have lysis resistant subacute thrombus.

In fact, the endovascular operators performed well. Safety (just 1.4% additional major bleeds) was better than previous CDT/PCDT studies, and clot removal (mean post-lysis modified Marder score 2.7 out of 24 maximum points) was similar to previous studies.[3,4] We did not capture data on the intensity of anticoagulation delivered during PCDT, but the largely successful thrombus removal and low rate of early re-thrombosis suggest that it was adequate. We did not observe between-arm differences in use of anticoagulant therapy during follow up.

PTS exhibits diverse clinical phenotypes and has no diagnostic gold standard, so we used a Villalta PTS Scale score ≥5 as our primary outcome measure, per international guidelines.[5] However, a major strength of the study was its use of *multiple* venous outcome measures. Even using the Venous Clinical Severity Scale, there was no significant difference in PTS rates (30% PCDT vs. 36% control). QOL assessment using two validated measures found no benefit from use of PCDT in the overall study population, consistent with a previous RCT.[3]

Some ATTRACT findings hint at likely differences in PCDT effect between patients with iliofemoral DVT versus femoral–popliteal DVT; we continue to explore the magnitude, statistical significance, and clinical importance of such subgroup effects. The inclusion of patients with femoral–popliteal DVT was well justified because they are at high risk of PTS, because previous studies suggested that they may benefit from clot removal, and because some practitioners were exposing these patients to the risks of thrombolysis.

ATTRACT featured unprecedented precautions against bias: central randomisation, stratification by thrombus extent, blinding of assessors and adjudicators, control of confounders, independent data management, and rigorous site monitoring and data verification against source documents. The study's size, diverse physician subspecialty involvement, and rigorous design should encourage strong

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MAYO CLINIC

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https://doi.org/10.1007/s00270-018-2016-y

REVIEW

Just How Attractive is the ATTRACT Trial?

Gerard J. O'Sullivan[1] · Rick de Graaf[2] · Steven A. Black[3]

Received: 17 February 2018 / Accepted: 20 June 2018 / Published online: 26 June 2018

Abstract Venous thromboembolism (VTE) is a major public health issue; deep vein thrombosis (DVT) affects about 1/1000 patients. Each year, VTE kills more patients in Western Europe than breast cancer, prostate cancer, acquired immune deficiency syndrome (AIDS) and road traffic accidents combined and is responsible for the deaths of approximately 370,000 European citizens (Cohen et al. in Thromb Haemost 98:756–764, 2007; Bělohlávek et al. in Exp Clin Cardiol 18(2):129–138, 2013). The recently published ATTRACT trial (Acute Venous Thrombosis Thrombus Removal with Adjunctive Catheter-directed Thrombolysis) (Vedantham et al. in N Engl J Med 377:2240–2252, 2017) concluded that the addition of catheter-directed thrombolysis to standard therapy with anticoagulation and compression stockings offers no significant clinical benefit over standard therapy in terms of reduction in the rate of post-thrombotic syndrome (PTS) at 2 years. It is the largest, prospective, multi-centre, randomised controlled trial (RCT) and represents the culmination over a decade of planning, execution and analysis. In this opinion article, we analyse why it was needed, what it demonstrated, some limitations, and the directions in which this important publication will take us.

Keywords Deep venous thrombosis · Catheter directed thrombolysis · Pharmaco-Mechnical venous thrombectomy · Review

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Introduction

Why was ATTRACT Needed?

The current gold standard of anticoagulation (AC) dates largely from a single randomised trial in 1960, demonstrating that anticoagulation improved the mortality and reduced the incidence of pulmonary embolus [4, 5] in patients suffering from acute deep vein thrombosis (DVT).

Over time, it was realised that despite adequate anticoagulation, patient morbidity was considerable, with a high rate of post-thrombotic syndrome (PTS), and a landmark paper by O'Donnell et al. [6] in 1977 eloquently demonstrated the practical, socio-economic implications of an ilio-femoral DVT—at 10 years nearly 50% of patients had ulcers, 11 of 12 men were disabled and unable to maintain a steady job because of their leg symptoms and 7 of 9 women were unable to perform household duties.

Around this time, systemic thrombolysis was considered for the treatment of deep vein thrombosis, and multiple trials had already demonstrated improved rates of venous patency, however, at the cost of increased rates of bleeding which significantly impacted on the viability of this approach [7].

During the same period, large cardiology trials demonstrated improved rates of survival in acute myocardial infarction for systemic thrombolysis as opposed to standard therapy. The benefits in these trials did outweigh the risks [8].

Vascular specialists felt that similar benefits might apply to deep veins if the thrombolytic agent was confined to the thrombosed area, and so catheter-directed thrombolysis became the focus of intense efforts. Results from a small experience in Stanford from 1994 [9] paved the way for the

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CIRSE CrossMark

REVIEW

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Editorial

Phlebology

The ATTRACT trial may seem more attractive than it first looks for the management of acute deep vein thrombosis!

Phlebology
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SAGE

Thomas M Aherne[1], Stewart R Walsh[1], Gerry J O'Sullivan[2], Alun H Davies[3] and Tjun Y Tang[4]

Post-thrombotic syndrome (PTS) affects almost half of patients who develop deep venous thrombosis[1] (DVT) and represents a significant impediment to both patient functionality[1] and healthcare costing.[2] The syndrome manifests as a result of dysfunctional venous outflow, with the ensuing tissue oedema resulting in an acute inflammatory response within the interstitium. This in turn causes the spectrum of debilitating symptoms known as PTS, which may eventually lead to tissue loss.[3]

With persistent outflow obstruction, a predictor of future PTS,[4] the aim of the pharmacomechanical venous intervention is to reduce thrombus burden and hence maintain an 'open vein' with the hypothesis that this reduces chronic obstructive symptomatology. However, there remains a paucity of level-one data addressing its use.

The recent publication of the Acute Venous Thrombosis: Thrombus Removal with Catheter-Directed Thrombolysis (ATTRACT) trial[5] has provided venous interventionists with more robust evidence to guide the management of patients with acute ilio-femoral DVT. This powered multi-centre trial represents the largest dataset to address this challenging patient cohort with participants randomised to pharmacomechanical thrombolysis plus standard treatment or standard treatment alone. Interventions involved initial catheter-directed thrombolysis (CDT) and either interval or immediate thrombectomy with stenting reserved for those with a residual 50% venous stenosis following thrombus extraction. The primary outcome was the development of PTS at 6–24 months as defined by the validated Villalta score,[6] limb ulceration or need for further deep venous intervention. Further outcomes included severity of PTS, quality of life (QOL) and importantly major bleeding events. The findings of this long-term and ambitious randomised controlled trial (RCT) undoubtedly raise more questions than it answers, and there is a need for additional prospective data to determine the best management strategies for specific patient cohorts. In contrast with the existing data,[7–9] Vedantham et al.[5] identified no difference between groups with regard to the reported PTS (47% vs. 48%, p = 0.56) at 24 months. This may have been down to the design of the trial, which included patients with acute DVT not only within the femoro-popliteal segments but also those with more proximal iliac thrombosis. If enrolment had been limited to ilio-femoral cases, in which there is a higher risk of developing late PTS, the study may have had a higher probability of meeting the primary outcome measure. Thus, while the ATTRACT study recruited significantly more proximal DVT patients than previous RCT's,[7,8,10] it may well be underpowered to offer definitive PTS outcome data. Of note, subgroup analysis did suggest that the severity of PTS was significantly lower in the study cohort at all timepoints compared to the control. However, intervention offered no improvement in QOL compared to standard therapy with the added detriment of higher peri-procedural major bleed rates (1.7% vs. 0.3%, p = 0.049).

Indeed, the ATTRACT primary outcome contradicts, to some degree, previous well-regarded evidence examining the use of endovenous intervention.

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EDITORIAL

Results of the ATTRACT trial do not change the management of acute deep vein thrombosis

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The recent presentation of the primary results from the Acute Venous Thrombosis: Thrombus Removal with Adjunctive Catheter-Directed Thrombolysis (ATTRACT) trial has sparked renewed interest in the appropriate indications for interventional therapy for acute lower extremity deep venous thrombosis (DVT).[1] Predictably, the findings of this ambitious long-term prospective randomized trial have raised more questions than they have patients in this subset treated with anticoagulation alone. Also, those presenting with severe symptoms experienced more rapid resolution of symptoms in the first 30 days after PCDT compared with the control. The ATTRACT trialists cautioned that the study was not powered to draw definitive conclusions from these secondary analyses, so these findings should be confirmed by future research.

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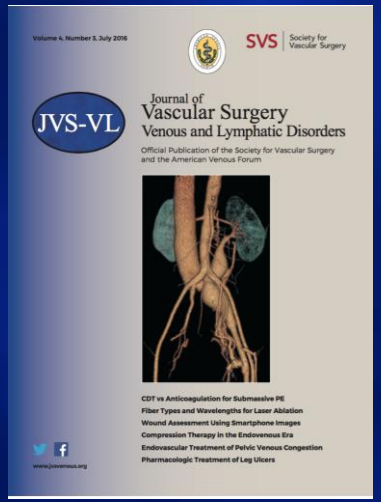

SOCIETY FOR VASCULAR SURGERY® DOCUMENTS

Early thrombus removal strategies for acute deep venous thrombosis: Clinical Practice Guidelines of the Society for Vascular Surgery and the American Venous Forum

Mark H. Meissner, MD,[a] Peter Gloviczki, MD,[b] Anthony J. Comerota, MD,[c] Michael C. Dalsing, MD,[d] Bo G. Eklof, MD,[e] David L. Gillespie, MD,[f] Joann M. Lohr, MD,[g] Robert B. McLafferty, MD,[h] M. Hassan Murad, MD,[i] Frank Padberg, MD,[j] Peter Pappas, MD,[k] Joseph D. Raffetto, MD,[l] and Thomas W. Wak[illegible]ld, MD,[m] *Seattle, Wash; R[illegible] Rochester and New [illegible]NY; Cincinnati, Ohi[illegible]*

Background: The antico[illegible]tment [illegible] the prevention of recur[illegible]thr[illegible] manifestations of the pos[illegible] thrombus removal strategie[illegible]
Objective: A committee of exp[illegible] Venous Forum to develop evid[illegible] directed pharmacologic thromb[illegible]
Methods: Evidence-based recomm[illegible] supplemented when necessary by [illegible] mendations Assessment, Developm[illegible] recommendation (strong: 1; weak: 2)
Results: On the basis of the best eviden[illegible] venous thrombosis" in favor of more pre[illegible] venous segments (Grade 1A). We further [illegible] good functional capacity and a first epi[illegible] recommend their use in patients with lim[illegible] 1A). We suggest pharmacomechanical str[illegible] available and that surgical thrombectomy[illegible]
Conclusions: Most data regarding early[illegible] important benefits with respect to reduc[illegible] additional evidence becomes available.

- **We suggest the use of early thrombus removal strategies in ambulatory patients with good functional capacity and a first episode of iliofemoral DVT of <14 days in duration (Grade 2C)**
- **We strongly recommend their use in patients with limb-threatening ischemia due to iliofemoral venous outflow obstruction (Grade 1A).**

Take Home Message

PCDT is a reasonable treatment in selected symptomatic patients with iliofemoral DVT, who have low bleeding risk, and a willingness to undergo a catheter-based procedure after discussion of the benefits and risks.

After the ATTRACT study,
the management of acute deep vein thrombosis of the iliofemoral veins
DID NOT CHANGE!

IT IS STILL POSSIBLE TO RECOMMEND PHARMACOMECHANICAL THROMBOLYSIS!

After the ATTRACT study,
the management of acute deep vein thrombosis of the iliofemoral veins
DID NOT CHANGE!

IT IS STILL POSSIBLE TO RECOMMEND PHARMACOMECHANICAL THROMBOLYSIS!

THANK YOU!