Thrombolytic Therapy for Venous Thromboembolism: Current Clinical Practice

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BACKGROUND: Venous thromboembolism (VTE) is a life-threatening condition for which thrombolytic therapy may be beneficial. The appropriate setting for the use of thrombolytic therapy remains controversial. More than 10 years ago we described the case-based practice patterns for the use of thrombolytics in VTE, and now, in the context of recent studies and guidelines, we sought to reevaluate the use of thrombolytics and to determine whether beliefs have changed.

METHODS: Active pulmonologists in 11 southeastern states were selected to complete a web-based questionnaire that included background questions and hypothetical case scenarios involving VTE and potential treatment with thrombolytics.

RESULTS: Eighty-one physicians completed the survey and 84% reported using thrombolytic therapy for VTE within the last 2 years. In the absence of absolute contraindications, 99% of respondents would strongly consider using systemic thrombolytic therapy for massive pulmonary embolism (PE) with hypotension, 83% would strongly consider thrombolysis for a large PE with severe hypoxemia, and 62% would strongly consider thrombolysis for PE with echocardiographic evidence of right ventricular dysfunction. In a patient with massive PE and hypotension with certain contraindications, 91% of respondents would still strongly consider thrombolysis.

CONCLUSIONS: Most practicing pulmonologists would strongly consider administering thrombolytic therapy for massive PE with hypotension or hypoxemia, and a majority favor thrombolysis for PE in the setting of echocardiographic evidence of right heart dysfunction. Despite the evolving data and guidelines for the management of VTE, our findings are similar to prior survey results, emphasizing the need for further physician education and future randomized trials to clarify the therapy for this potentially deadly condition. Journal of Hospital Medicine 2009;4:313–316. © 2009 Society of Hospital Medicine.

KEYWORDS: pulmonary embolism, questionnaires, thromboembolism, thrombolytic therapy, venous thrombosis.

More than a decade ago, we surveyed a group of practicing pulmonologists to determine their attitudes regarding the use of thrombolytic therapy in various settings of acute venous thromboembolism (VTE). Since that time, the literature regarding the treatment of acute VTE has grown dramatically. However, despite the available evidence, there remains considerable controversy regarding the appropriate setting for thrombolysis in acute pulmonary embolism (PE) or deep-vein thrombosis (DVT). We therefore sought to better describe the current patterns of thrombolytic use among practicing pulmonologists and to determine if these patterns have changed over the last decade.

Methods
Five-hundred and ten physicians in the southeastern US were selected from the American Thoracic Society (ATS) membership roster and were e-mailed a link to an online questionnaire. The roster was searched for physicians who described their subspecialty as pulmonary disease or pulmonary and critical care.

Results
Baseline Characteristics
Eighty-one physicians completed the questionnaire; their baseline characteristics are shown in Table 1. During the previous 2 years, all physicians surveyed had treated at least 1 patient with acute PE and all but 1 had treated at least 1 patient with DVT. Also, 68 respondents reported that they

Participants were asked background information and questions regarding hypothetical clinical scenarios. All participants were offered a $50 stipend, and to further improve the response rate, 2 reminder e-mail messages were sent 30 days and 45 days after the initial request.

Baseline findings of the survey were summarized using descriptive statistics. Differences among participants and their responses were determined by Fisher’s exact test. Analyses were performed using SAS E-Guide Version 3.0 for Windows (SAS Institute, Cary, NC) with 2-sided P values at the standard 0.05 level used to determine statistical significance.
had used thrombolytic therapy in at least 1 case of PE in the past 2 years.

Use of Thrombolytic Therapy in Various Scenarios
The responses for the 8 clinical scenarios are shown in Table 2. Approximately equal numbers of academic and private practice physicians completed the questionnaire, and comparison between these groups showed no significant differences in decision-making for each of the case scenarios. Less experienced physicians (>10 cases treated versus ≤10 cases treated) were more likely to consider thrombolytic therapy in a patient with a smaller PE but with poor cardiopulmonary reserve (P = 0.001), and with proximal symptomatic DVT of any size present less than 7 days (P = 0.047).

Discussion
Given the paucity of data from randomized controlled trials, there remains considerable controversy regarding the indications for thrombolytic therapy. It may be difficult to

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Current Study (%)</th>
<th>Previous Study (%)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Massive PE with hypotension</td>
<td>80 (99)</td>
<td>56 (100)</td>
<td>NS</td>
</tr>
<tr>
<td>Large PE with hypoxemia</td>
<td>67 (83)</td>
<td>41 (73)</td>
<td>NS</td>
</tr>
<tr>
<td>PE with RV strain or failure</td>
<td>50 (62)</td>
<td>31 (55)</td>
<td>NS</td>
</tr>
<tr>
<td>Large PE without hypotension, hypoxemia, or RV strain</td>
<td>9 (11)</td>
<td>6 (11)</td>
<td>NS</td>
</tr>
<tr>
<td>Smaller PE in a patient with poor cardiopulmonary reserve</td>
<td>11 (14)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Massive symptomatic DVT, &lt;7 days</td>
<td>41 (51)</td>
<td>33 (50)</td>
<td>NS</td>
</tr>
<tr>
<td>Massive symptomatic DVT, &gt;7 days</td>
<td>14 (17)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proximal DVT, any size, &lt;7 days</td>
<td>6 (7)</td>
<td>7 (13)</td>
<td>NS</td>
</tr>
</tbody>
</table>

Abbreviations: DVT, deep vein thrombosis; NS, not significant; PE, pulmonary embolism; RV, right ventricular.

Use of Thrombolytic Therapy When Contraindications Exist
The vast majority of respondents reported that they would consider giving thrombolytic therapy to a patient with massive PE and hypotension requiring vasopressor therapy despite having a traditional contraindication (relative or absolute) to thrombolysis (Table 3). Most respondents would consider giving thrombolytic therapy to postoperative orthopedic, abdominal, or thoracic surgery patients if they were more than 2 weeks postoperation, and very few would give thrombolytic therapy to patients who were less than 2 days postoperation. Many respondents would also consider giving thrombolytic therapy to a patient with a massive PE and a history of major gastrointestinal (GI) bleeding (requiring blood transfusion) if the bleed was more than 4 weeks prior to the embolism (Figure 1).

Discussion
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<table>
<thead>
<tr>
<th>Condition</th>
<th>Number of Physicians (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age &gt;75 years</td>
<td>58 (72)</td>
</tr>
<tr>
<td>Guaiac + stool</td>
<td>54 (67)</td>
</tr>
<tr>
<td>CPR in past 10 days</td>
<td>38 (48)</td>
</tr>
<tr>
<td>History of ischemic stroke</td>
<td>37 (46)</td>
</tr>
<tr>
<td>Recent venipuncture of a noncompressible vessel</td>
<td>33 (41)</td>
</tr>
<tr>
<td>History of ICH</td>
<td>6 (7)</td>
</tr>
<tr>
<td>Brain tumor</td>
<td>6 (7)</td>
</tr>
<tr>
<td>Would never use thrombolytics in these scenarios</td>
<td>7 (9)</td>
</tr>
</tbody>
</table>

Abbreviations: CPR, cardiopulmonary resuscitation; ICH, intracranial hemorrhage.
to use thrombolytic therapy in the setting of a brain tumor or prior intracranial hemorrhage. These scenarios emphasize the vagaries of the current guidelines and real-world complexities of considering thrombolytic therapy in clinical practice, in which the risks and benefits must be weighed on a case-by-case basis.

One major difference between our current and past findings is the general experience with thrombolytic therapy in acute PE. In our first study, only 54% of physicians queried had employed systemic thrombolysis for acute PE. Our current findings were that 84% of physicians had used thrombolysis for acute PE within the last 2 years, perhaps suggesting a greater comfort with this therapy.

Response bias is a major limitation of our study. We sought to keep questions short and clear, and offered a small stipend to improve the return rate. Despite these measures, only 81 of 510 questionnaires were completed. We selected our list of participants from the ATS roster and by geographic location. As suggested by our findings, the results may have been different had we focused solely on VTE "experts" or those treating large numbers of VTE patients. One strength of this study is that our sample had approximately even numbers of academic and private practice physicians, and that we could compare current results with our prior findings.

In conclusion, practicing pulmonologists generally agreed that in the absence of contraindications, thrombolytic therapy should be considered in patients with massive PE and hypotension, which is in accordance with current guidelines. Furthermore, a majority would still consider thrombolysis in patients with PE and severe hypoxemia or right ventricular (RV) dysfunction. Despite the evolving data and guidelines, our findings are similar to prior survey results, with the notable exception that more physicians reported thrombolytic therapy use in acute PE in the current study. This emphasizes the need for further physician education and future randomized clinical trials to delineate and unify therapeutic strategies in cases of VTE.

**References**


