Several studies have consistently demonstrated the capability of ultrasound to enhance the lysis of intra-arterial thrombi in acute ischemic stroke during systemic intravenous thrombolysis with tissue plasminogen activator (tPA), an intervention also called sonothrombolysis.

Material and Methods

Objectives

1. To quantify the potential benefits of sonothrombolysis in acute ischemic stroke.
2. To quantify the potential harms of sonothrombolysis.

Types of Studies

Randomized controlled trials with clear allocation concealment.

Types of Participants

Patients admitted to hospital with acute ischemic stroke.

Types of Interventions

Sonothrombolysis versus intravenous tPA therapy alone or conventional treatment.

Primary Outcomes

Survival free of significant disability at the end of follow-up.

Secondary Outcomes

Case fatality, vessel recanalization, symptomatic and asymptomatic hemorrhagic transformation, and cerebral hemorrhage.

Results

We included 5 studies, with a total of 233 patients randomized. However, not all patients were available for all outcomes: for instance, follow-up at 3 months (death and dependency) was available for 206 patients (88.4%). Three studies used transcranial color-coded duplex, and 2 used transcranial color doppler. The duration of sonothrombolysis varied from 1 to 2 hours. When we considered all the 5 studies, we observed a statistically significant difference for the primary outcome (death or disability at 3 months; 206 patients; odds ratio, 0.50; 95% confidence interval [CI], 0.27–0.91). Results for death were neutral (206 patients; odds ratio, 1.00; 95% CI, 0.46–2.16); failure to recanalize was lower in the sonothrombolysis group (230 patients; odds ratio, 0.28; 95% CI, 0.16–0.50); and there was a nonsignificant trend for increasing cerebral hemorrhages (233 patients; odds ratio, 2.35; 95% CI, 0.95–5.80). When including patients only treated with tPA, the results were very similar.

Conclusions

Our results indicate that sonothrombolysis performed in patients with recent onset ischemic stroke with evidence of middle cerebral artery or posterior cerebral artery occlusion produces a significant increase in the recanalization rate (Figure), associated with a nonsignificant increase of hemorrhagic transformation of the cerebral infarction. There was a statistically significant clinical improvement at the 3-month follow-up in terms of death plus disability rate, although with very wide CIs.

Implications for Practice

There is insufficient evidence to establish the effectiveness and safety of sonothrombolysis in routine clinical practice.

Implications for Research

Sonothrombolysis is a promising technique but there is a clear need for a new multicenter randomized trial.

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Disclosures

None.

Reference

**Figure.** Failure to recanalize. CI indicates confidence interval.
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Stefano Ricci, Lavinia Dinia, Massimo Del Sette, Gian Paolo Anzola, Tatiana Mazzoli, Silvia Cenciarelli and Carlo Gandolfo

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