

# Should All PFOs Be Closed After A Thromboembolic Stroke?

Yes. Don't wait for a second event!

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# Disclosure

- Investigator, Closure I Trial



# Case History 1

- 28 year old female developed abrupt onset flaccid right hemiparesis with expressive aphasia
- MVP diagnosed 10 yrs earlier
- Recent echo - possible mild MVP
- No other CV history



# Baseline Imaging

MRA at Circle of Willis



# Cerebral Arteriography Before thrombolysis



**Carotid Injection**

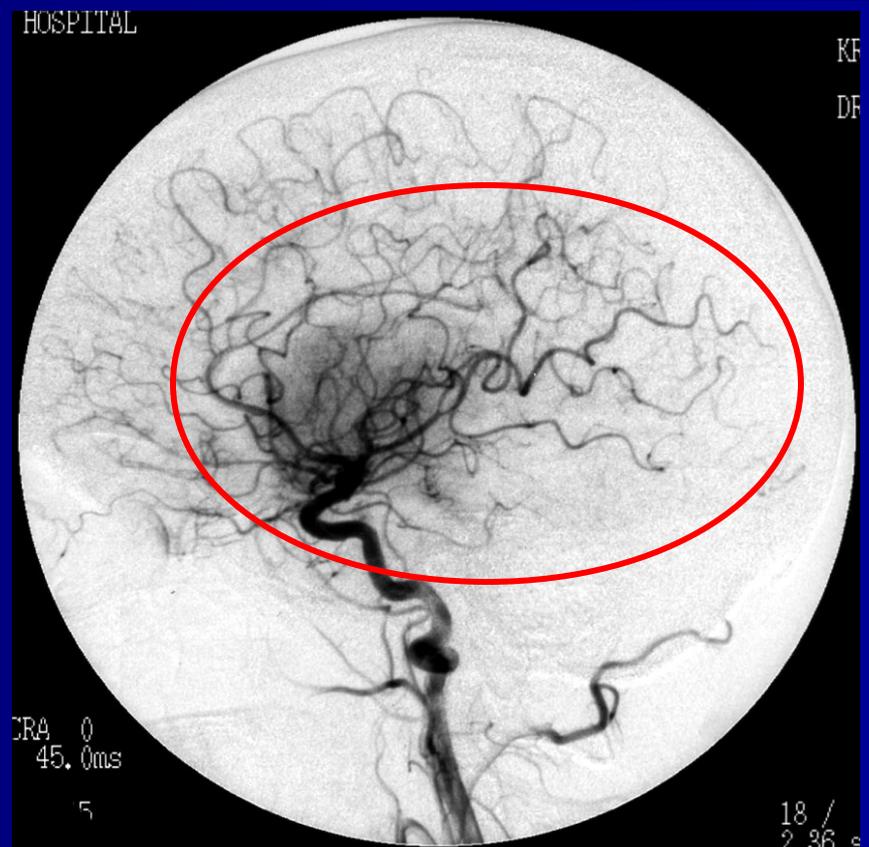


**Injection from thrombolysis  
catheter**



# Cerebral Arteriography

## After Thrombolysis



# Case History 2

- 78 yo man underwent mechanical AVR in 1992, on warfarin since
- Aug 2004 – chest pain, + stress echo, two DES, discharged on antiplatelets
- Sept 15, 2004 – admitted with expressive aphasia, right hemiparesis; on ASA, clopidogrel, INR 3.8



# Case History 2 (cont.)

- MRI shows left MCA infarct
- Carotid duplex shows mild plaque
- Echo/Doppler shows normal LV fxn, AV prosthesis
- TEE shows PFO without ASA



# Real World Considerations in Recommending PFO Closure

- Is it feasible?
- Is it safe?
- Is it effective?
- What are the alternatives?
- What does your patient think?
- What do you think?



# Considerations in the Adoption of Percutaneous PFO Closure

## ■ Feasibility

- Success rates near 100% widely reported
- Procedure usually requires <30 minutes
- Patients discharged same day or <24 hours
- Advent of intracardiac echo has greatly simplified the logistics of closure

## ■ Safety

- Thrombosis, erosion, embolization, infection relatively rare with current devices and techniques (avoidance of protamine)
- Emergency or urgent cardiac surgery rare



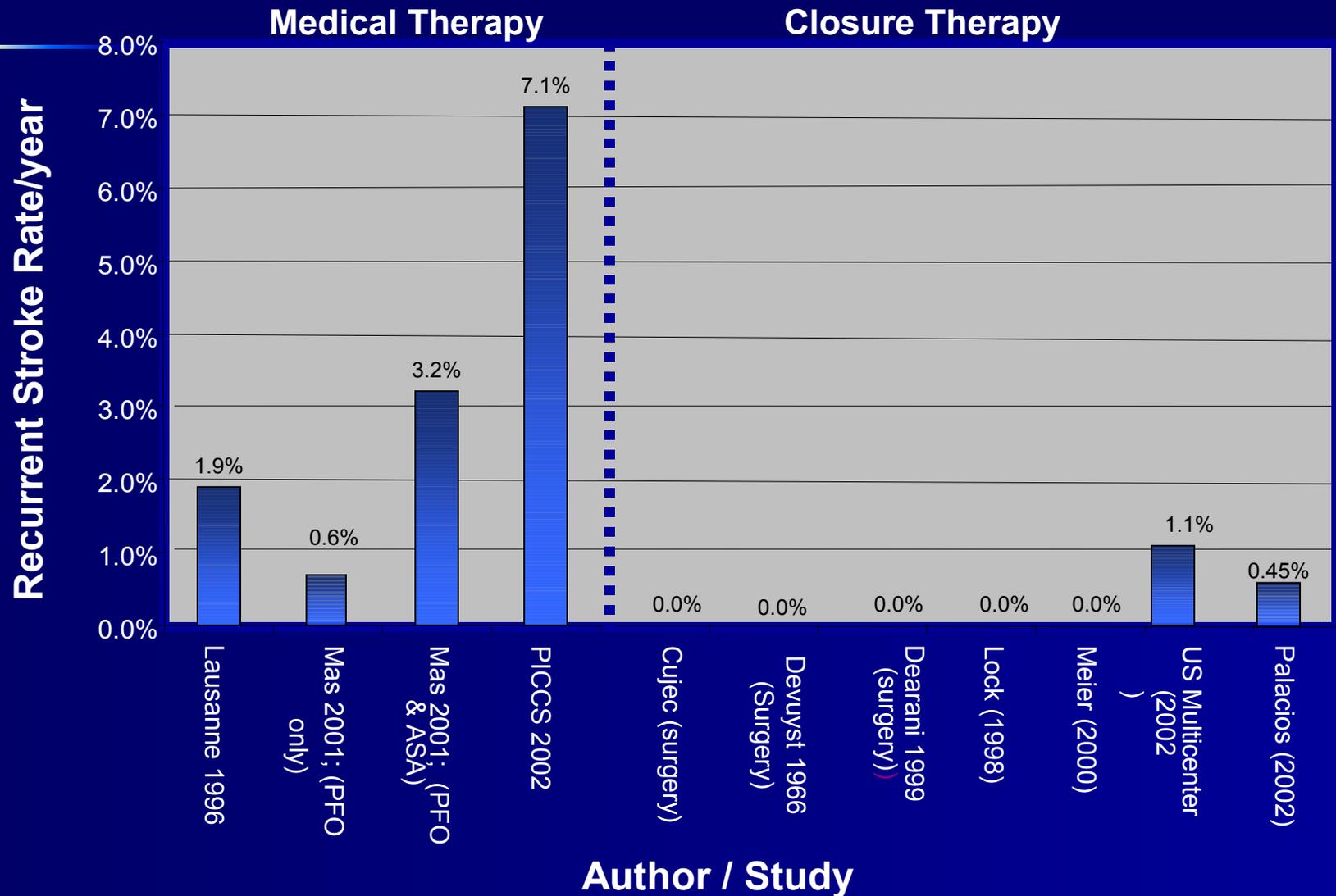
# Considerations in the Adoption of Percutaneous PFO Closure (cont.)

## ■ Efficacy

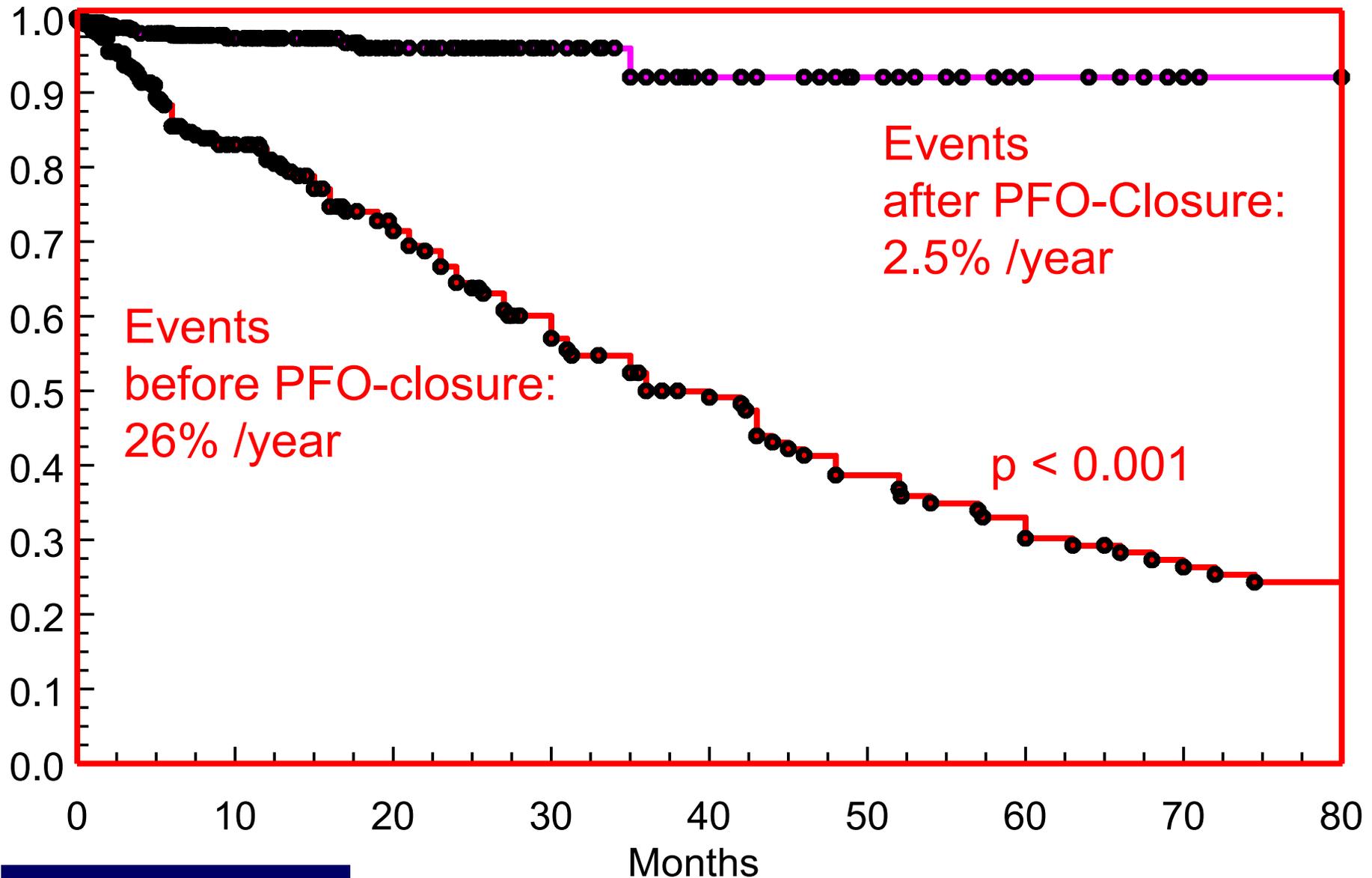
- Rates of recurrent events after closure are the lowest reported
- Residual shunt assessed by contrast echo at 6 months is about the same as after surgical closure and approximates the false positive rate
- Randomized trials underway in U.S. (Closure and Respect) are <10% enrolled more than 12 months after initiation



# Recurrent Stroke Rates

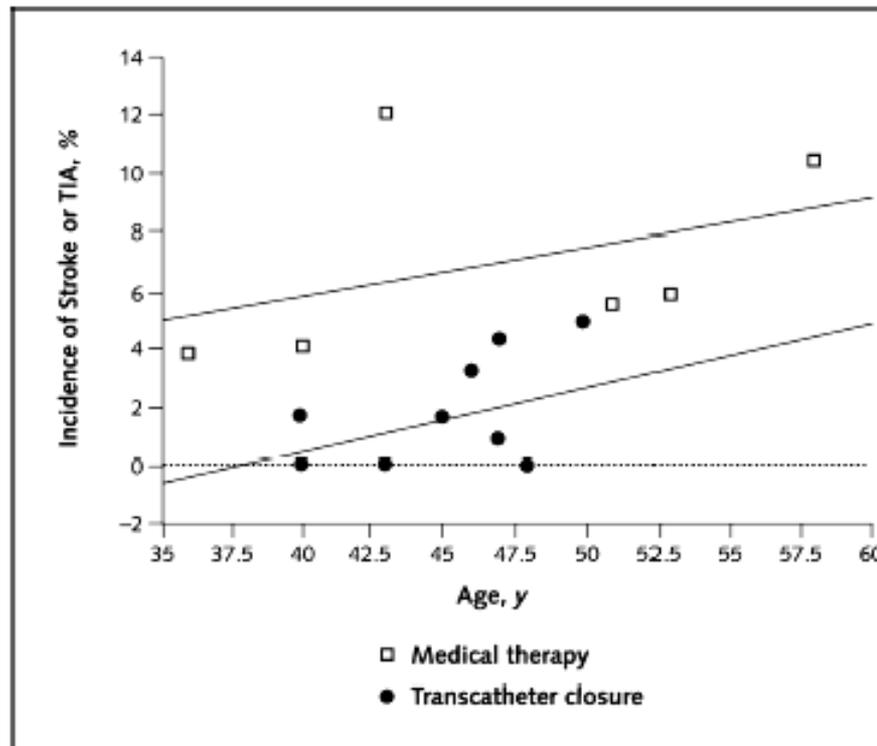


# Freedom from recurrent cerebral events



# Meta Analysis Comparison of Recurrent Neurologic Event Rates

Figure 2. Incidence of recurrent events by patient age per study for medical therapy and transcatheter closure of patent foramen ovale.



Medical Therapy

Transcatheter Closure

Solid lines are regression lines; the dotted line marks the zero level. TIA = transient ischemic attack.



# Current U.S. Approval for Percutaneous PFO Closure

- Humanitarian Device Exemption

“The [device] is indicated for the closure of a patent foramen ovale (PFO) in patients with recurrent cryptogenic stroke due to presumed paradoxical embolism through a patent foramen ovale and who have failed conventional drug therapy... Conventional drug therapy is defined as a therapeutic INR on oral anticoagulants.”



# WARSS

## Warfarin-Aspirin Recurrent Stroke Study

- 2206 pts 30-85 (mean 63 ) years of age with “noncardioembolic” stroke randomized to ASA 325 mg/d or warfarin to effect INR 1.4-2.8
- Noncardioembolic stroke
  - No inferred cardiac source, e.g., AF or anterior MI
  - Not due to high-grade carotid stenosis “for which surgery was planned”
- Composite endpoint of recurrent stroke or death within two years



# PICSS

## Patent Foramen Ovale In Cryptogenic Stroke Study

- 630 pt substudy of WARSS who underwent TEE for study or for other reasons; 601 were “adequate”
- Most (58%) pts did not have cryptogenic stroke; most patients (66%) did not have PFO
- Patients were randomized to ASA 325 mg/d or warfarin to effect INR 1.4-2.8
- Same composite endpoint as WARSS



# PICSS

## Results

- Death was the endpoint in 23% of patients
- Composite endpoint for entire group (at 2 yrs) 13.2% in aspirin group vs 16.5% in warfarin group (p=NS)
- Composite endpoint in group with cryptogenic stroke and PFO (n=98): 17.9% in ASA group vs 9.5% in warfarin group (p=NS)

**This group of 98 patients represents the only group of cryptogenic stroke/PFO patients enrolled in a randomized trial (not placebo-controlled) of medical therapy.**



# Why PFOs Should Be Closed After A First Thromboembolic Stroke

- It is simple to do.
- It is safe to do.
- It is effective in closing PFO and eliminating the pathway enabling paradoxical embolism.
- The evidence basis for the current HDE language is lacking.
- Available evidence indicates that PFO closure is associated with the lowest rates of recurrent events.
- Emotional impact of a first event influences patients' treatment decisions.

