

PFO: Should we close them?

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* Disclosures: Philips grant, GE stock

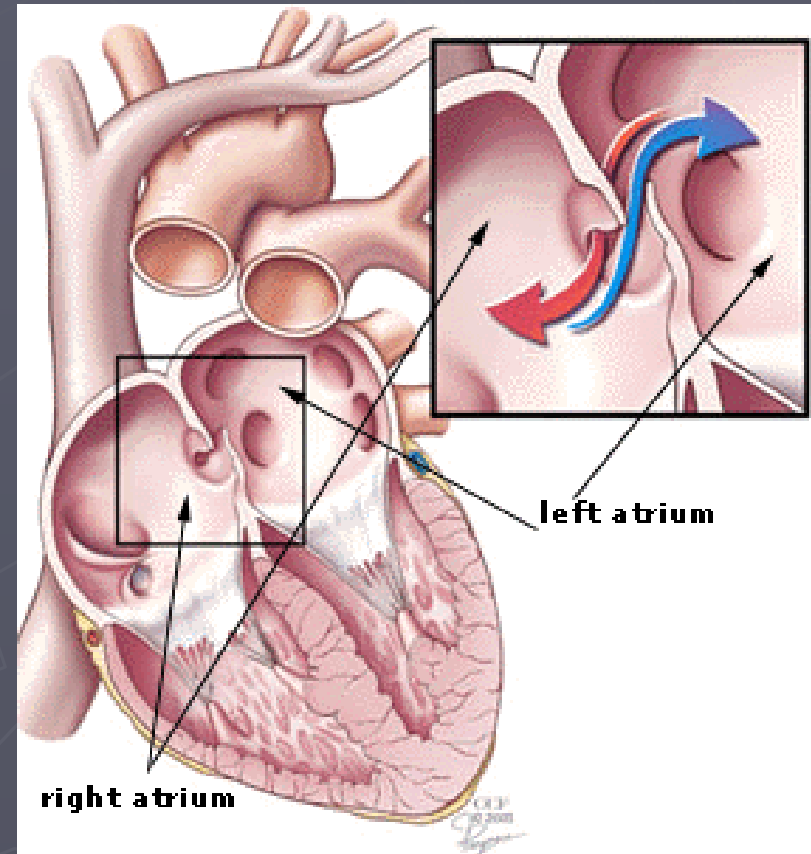
PFO: Should we close them?

► Sometimes.....



Patent Foramen Ovale: What is it?

- ▶ Residua of fetal life
 - Oxygenated blood from IVC provides systemic circulation.
- ▶ Primum and secundum tissue overlap fails to seal completely
 - *Intermittent* right to left shunting



PFO: how common is it?

Incidence of PFO

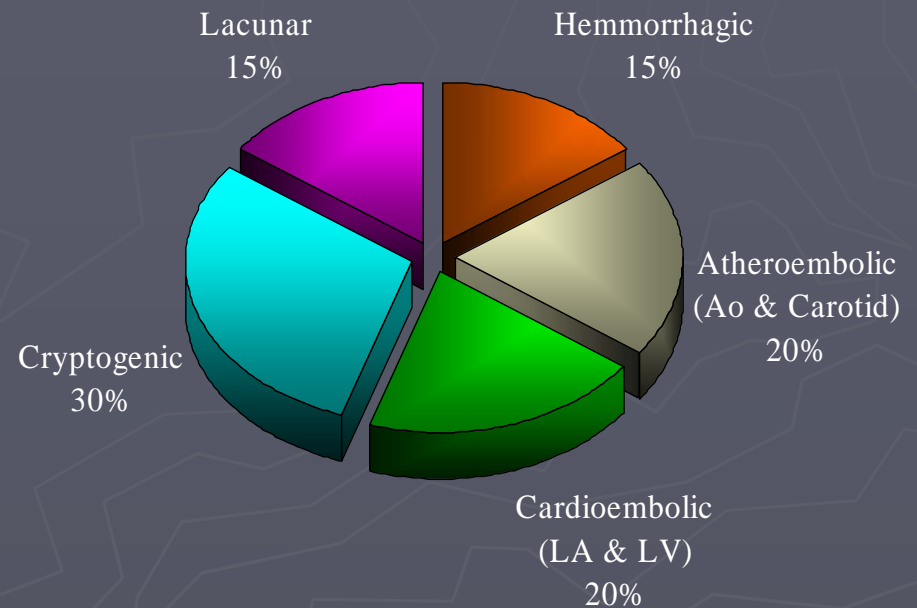
Autopsy study of 965 normal hearts:

- ▶ 27% overall
- ▶ 34% age 0-30,
- ▶ 25% age 30-70,
- ▶ 20% age 70-90
 - Diameter mean=4.9mm, 98% 1-10mm
 - Mayo Clin Proc '84



PFO: potential clinical manifestations

- ▶ Cryptogenic stroke
 - Embolic w/o source
- ▶ Migraines
 - Conflicting association
- ▶ Scuba Divers
 - Decompression sickness
 - 2-5x OR increase
- ▶ Platypnea-orthodeoxia
 - Orthostatic increase in shunt and hypoxia
- ▶ Paradoxical embolism



PFO: What's the relationship to "cryptogenic" stroke

	Cryptogenic Stroke	Control	p
▶ Lechat 1988	54%	10%	< 0.01
▶ Webster 1988	50%	15%	< 0.01
▶ De Belder 1992	13%	3%	< 0.01
▶ Di Tullio 1992	47%	4%	< 0.01
▶ Hausmann 1992	50%	11%	< 0.01
▶ Cabanes 1993	56%	18%	< 0.01

PFO: What's the relationship with migraines

	Migraines	Control	p
▶ Lechat 1988	54%	10%	< 0.01
▶ Webster 1988	50%	15%	< 0.01
▶ De Belder 1992	13%	3%	< 0.01
▶ Di Tullio 1992	47%	4%	< 0.01
▶ Hausmann 1992	50%	11%	< 0.01
▶ Cabanes 1993	56%	18%	< 0.01

PFO: How do you diagnose it?

TTE "bubble study":

Agitated iv saline injection

TEE demonstrating LA to RA flow through PFO

PFO and CVA

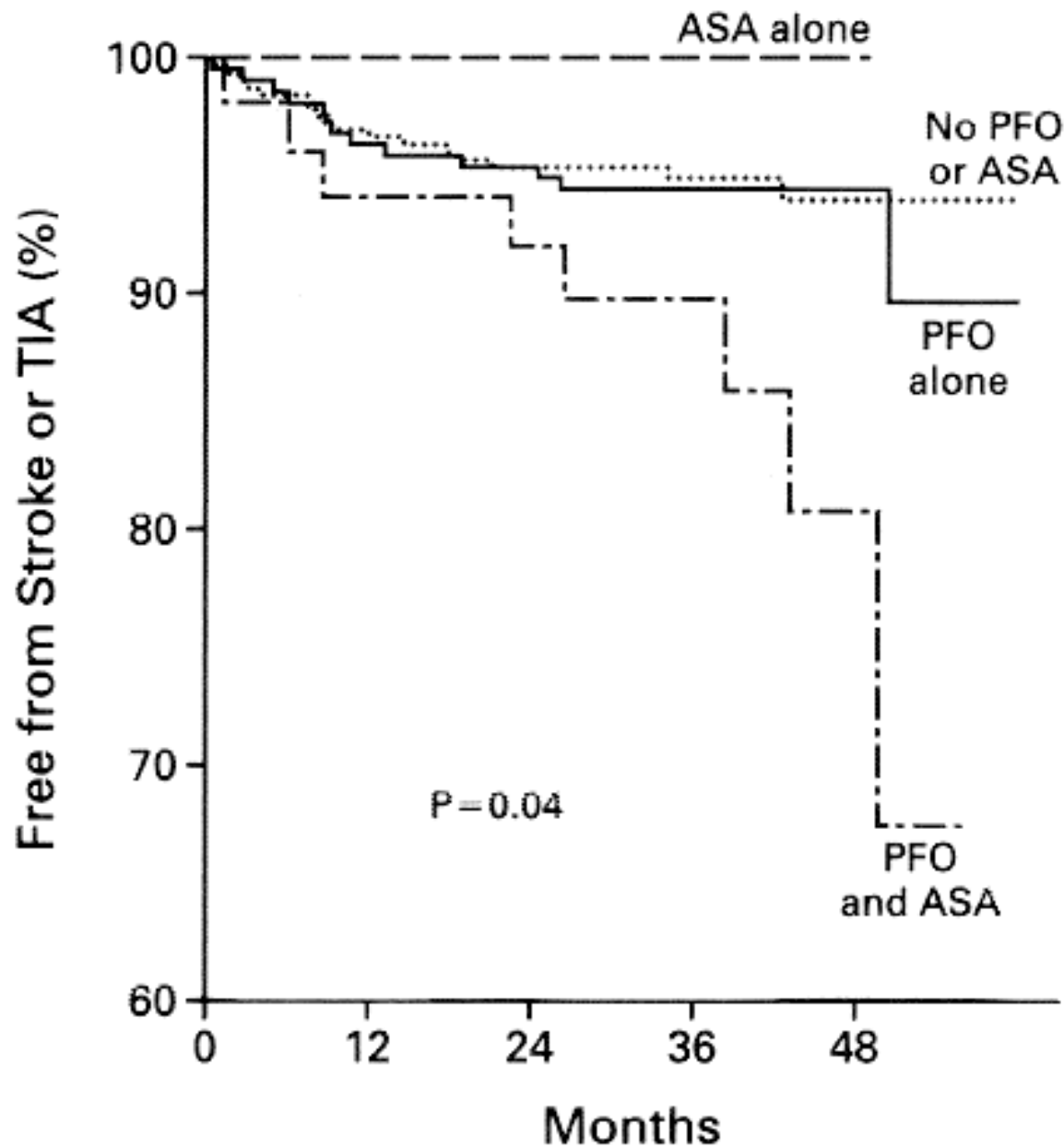
TEE characteristics of increased risk

- ▶ PFO size >4mm
 - Am J Med '00
- ▶ Significant resting shunt
- ▶ High mobility of the overlap
- ▶ Study of 350pts with CVA/TIA
 - 29% with shunt by TEE/contrast and 25% cryptogenic
 - Recurrent events at mean 31 mos: 4.3% lowrisk PFO, 12.5% highrisk PFO, 16.3% for cryptogenic
 - De Casto, Stroke '00

PFO and ASA

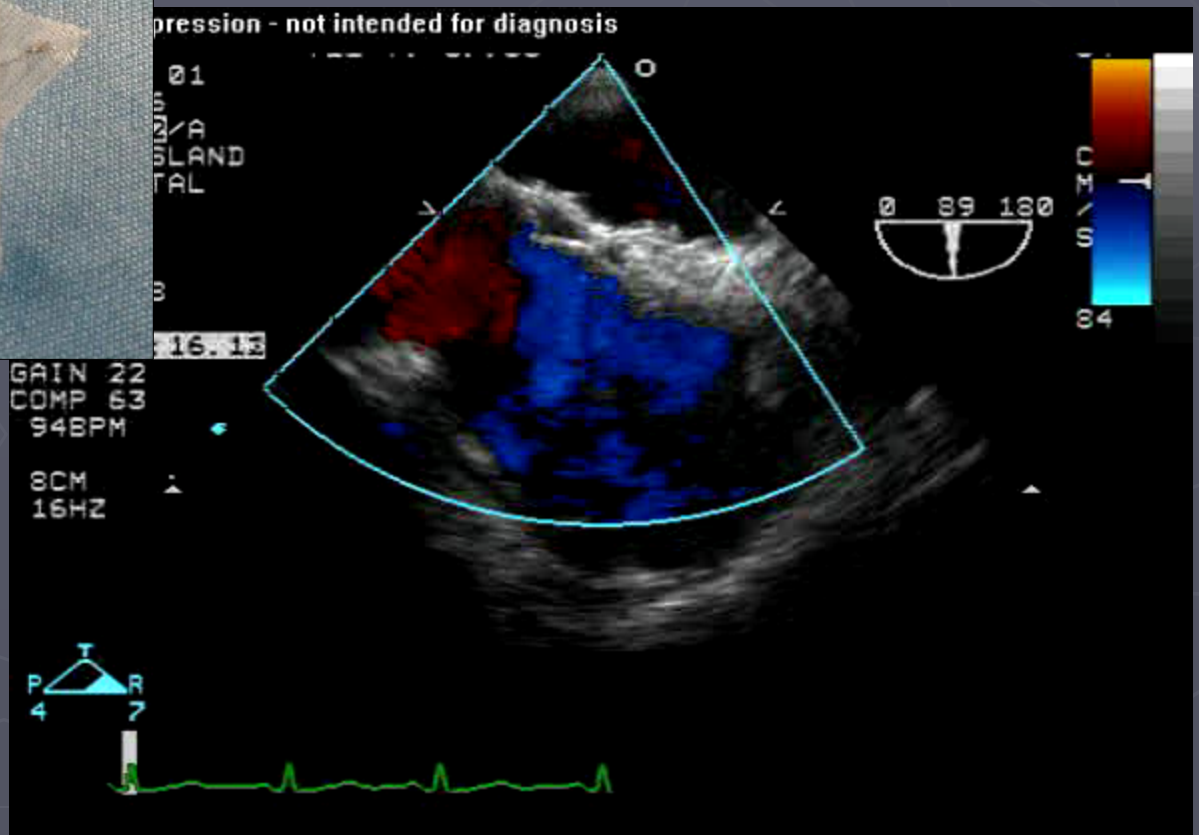
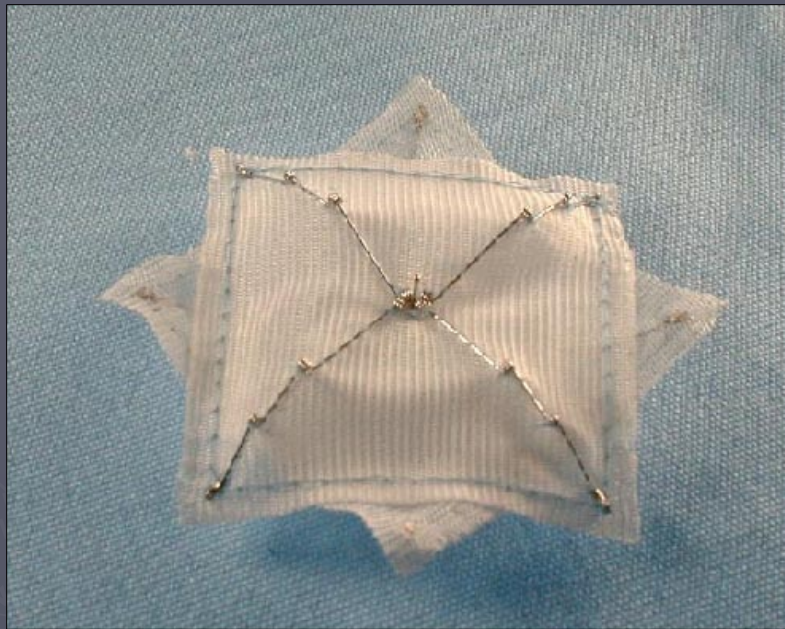
Atrial Septal Aneurysm

- ▶ Definition: redundant, hypermobile atrial septum
 - Prevalence: 1% autopsy, 4% TEE, 5% CV surgery
- ▶ 10% of unselected pts, 28% of pts with stroke
 - TEE Study: 100 with CVA, 50 nmls: Stroke '93
 - ▶ ASA OR=4.3 (1.3-14.6)
 - ▶ PFO OR=3.9(1.5-10)
 - ▶ Both OR=33 (4.1-270)
 - Meta-analysis pts < 55yrs, Neurology '00
 - ▶ ASA OR=3.1 (2.3-4.2)
 - ▶ PFO OR=6.1(2.5-15.2)
 - ▶ Both OR=15.6 (2.8-85.9)



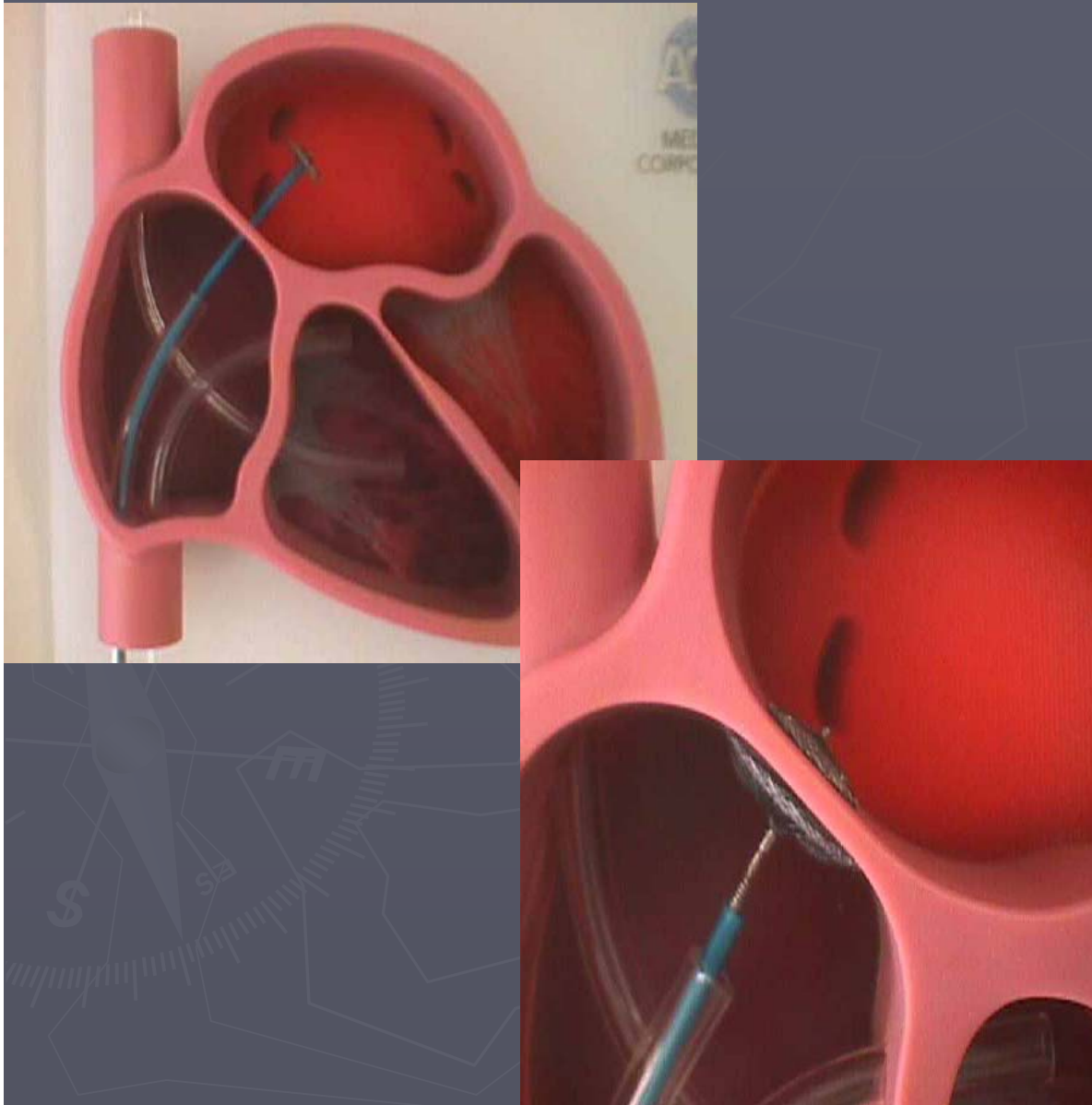
Recurrent
Cerebrovascular
Events with:
PFO
ASA
Both

PFO: We CAN close them!



18mm left
disc opened

Amplatzer PFO closure:



Closure Device Complications

Thrombus Formation:

- ▶ 1,000 consecutive pts, PFO (593) ASD (407)
- ▶ '92-03, Age 48yrs (13-90)
- ▶ 70% with TEE, 14/20 at 4wks
- ▶ 1.2% ASD, 2.5% PFO
 - 7% Cardioseal (27), 0.3% for amplatzer (418)
 - Etiology: AF (4) and ASA(4) and cl dz (2)
 - 17/20 tx with hep/coumadin, 3 tx surgery
 - Sievert JACC '04

PFO and stroke: What do consensus documents recommend?

Treatment:

- ▶ 8th ACCP Recommendations: Chest '08
 - First embolism/TIA: long-term anticoagulation
 - ▶ coumadin if venous thrombosis
 - Failure of anticoagulation: closure/excision
- ▶ AAN 2004
 - Based on prospective PICCS and Mas
 - PFO alone, NOT increased risk for recurrent cryptogenic
 - ASA alone, insufficient data
 - PFO & ASA, possible increased risk in pts <55
- ▶ AHA/ASA/ACC Stroke '06
 - Closure for failure of treatment
 - FDA withdrew approved devices '06

PFO: Should we close them?

- ▶ Most are incidental, NO workup required
- ▶ Cryptogenic stroke patients < 55yrs old
 - NO First event:
 - ▶ ENROLL in randomized trials
 - *YES, Second event*
 - ▶ Follow expert consensus guidelines
- ▶ Migraines
 - No, consider enrollment in randomized trials
- ▶ Divers: *Yes*
- ▶ Orthodeoxy-platypnea: *Yes*