Persistent and longstanding persistent AF are best treated with catheter ablation

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MY CONFLICTS OF INTEREST ARE

Honoraria for speaking and/or consulting – Biosense Webster, Biotronik, Boston Scientific, Medtronic, St. Jude Medical,

Surgical vs. catheter ablation

Perfect example of a debate topic (no data to decide!)

- Limited RCTs available
  -- 3 studies, 326 patients, only 68 with persistent AF
- Single center studies have considerable limitations
- Both strategies suffer from lack of uniform approach

- Assumptions
  1. SA stand alone, minimally invasive procedure
  2. Both SA and CA performed in high quality centers

Surgical strategy for AF ablation

Surgical vs. catheter ablation

Why I think catheter ablation is the standard of care

- The apparent increased efficacy of surgical ablation is not worth the increased risk of major complications
- Improbable things about the surgical approach
- Innovation favors future development in catheter ablation
- What do patients choose?

Randomized trials of SA vs. CA

FAST study

- 124 AF pts with HTN and ↑ LA, or prior failed CA (67%)
- SA: Wolf/Edgerton VATS using bipolar RF (± GP ablation and lines), LAA exclusion
- CA: WACA (non-irrigated 4 mm RF at one site)
- Endpoint assessment: need for CV > 3 months, 7 day Holter at 6 and 12 months

- 1º endpoint 12 month free of AT/AF without AAD
  SA % 65.6/ CA 36.5% (persistent AF 58.8 vs. 36%)
- Procedural complications SA: 23%, CA 3.2%

Boersma VA: Circulation 2012;125:23-30

Randomized trials of SA vs. CA

Table 4. Procedural Adverse Events of CA and SA

Adverse Events	CA N=63	SA N=61
Pericardial effusion/tamponade	1	1
TIA/Stroke	1	1
Pneumothorax	...	6
Hematothorax	...	1
Rib fracture	...	1
Sternotomy for bleeding	...	1
Pneumonia	...	1
Death	...	...
PM implant	...	2
Total	2 (3.2%)	14 (23.0%)
Minor		
Groin hematoma/bleed	4 (6.3%)	...

Table 5. Adverse Events During 12-mo Follow-Up of CA and SA

Adverse Events	CA N=63	SA N=61	*P*-Value
Stroke	1	...	
TIA	1	...	
Pneumonia	2	2	
Hydrothorax	...	2	
Heart failure by AF	2	...	
SAB causing death	1	...	
Pericarditis	...	1	
Fever unknown origin	...	1	
Ileus	1	1	
PV stenosis >70%	...	...	
Total	8 (12.6%)	7 (11.5%)	*P*=1.0
Minor			
Groin hematoma/bleed	2 (3.2%)	...	

Death due to SAH on coumadin

Boersma VA: Circulation 2012;125:23-30

Randomized trials of SA vs. CA

Funny things about the FAST study

- Significantly more pAF patients in SA group
- Use of 4 mm RF at one hospital (no difference in outcome)
- Variation in surgical strategy (no difference in outcome)
- Unexpectedly poor CA outcome; no difference between paroxysmal and persistent AF (36 vs. 35.1%)

Boersma VA: Circulation 2012;125:23-30

Randomized trials of SA vs. CA

Pokushalov study

- 64 patients (pAF and pers AF) after failed CA
- SA: VATS bipolar RF, PVs and posterior box, guided GP ablation, LAA excision
- CA: repeat isolation, irrigated RF
- Implantable loop recorders in all patients

- 1º endpoint 12 month free of AT/AF
  SA 81% / CA 47% (persistent AF 75 vs. 36%)
- Serious AE SA: 7 (tamponade, PTX, pleural effusion
  CA: 1 (TIA)

Pokushalov E: JCE 2013; doi: 10.1111/jce.12245

Meta-analysis of SA vs. CA

- 2 recent studies (literature review and analysis), including RCT and non-randomized comparative studies (single center)
- Wide range of inclusion criteria, paroxysmal/persistent
- Sydney study
  -- 3 RCT, 5 observational studies; no difference in populations

Kearney K: Ann CT Surg 2014;3:15-29
Phan K: Eur J CT Surg 2015;doi 10.1093/ejcts/ezv180

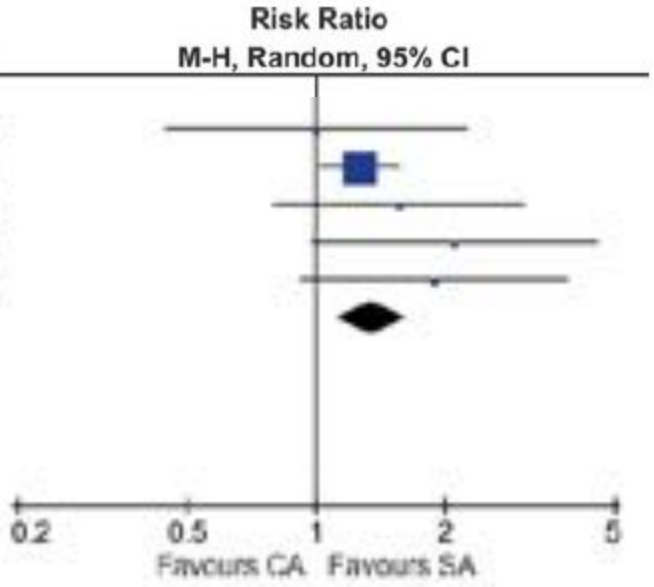
Meta-analysis of SA vs. CA

Efficacy in persistent AF – SA: 74.4% CA 51.1%

	SA		CA			Risk Ratio	
	Events	Total	Events	Total	Weight	M-H, Random, 95% CI	Year
Persistent AF							
Sauren 2009	8	8	1	1	5.3%	1.00 [0.44, 2.26]	2009
Wang 2011	62	83	49	83	74.3%	1.27 [1.02, 1.57]	2011
Boersma 2012*	9	16	9	25	7.7%	1.56 [0.79, 3.08]	2012
Pokushalov 2013*	9	12	5	14	5.9%	2.10 [0.97, 4.55]	2013
De Souza 2014	11	14	5	12	6.8%	1.89 [0.91, 3.89]	2014
Subtotal (95% CI)		133		135	100.0%	1.34 [1.11, 1.62]	
Total events	99		69				

Heterogeneity: Tau² = 0.00; Chi² = 3.23, df = 4 (P = 0.52); I² = 0%

Test for overall effect: Z = 3.08 (P = 0.002)



"However, major complications were significantly higher in the SA group (28.2 vs 7.8%) driven by pleural effusion and pneumothorax"

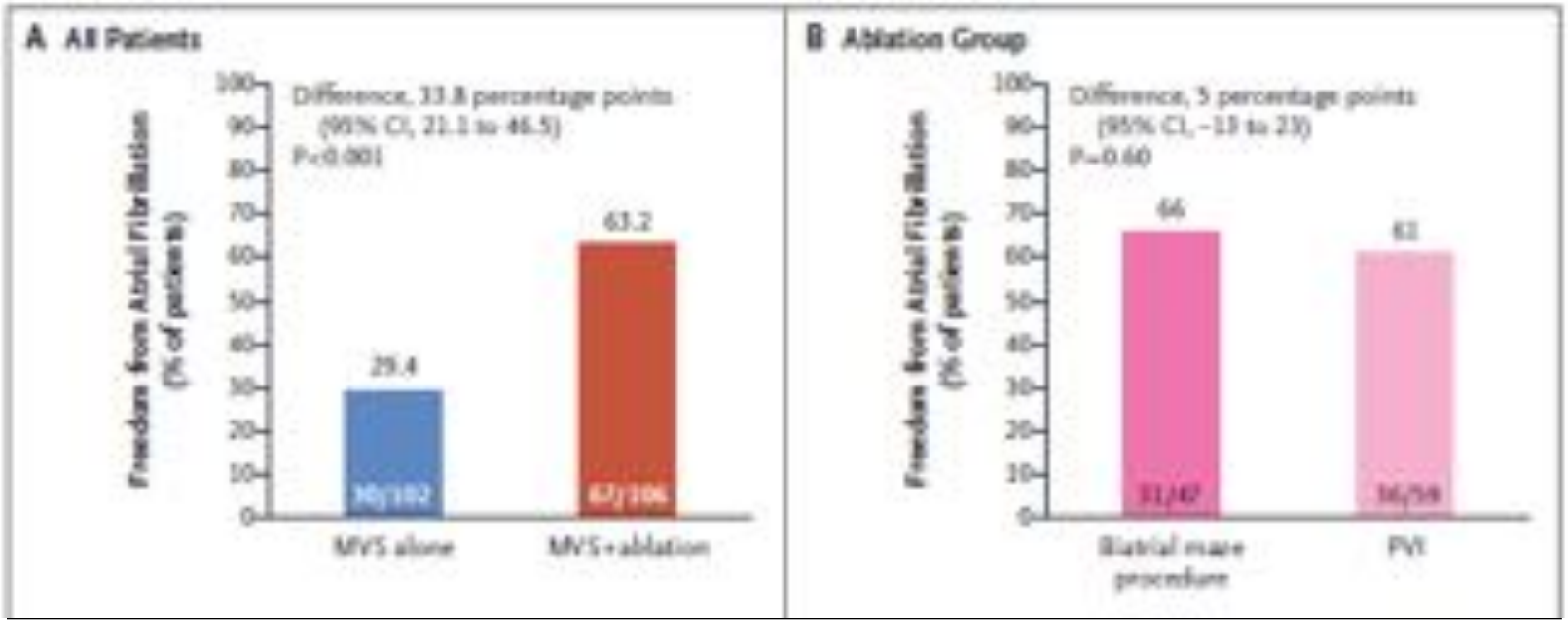
Phan K: Eur J CT Surg 2015;doi 10.1093/ejcts/ezv180

Why is surgical ablation more effective?

- More extensive substrate ablation?
- Ablation of gangionated plexi?
- LAA exclusion/excision?
- “Bias” against CA (RCT enrollment: failed CA)?
- Better ability to create transmural lesions?

Phan K: Eur J CT Surg 2015;doi 10.1093/ejcts/ezv180

More extensive substrate ablation?



260 pts with LS persistent AF undergoing mitral surgery

MVS ± AF ablation (RF) / PVI vs. biatrial MAZE

Extensive ablation did not improve AF freedom at 12 m.

Gillinov AM (CTSM): NEJM 2015; DOI: 10.1056/NEJMoa1500528

Better ability to create transmural lesions?

Sequential hybrid procedure

- 50 patients with LL persistent AF and LA > 45 mm
- SA bipolar clamp (> 5 applications for PV, proven block), posterior box, “trigone” line, LoM disection, guided GP, LAA exclusion
- Standard CA 6-8 weeks afterwards

Findings at CA: 4 PV isolation in 36 (72%)
complete posterior box in 14 (28%)

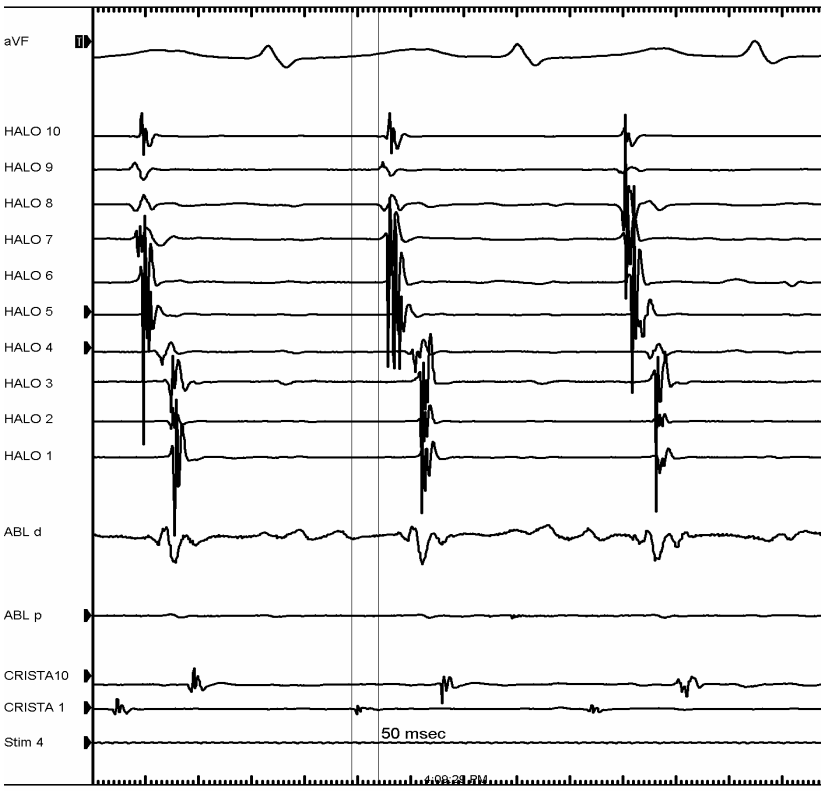
Bulava A: JAHA 2015;e001754

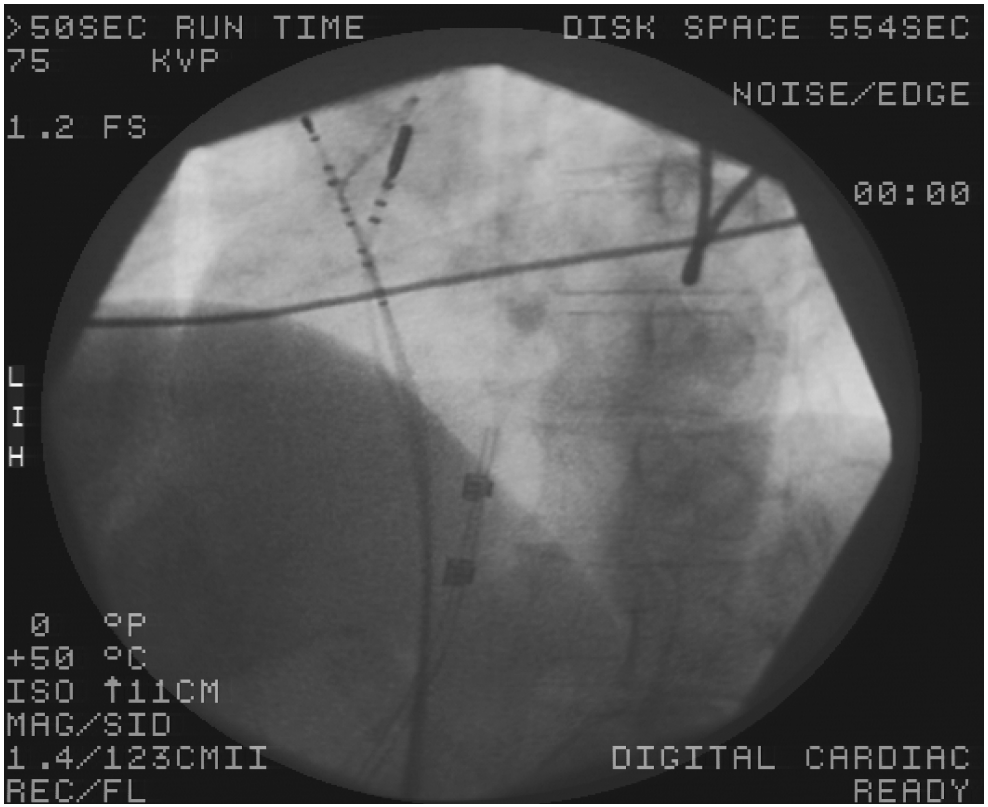
Improbable things about SA from an electrophysiologist's perspective

1. Periprocedural discontinuation of anticoagulation
2. The Rx for recurrent arrhythmias after CA is CA; the Rx for recurrent arrhythmias after SA is …
3. SA has no electrophysiologic mapping for non-AF related arrhythmias
4. There may be surgical complications that are not discussed in the literature…

Sometimes EP data is more important than anatomic ablation

51 year old man with typical AFl 4 months after SA. Flutter easily ablated, but what provided triggers to initiate flutter? PVIs isolated from before





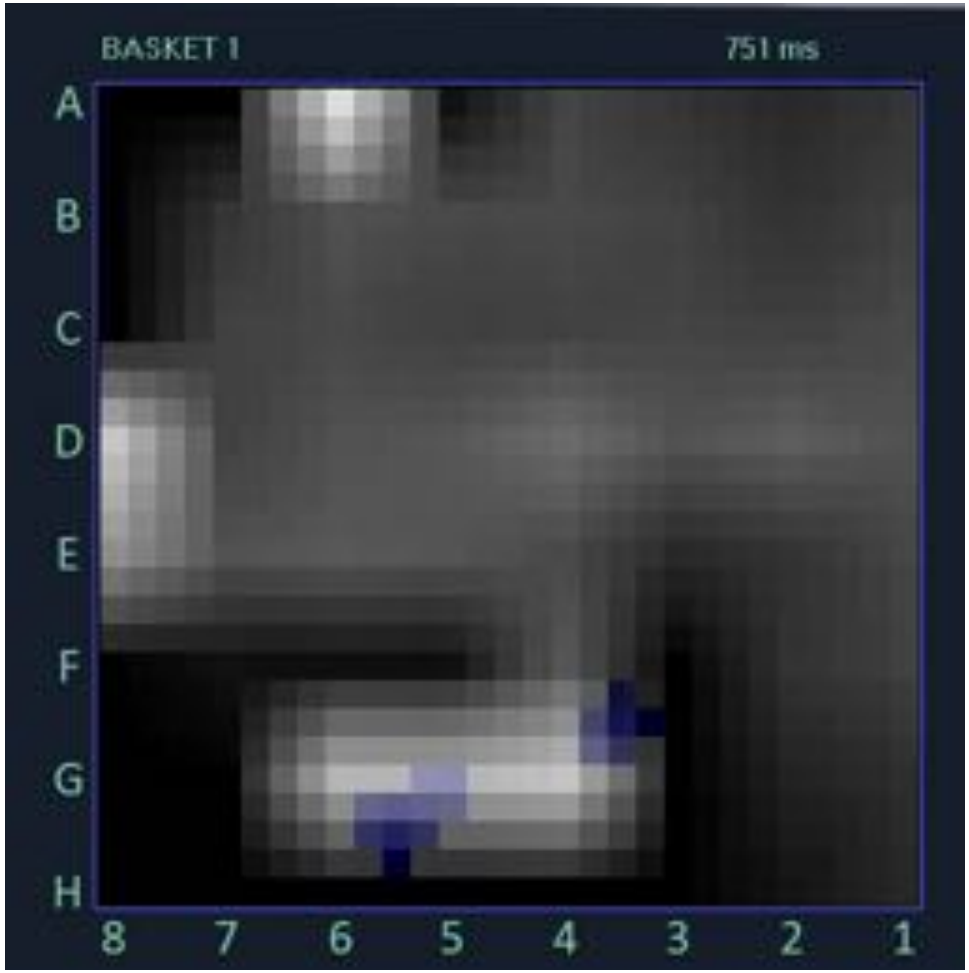
Surgical complications that are not discussed in the literature

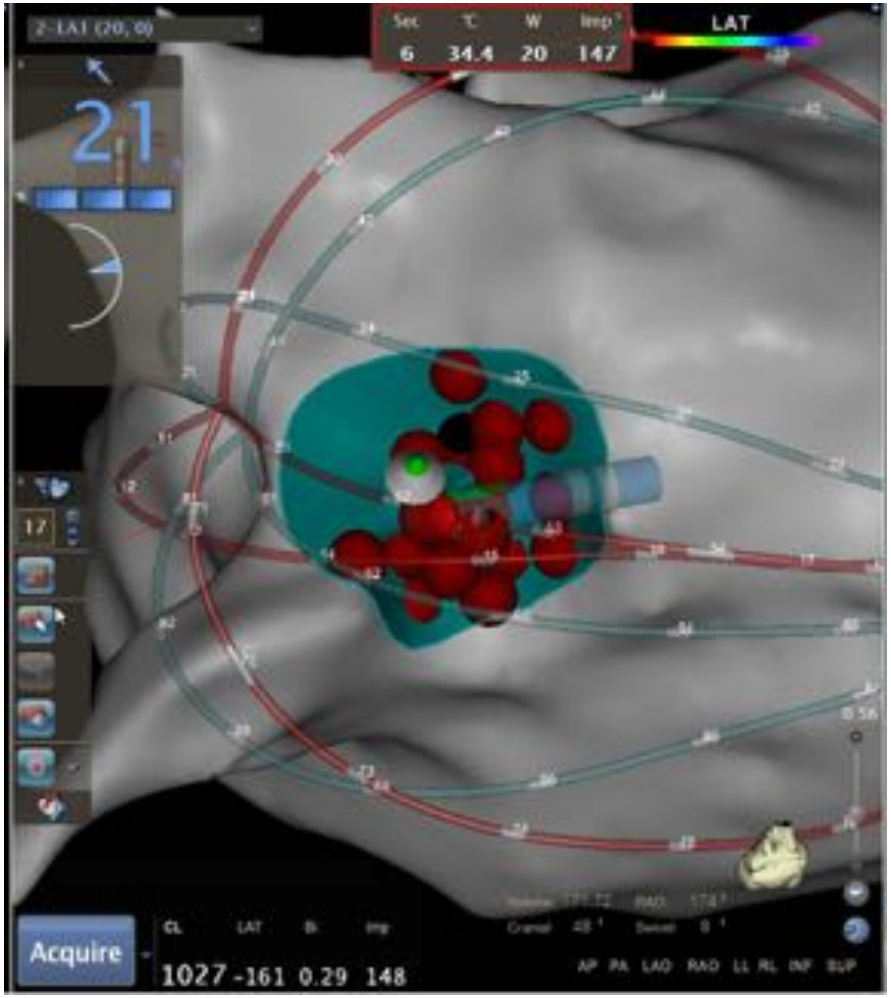
Chronic post thoracotomy pain syndrome

- Continuous pain in the general area of the incision(s) that persists for area at least 2 months
- Incidence 50%, usually mild/moderate pain, but severe and disabling in 5%
- Thought secondary to intercostal nerve damage
- Not alleviated with smaller incisions…

Rogers and Duffy: Eur J CT Surg 2000;18:711-716

After a large head start for SA, innovation has turned towards CA





How do patients vote on this issue?

- Industry estimates ~ 2000-2500 Mini-maze / hybrid procedures / year world-wide
- Some North American cities perform more catheter ablations for AF annually!

Surgical vs. catheter ablation

Thoracoscopic surgical ablation versus catheter ablation for atrial fibrillation

"SA may be more efficacious than CA treatment in a selected patient population with refractory AF and prior failed catheter intervention. Improved freedom from arrhythmias at up to 12-month follow up is counterbalanced by higher procedural complications"

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Abstract

For patients with atrial fibrillation (AF) who are refractory to anti-arrhythmic drugs (AADs), minimally invasive video-assisted thoracoscopic surgical ablation (SA) and catheter ablation (CA) are potential alternative treatment options. The recent FAST randomized study suggested that thoracoscopic SA was superior to CA in achieving freedom of AF in patients who have failed at least one prior AAD. To assess the relative merits and risks of SA versus CA, a systematic review and meta-analysis was conducted. Electronic searches were performed using six databases from their inception to December 2014. Relevant studies comparing thoracoscopic SA and CA were identified; data were extracted and analysed according to predefined clinical endpoints. Relative risk (RR) and weighted mean difference were used as summary statistics. Freedom from AF/arrhythmias was significantly higher in SA versus CA at 12-month off-AAD (78.4 vs 53%; RR, 1.54; $P < 0.0001$) and on-AAD (82.6 vs 45.7%; RR, 1.85; $P < 0.00001$). This difference was maintained in paroxysmal and persistent AF subgroups. The SA cohort had a significantly lower requirement for repeat ablations compared with the CA cohort (4.7 vs 24.4%; RR, 0.21; $P = 0.0001$). However, major complications were significantly higher in the SA group (28.2 vs 7.8%; RR, 3.30; $P = 0.0003$), driven by pleural effusion and pneumothorax. SA may be more efficacious than CA treatment in a selected patient population with refractory AF and prior failed catheter intervention. Improved freedom from arrhythmias at up to 12-month follow-up is counterbalanced by higher procedural complication rates.