

Barts and The London Cardiovascular Biomedical Research Unit

Maximising success

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Disclosures

- Research agreements with:
 - Biosense Webster
 - St Jude
 - Medtronic
 - Hansen medical
 - Boston Scientific

What is the definition of success?

- 1 year AF/AFL/AT free (3 month blanking)
- ECG, 24 holter and regular event recording
- AF >30 seconds

Prognostic benefit of AF ablation

- Randomised controlled trials showing prognostic benefit:

Discussion with patients

- No RCT demonstrating prognostic benefit for any form of rhythm control
- RACE and AFFIRM - drugs and cardioversion show increased risk
 - 40% of pts in SR at 1 year
- AF ablation has small but significant risk

Indications and endpoints for AF ablation

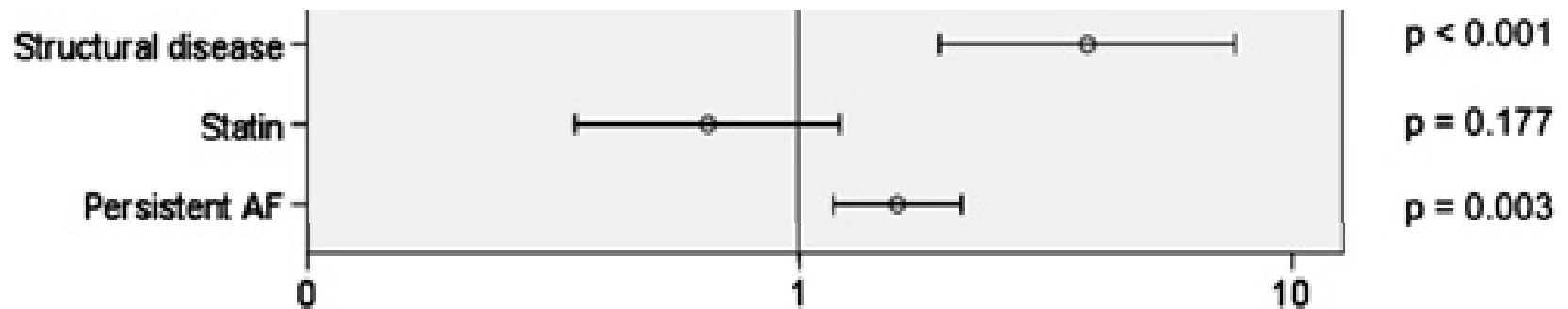
- Symptom improvement

Patient selection issues

- Symptomatic despite rate control:
 - Symptoms correlate with AF on ECG
 - Symptoms return after

Patient selection

- PAF vs persistent



Patient selection - predictors of success

- time in continuous AF \approx LA size
- >4.5 cm LA diameter
- Multivariate analysis

	HR (95%CI)	P-value
LAD	1.1(1.06-1.2)	0.001
Hypertension	2.8(1.5-5.4)	0.002

Older patients

	HR (95% CI)	P-value
Age (years)	1.03 (1.00–1.06)	0.031*
Male gender	1.02 (0.45–2.32)	0.942
Hypertension	2.70 (1.43–5.07)	0.002*
Permanent AF	2.23 (1.08–4.59)	0.042*
Structural heart disease	1.28 (0.61–2.69)	0.331
AF duration (months)	1.00 (1.00–1.00)	0.989
LAD (mm)	1.11 (1.05–1.18)	0.001*
LVEDD (mm)	1.05 (0.98–1.12)	0.175
LVESD (mm)	1.07 (1.00–1.15)	0.029*
LVEF (%)	0.98 (0.95–1.01)	0.128
IVS (mm)	0.99 (0.78–1.27)	0.843
LVPW (mm)	1.05 (0.74–1.48)	0.927

Berruezo EHJ 2007

6 studies of ablation in the elderly

Study		1	2	3	4	5	6
Success	Elderly	78%	80%	86%	n/a	69%	64%
	Non-elderly	75%		88%		71%	84%
Comps	Elderly	8.5%	2%	8.8%	19.2%	N/A	3.9%
	Non-elderly	4.1%		3.6%	12.7%		5%

Patient selection - heart failure

- same as other patients

	Univariable		Multivariable Model 1		Multivariable Model 2	
	Unadjusted HR (95% CI)	P	Adjusted HR (95% CI)	P	Adjusted HR (95% CI)	P
Age	0.99 (0.96–1.02)	0.55			0.98 (0.93–1.02)	0.28
Gender	3.8 (0.52–27.88)	0.19		0.42		
Paroxysmal vs. persistent	0.55 (0.27–1.14)	0.11		0.23	0.68 (0.31–1.48)	0.33
Duration of AF	1.00 (0.99–1.00)	0.37				
AHT	1.12 (0.57–2.21)	0.73			1.19 (0.50–2.84)	0.69
RF time	1.00 (1.00–1.00)	0.59				
LVESD	1.00 (0.95–1.05)	0.92				
LVEDD	1.01 (0.96–1.07)	0.64				
LAD	1.10 (1.03–1.16)	0.004	1.10 (1.03–1.16)	0.004	1.09 (1.02–1.16)	0.009
EF	0.99 (0.97–1.02)	0.65		0.78	0.99 (0.97–1.02)	0.83

Other predictors

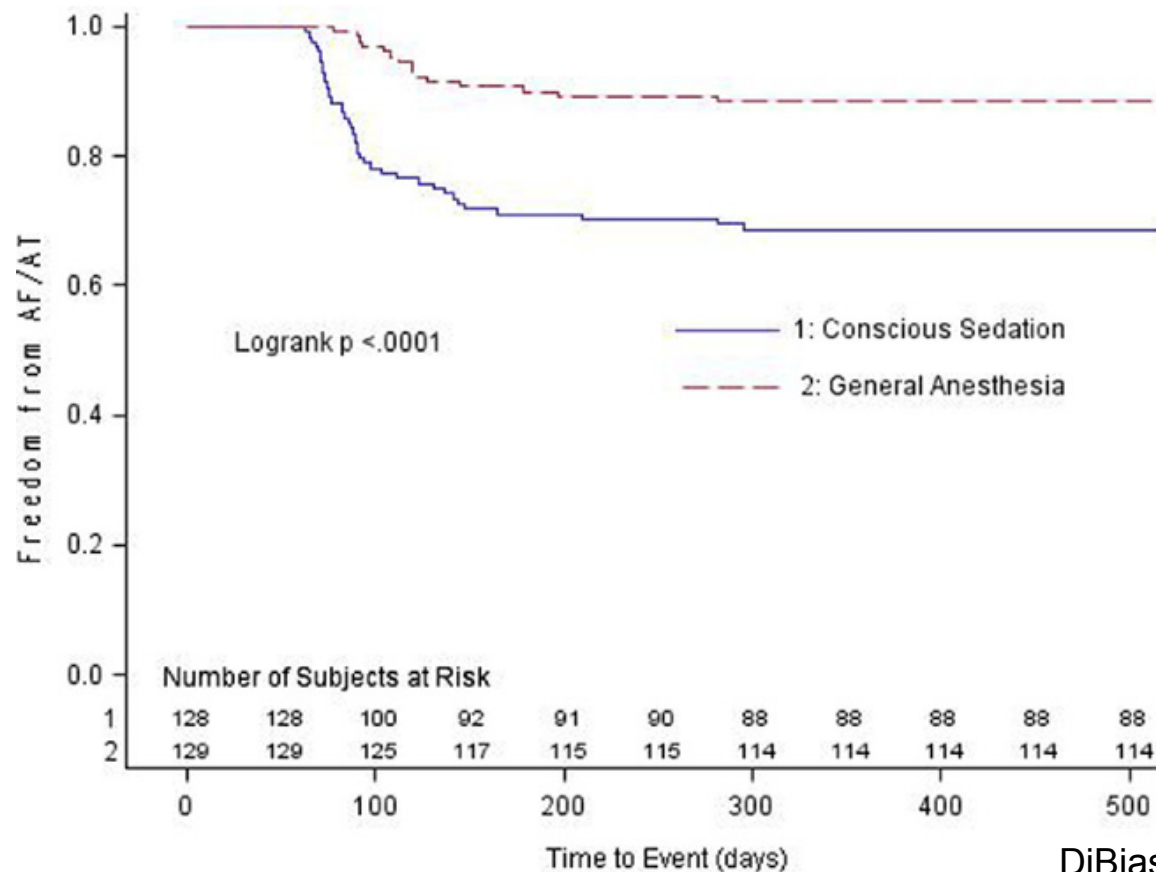
- LA scar on MRI or EP study
 - not a practical selection tool

Patient selection summary

- Highly symptomatic
- PAF or early persistent (<1 year)
- No other cardiovascular disease

Procedural factors

- Sedation vs GA



Procedural factors to improve outcome - CFE ablation

- AF recurrence/100yrs pt follow up

	0–1 years	1–2 years	2–3 years	>3 years
All AF (patient years studied)	30.0% (270)	6.4% (267)	4.0% (200)	3.0% (164)
PAF (patient years studied)	24.1%† (145)	4.2% (143)	2.8% (109)	4.2% (72)
PeAF (patient years studied)	36.8% (125)	8.9% (123)	5.5% (91)	2.2% (93)
PeAF–CFE targeted (patient years studied)	34.2% (73)	7.0% (72)	2.2% (46)	0% (16)
PeAF–CFE not targeted (patient years studied)	40.2% (52)	11.6% (52)	8.8%‡ (45)	2.6% (77)

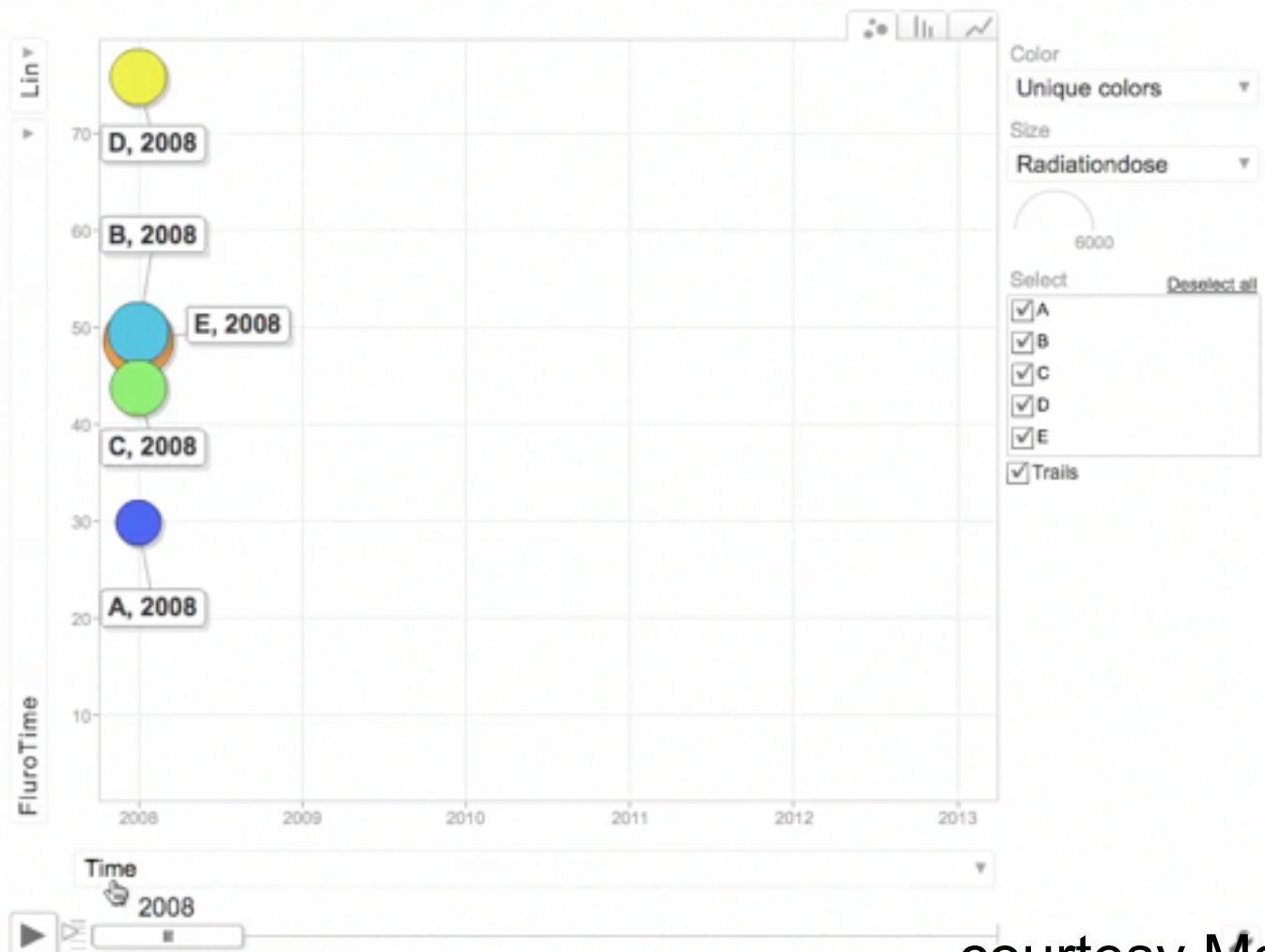
Procedural factors - Technology

- Cryo vs RF - single procedure success at 1 year follow up, n= 240

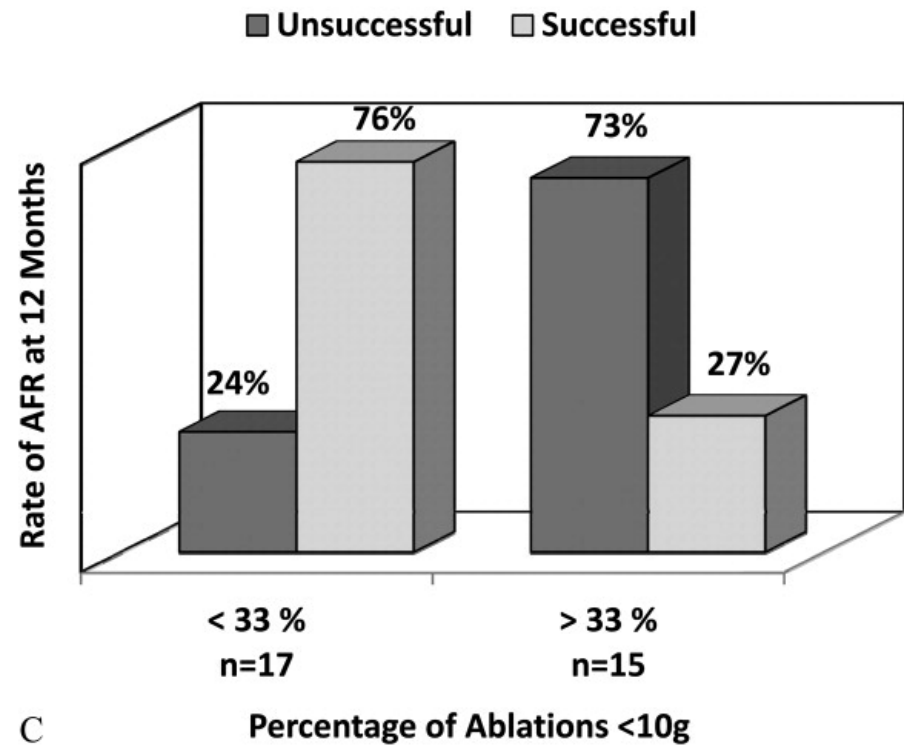
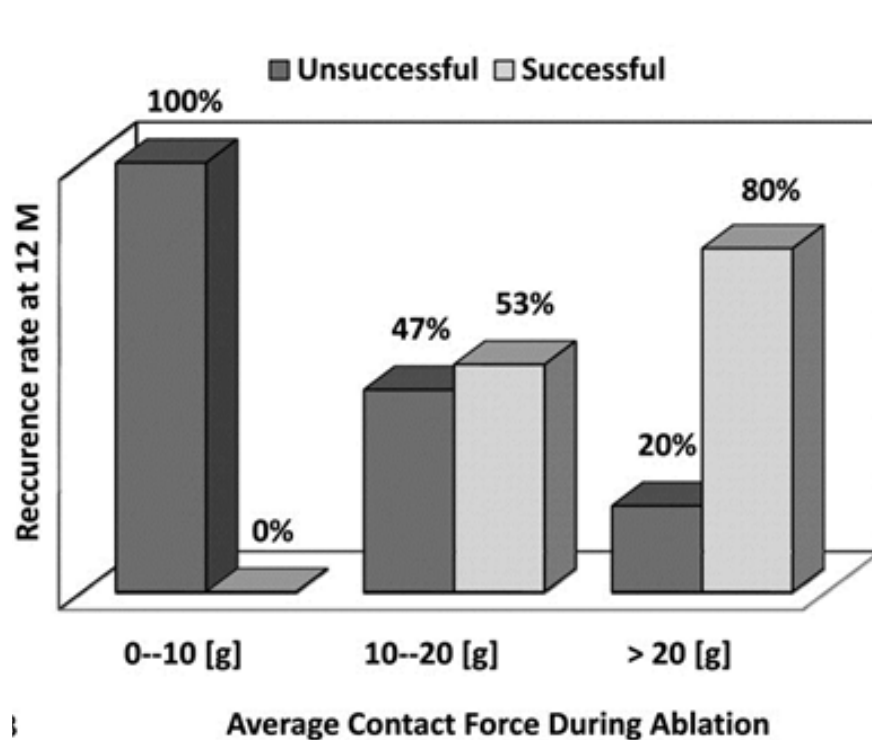
PAF pts

	Cryo	RF	RF + cryo
Success (%)	63.3	44	73.8

Procedural factors - catheter navigation

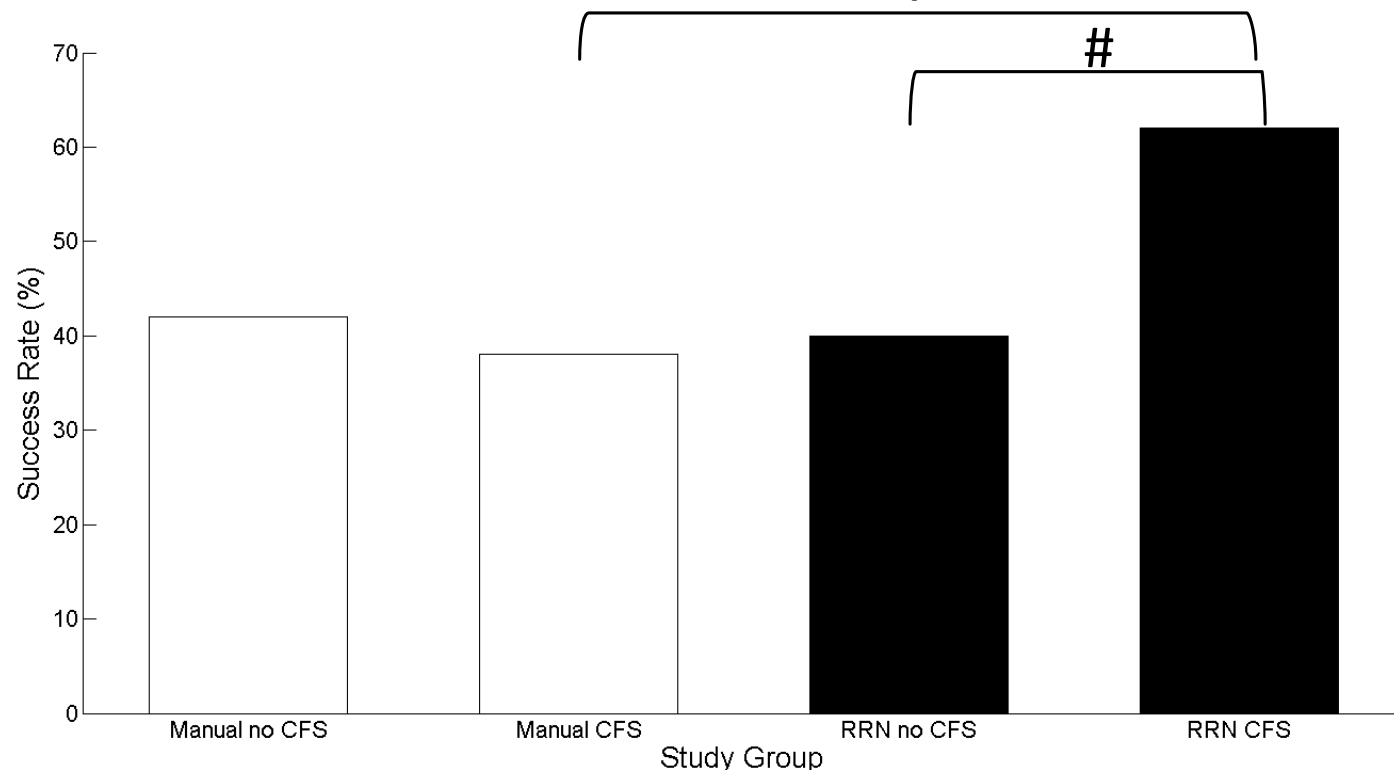


Contact force and reconnection



Procedural factors persistent AF

- Non-randomised Manual vs Robotic with force sensing in persistent AF



CFS=Catheter-contact force sensing; RRN=Remote Robotic Navigation; AAD=Anti-arrhythmic drug

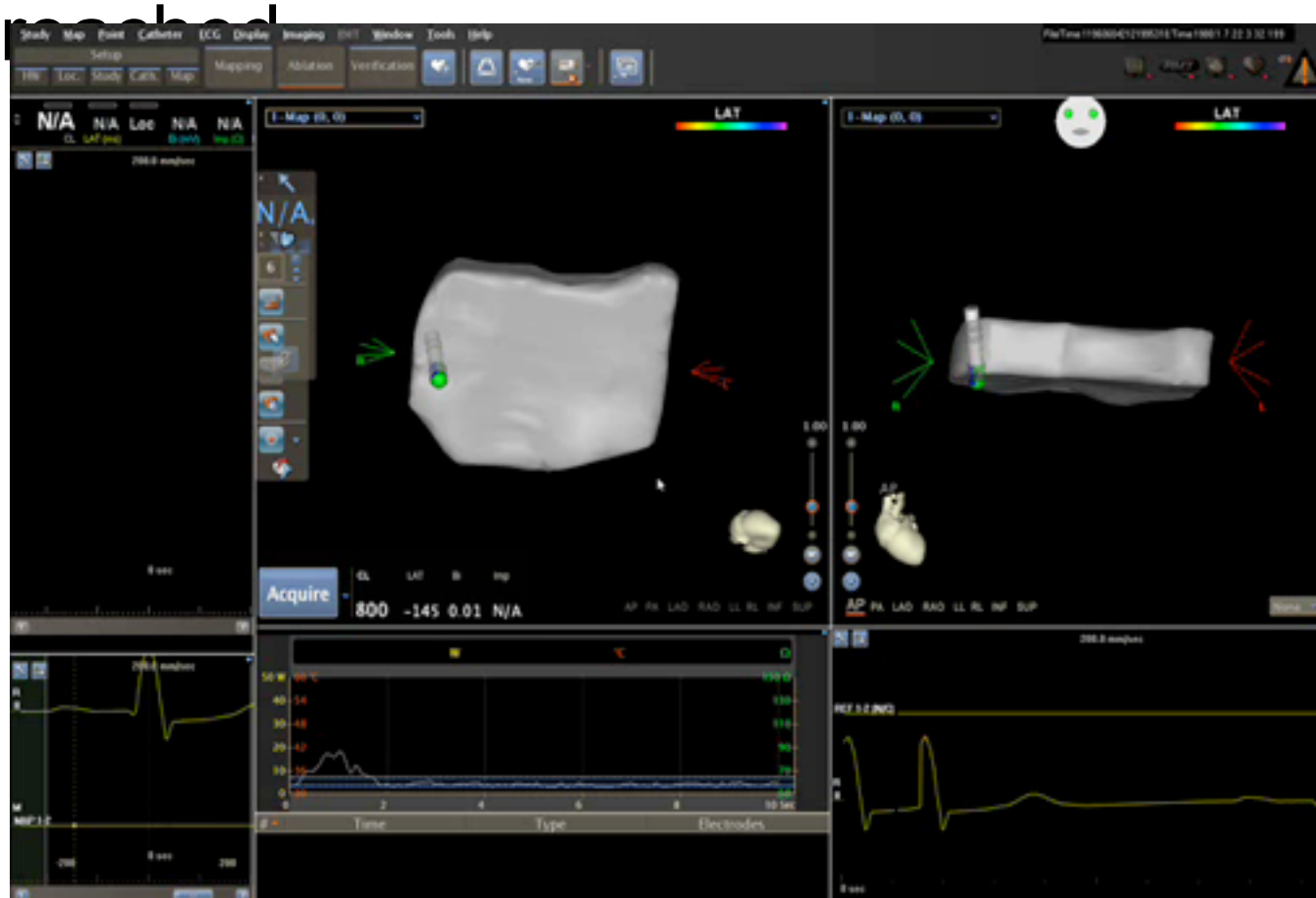
* p=0.027 for comparison between RRN and Manual with CFS

p=0.045 for comparison between RRN with and without CFS

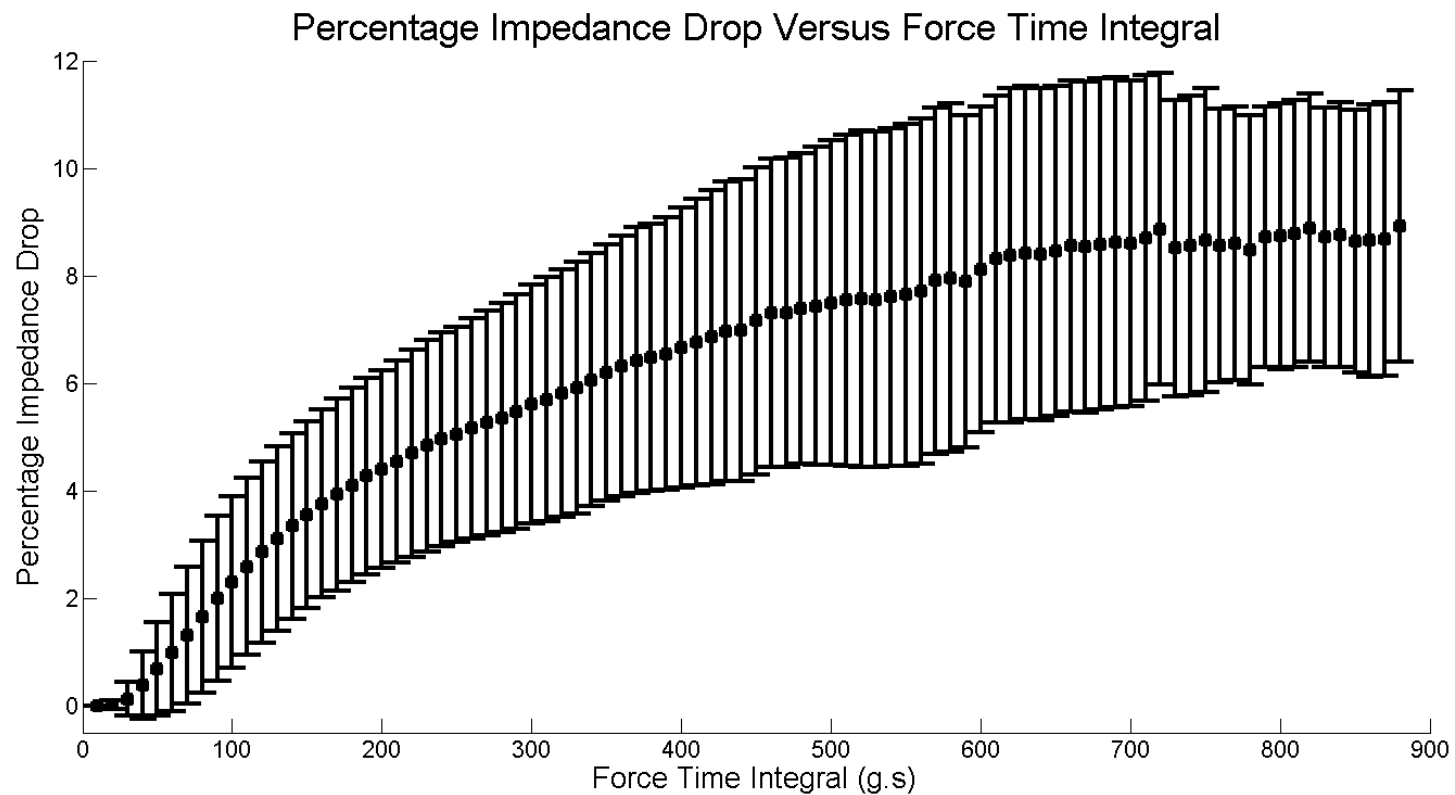
Ullah et al in review

Visitag

- Lesions placed after threshold FTI



Force*time = lesion

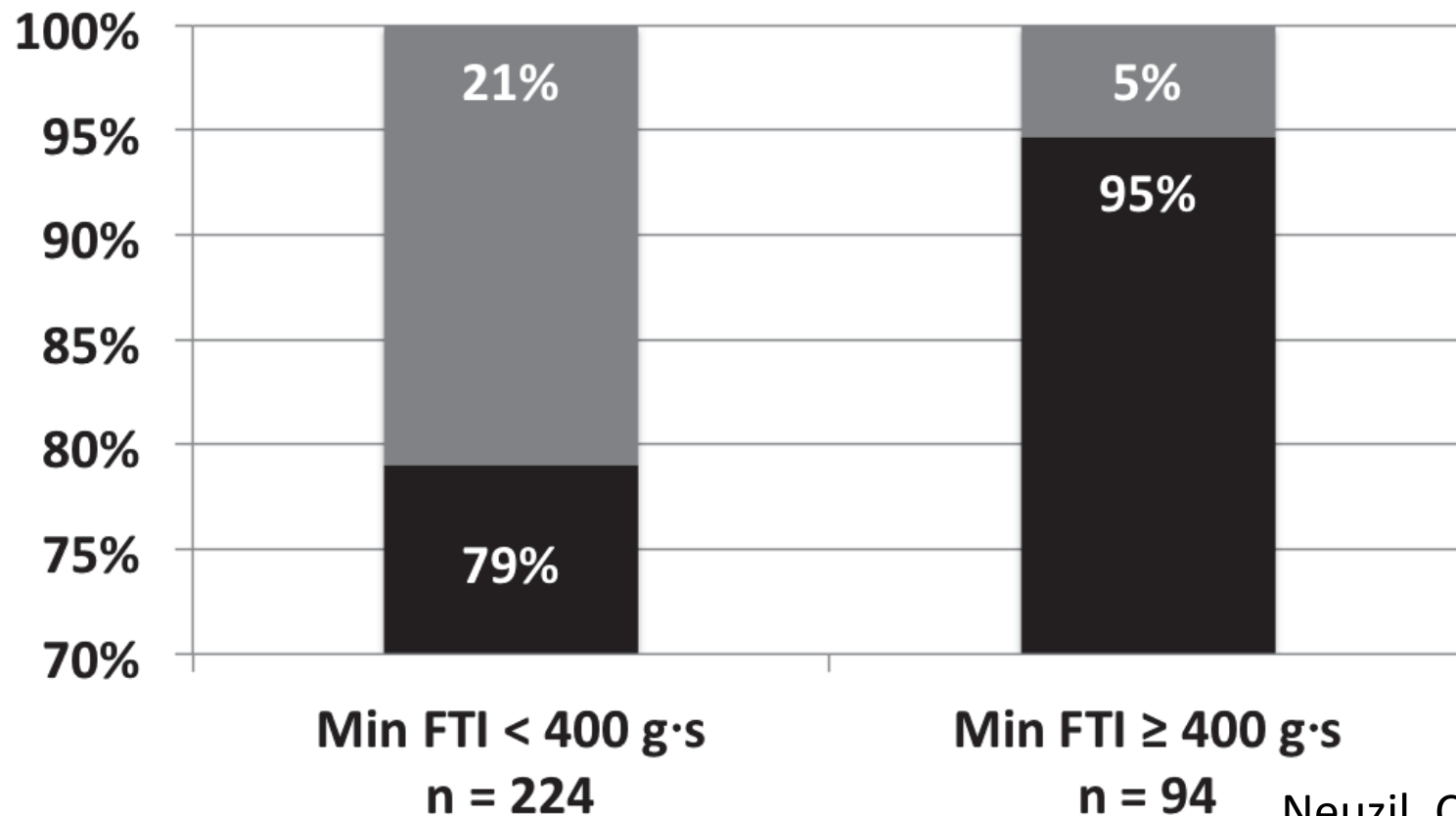


Ullah et al in submission

Degree of contact and reconnection

- N=46 PAF pts
- At 3 months
 - Median contact force lower for reconnecting PVI segments (15.5 vs 19.5g)
 - Minimum contact force and minimum FTI in segment most predictive

Minimum FTI (g·s) success ratio per segment
p = 0.0004 - OR = 0.21



Follow up factors

- Manage patient expectation
- Clear distinction of ectopy from AF
- Rigorous control of reversible factors
 - Alcohol, hypertension
- Encourage review by referrer after 6 months

Putting it all together

- Early experience
 - PAF with no structural heart disease
 - Cryo ablation
- Medium experience
 - PAF or early persistent
 - point by point/force time integral sensing/ GA
- Large experience
 - PAF or persistent <3 years
 - Robotic navigation under GA

Conclusions

- Maximising success is critical to credibility
- Starting with the best cases and evolving is a good strategy
- Critical appraisal and adoption of technology can make a difference