Background: Catheter ablation for paroxysmal atrial fibrillation (AF) is an established therapy in selected patients. It has been shown, that long-term outcome was related to left atrial (LA) size. The aim of study was to identify, if CARTO related left atrial volume (LAV) predicts clinical outcome of catheter ablation for atrial fibrillation in real-life population.
Methods: An analysis was performed in 709 consecutive patients (61 ± 10 years; 64% males; and 64% persistent) referred to catheter ablation for drug resistant symptomatic AF in one center.
Results: Out of all patients, 589 (83%) were classified as good rhythm control (either with or without antiarrhythmic medication) after mean follow-up of 28 ± 25 month. Mean number of procedures was 1.3 ± 0.6 per one patient. When compared to patients with good arrhythmia control patients with recurrent AF had more enlarged LA (LAV 136 ± 43 vs. 118 ± 36 ml), were older (67 ± 10 vs. 61 ± 9 years) and had more frequently history of heart failure (14% vs. 7%); $p < 0.05$. Side to age and history of heart failure, LAV was identified as independent predictor of treatment failure ($p < 0.05$). The sensitivity and specificity of LAV estimated by CARTO above median (115ml) to identify patients without good arrhythmia control was 54% and 63%.
Conclusion: Despite LAV estimated by CARTO was identified as independent predictor of clinical outcome, its sensitivity and specificity seem to be low.

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Presence of low voltage zone areas is associated with lower AF recurrence in patients undergoing re-ablation with substrate modification

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Background: Presence of low voltage zones (LVZ) in the left atrium during high-density bipolar voltage mapping (HD-BVM) indicates fibro-fatty infiltration which is an important determinant for initiation and maintenance of atrial fibrillation (AF). Left atrial substrate modification (LASM) targeting LVZ in addition to pulmonary vein isolation (PVI) is an ablation strategy that tries to eliminate these areas to reduce recurrence. However, even after successful LASM and PVI there is a relative high rate of recurrence. Important factors at re-ablation such as PV reconduction or untreated LVZ might explain failure in some of these patients.
Objective: To study mapping related predictors of AF recurrence during re-ablation in a cohort of patients treated with PVI and LASM and further to compare differences in recurrence rates after re-ablation procedures and 1st ablation only procedures.
Methods: We included patients who were re-ablated for paroxysmal or persistent AF from January 2014 to-May 2017. As a control group we included patients undergoing 1st time only ablation in the same period, whit an implantable loop recorder. Patients undergoing re-ablation were followed with continuous monitoring in 82% and periodic Holter monitoring in 18% of the patients. At all procedures a HD-BVM was performed in sinus rhythm before ablation and areas displaying voltage < 0.5 mV was categorized as LVZ. At the re-ablation procedure re-conduction to PVs were registered. The endpoint was time to first episode of any atrial arrhythmia. Mapping related variables at re-ablation included isolated PVs and presence of LVZ. Data are presented as absolute number and percentages and adjusted Hazard Ratios (aHR) with 95% CI adjusting for the following variables; CHAā DSā VASc score with gender entered independently and arrhythmia recurrence (paroxysmal/persistent).
Results: A total of 100 patients (age 68±10, 62% male, 33% paroxysmal) undergoing re-ablation followed for 12±10 months and 389 patients (age 65±12, 57% male, 53% paroxysmal) undergoing 1st ablation only followed for 15±10 months were included in the analysis. The 12 months freedom from arrhythmia recurrence was and 54% (43-63) after re-ablation and 54% (49-59) after 1st ablation only. At re-ablation presence of LVZ (aHR; 0.50, 0.25-1.0, p=0.049) was associated with lower recurrence as was reconduction to the PVs (aHR; 0.60, 0.34-1.80, p=0,087), although it did not reached statistical significance. However in patients undergoing 1st ablation LVZ was associated with a higher recurrence rate (aHR; 1.5, 1.1-2.0, p=0.011). Patients with LVZ at re-ablation had a lower recurrence rate as compared to patients with LVZ at 1st ablation (aHR; 0.53, 0.34-0.82, p=0.005).
Conclusion: In a patient cohort undergoing re-ablation including PVI and LASM, presence of LVZ is associated with lower arrhythmia recurrence as compared to both patients without LVZ at re-ablation and patients with LVZ undergoing first ablation.

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First in-human experience with ablation index to perform left atrial anterior line in patients with persistent atrial fibrillation

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Background: Ablation Index (AI) is a novel ablation quality marker that incorporates contact force (CF), time and power in a weighted formula to provide accurate information about lesion formation for pulmonary vein isolation (PVI). However, this index has still not been evaluated for other left atrial procedures such as an anterior line. The aim of this study was, to evaluate the feasibility of AI for left atrial anterior wall ablation.
Methods: During PVI procedures, an individual AI was used for all pulmonary vein (PV) segments (anterior =510, posterior=380, inferior=380, roof=410 and ridge=510) from one experienced operator. Thereafter a left atrial anterior wall AI was measured after retrospective evaluation of 10 consecutive procedures. Median AI for the left atrial anterior wall was 490±80. Thus, AI target was 500 (400-550) with 30 watt. A Smart-touch SF 56 ablation catheter was used in all these procedures.
Results: Ten consecutive patients with symptomatic drug-refractory persistent AF undergoing radiofrequency catheter ablation (mean age: 70±6 years; n=7/10 (70%) male) were enrolled. After PVI, an anterior line ablation was performed. Bidirectional block of the anterior line was confirmed after application of 19±5 RF applications and overall RF application duration was 9,3±2,3 minutes.
Although AI between the anterior segments of PV and the left anterior wall was similar (510 vs 500), mainly due to similar average force (19.2±12.8 vs 22.8±15 gr p=0.10) and mean power (28.3±4.9 vs 28±5 Watt p=0.88), we found in the anterior segment of the PVs higher values of baseline impedance (125.2±8.4 vs 119.5±10.4 Ω p=0.01), impedance drop (11.2±5.7 vs 9±4.6Ω p=0.01) and maximal temperature achieved (34±1.1 vs 33±2° p=0.02).
Conclusion: Ablation index for left atrial segments over the pulmonary vein is feasible however may not be able to discriminate some tissue difference.

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Radiofrequency catheter ablation technology to improve lesion formation

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Introduction: Radiofrequency Catheter Ablation (RFCA) is the mainstay of invasive treatment of cardiac arrhythmias, particularly atrial fibrillation (AF). Despite the dramatic technological advances in RFCA, achievement of complete Pulmonary Vein Isolation (PVI) remains a challenge.
Purpose: To systematically evaluate currentRFCA technology to provide therapeutic intervention and recommendations on the basis of the existing evidence.
Methods: A systematic literature search, in English, was conducted on Ovid MEDLINE, Embase and PubMed with the keywords "radiofrequency catheter ablation*', "contact-force*", "irrigated", "lesion formation" and "atrial fibrillation" up to 16 October 2017. Studies evaluating RFCA in lesion formation and factors influencing ablation outcome, such as power delivery, temperature, procedure time, impedance and radiation exposure were included. Clinical studies were evaluated for quality and risk of bias using the Cochrane Collaborations' tool and/or Newcastle-Ottawa scale.
Results: A total of 15 studies met our inclusion criteria, corresponding to 1,595 particiipants. We found two studies reporting on lesions, with one drawn from a randomised controlled, double-blind, trial and one from observational design. These demonstrated better lesions with contact force (CF)-guided circumferential PVI compared to non-guided ablation, and 8-mm tip and cooled-tip (40W) as compared to cooled-tip at 30W. Additionally, animal studies also revealed that the higher CF influences lesion depth, which is the key to lesion transmurality. Four studies reported CF-sensing vs non-CF catheters, mostly of observation cohorts and one RCT. Interestingly, CF catheters demonstrated a significant positive ablation outcomes compared to standard catheters, with almost 50% reduction in procedure and fluoroscopy times reported.
Conclusions: The systematic review showed the evaluation of current available RFCA and the procedure outcome to assist in future catheter intervention. CF-sensing catheter demonstrated better ablation effectiveness and efficacy more than non-sensing catheters. However, despite the development of these novel catheters, AF recurrence remains high, which warrant newer techniques to ensure transmural lesions to achieve complete PVI.

Reference	Design	Intervention	Main results	Procedural parameters			AT/AF recurrence
				Temperature/power	Procedure time	Fluoroscopy	
Lesion Size Endpoint							
Kimura et al; 2014	RCT	CF-guided CPVI vs non-guided	More lesions by CF;	25 to 30 W	59±16 min vs 98±39 min; p<0.01	9±20s vs 22±63s; p=NS	5.3% vs 15.8%; p=0.34
Matiello et al; 2008	Observational	8-mm tip vs cooled-tip (30W) vs cooled-tip (40W)	Tprd: 4.3±2.4 vs. 2.7±1.1 vs. 5.6±2.3; p=0.02	55 °C/55w vs. 45°C/30w vs. 45°C/40w	128±31 min	27±8 min	47% vs. 65% vs. 45%; p=0.03
Contact Force vs Non-CF Catheters							
Reddy et al; 2015	RCT	CF-sensing vs SAC	100% PVI short-term; p=NS	–	46.5 vs 53.0 min; p=0.02	27.0 vs. 23.0 min; p=0.04	67.8% vs. 69.4%
Wakili et al; 2012	Prospective	PVI with CF vs SAC	Reduced impedance; p=0.02	–	78.1±7.2 vs. 95.5±7.4 min; p<0.05	33.0±2.7 vs. 51.4±3.3 mins; p<0.01	40.8 vs. 37.1 %; p=NS
Kumar et al; 2014		CF vs. surrogates		25w/48°C			
Stabile et al; 2014	Pilot	>20 g vs. <10 g CF	–	30w-35w	92.0±23.0 vs. 160.0±67.0 min; p<0.01	17.5±13.0 vs. 11.0±7.7 min; p<0.01	–
Open-irrigated catheters							
Martinek et al; 2012	Non-RCT	Open-irrigated vs CF-sensing	CF: ↓energy; p=0.02	P=NS	154±39 vs. 185±46 min; p<0.02	P=NS	–
Wakili et al; 2016	Prospective	nMARQ vs SAC	<100% PVI vs SAC	30 w for both	21±9 vs. 35±12 min; p<0.01	31±12 vs. 23±10 min; p<0.05	26% for both; p=NS
Zellerhoff et al; 2014	Prospective	Efficacy of nMARQ	98% PVI	25w/45°C	86± 29 min	22.2± 6.5 min	34% & 23%
Gold MEA Mapping Catheters							
Gal et al; 2017	Non-RCT	Efficacy of Gold-MEA		30w/60°C	111±22 mins	20±8.1 min	40% >1 year follow up

Abstract P366 Figure. RFCA data summary

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Early European experience with a magnetic sensor enabled contact force-sensing catheter

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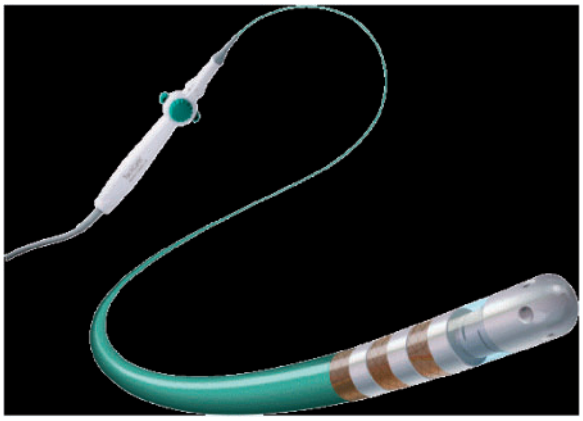
Introduction: A new sensor enabled contact force-sensing catheter received CE Mark in May 2017 (Figure 1). Procedural characteristics associated with the use of this novel ablation catheter technology across multiple centers have not yet been reported.
Purpose: To summarize the early European experience with this new ablation catheter technology, specifically for left and right atrial ablation procedures.
Methods: Non patient-identifiable procedural data associated with use of the new catheter technology was collected during the initial phases of commercialization. Left or right atrial ablation procedures were included. Procedural characteristics recorded included indication for ablation, procedure time, radiofrequency time, and concomitant device use.
Results: Procedural data was collected in a total of 208 cases across 38 European centers. Eight indications for ablation were represented, with de novo paroxysmal atrial fibrillation (PAF) ablation accounting for the largest portion at 63.0% of cases (Table 1). Bidirectional ablation catheters were utilized in 64.3% of cases (207/208 reporting) and a steerable sheath was used in 73.1% of cases (197/208 reporting). Within the de novo PAF ablation population, mean procedure (127/131 reporting) and RF times (128/131 reporting) were 144.9 ± 57.7 and 33.2 ± 15.6 minutes, respectively.
Conclusions: Initial European experience with this new ablation catheter technology included use for multiple left and right atrial ablation indications, including atrial fibrillation. The majority of cases utilized a steerable sheath, and use of the bidirectional version of the ablation catheter was more common than use of the unidirectional version. Procedure and RF times associated with de novo PAF ablation were in line with values previously reported for contact-force sensing catheters.

Abstract P367 Table. Indication for ablation.

Indication for Ablation	Number of Cases (%)
De Novo Paroxysmal Atrial Fibrillation	131 (63.0%)
Persistent Atrial Fibrillation	29 (13.9%)
Paroxysmal Atrial Fibrillation (Redo)	18 (8.6%)
Typical Atrial Flutter	10 (4.8%)
Atypical Atrial Flutter	7 (3.4%)
Atrial Tachycardia	6 (2.9%)
Left Atrial Flutter	4 (1.9%)
Accessory Pathway Ablation	2 (1.0%)
AV Node Ablation	1 (0.5%)



Abstract P367 Figure. Magnetic sensor contact force catheter

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Manual catheter ablation versus robotic navigation for atrial fibrillation pulmonary vein isolation

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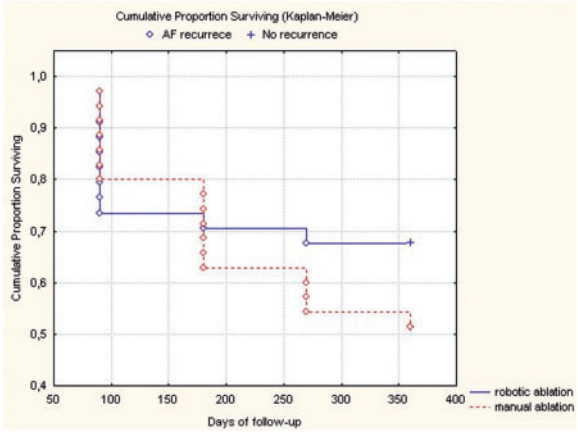
Background/Introduction: Clinical experience with the robotic remote navigation system (RNS) is limited but literature data suggests less radiation exposure and lower intraprocedural complications rate along with non-inferior efficacy compared with conventional approaches in atrial fibrillation (AF) ablation.
Purpose: to investigate the acute procedural success and long-term efficacy of manual catheter pulmonary vein isolation versus robotic navigation for atrial fibrillation.
Methods: Eighty patients (56.4 ± 12 years) with paroxysmal atrial fibrillation underwent robotic circumferential pulmonary vein (PV) isolation with 3-dimensional left atrial reconstruction. The ablation procedure was considered to be effective if no sustained atrial tachyarrythmias (lasting more than 30 sec) were registered during 12 months follow-up.
Results: Mean procedural duration and fluoroscopy time in the manual ablation (MA) group was 164 ± 28 minutes and 45 ± 14 minutes, respectively. The robotic ablation (RA) group was characterized by longer time of the procedure (200 ± 35 min) but lower overall (30 ± 12 min, p <0.05) and individual (18 ± 6 min, p <0.05) fluoroscopy time for operator. Nine (25%) patients of MA group and two (5%) patients of RA group had acute PV reconnection (p<0,05). Long-term efficacy was better in RA patients (69%) compared with those after MA (54%). There was no difference in major adverse events rate between groups.
Conclusion: A robotic navigation represents an alternative method of performing ablation for atrial fibrillation and is associated with significant reduction in X-ray exposure for both patient and operator, as well as lower complications risk.

Abstract P368 Table. Mean procedural and fluoroscopy duration

Parameters	RA Group Procedural time, min	Fluoroscopy, min	MA Group Procedural time, min	Fluoroscopy, min	P-value
Total time	200±35	30±12	164±28	45±14	<0,05
Approach time and mapping	36±8	15±6	32±10	16±4	>0,05
Installation of robotic remote navigation system	26±8	6±3	0	0	<0,05
Left PV isolation	29±7	3±1	34±8	11±3	>0,05
Right PV isolation	33±7	4±1	22±6	9±2	>0,05
Fluoroscopy time for operator		18±6		45±14	<0,05



Abstract P368 Figure. Long-term efficacy

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Comparison of three methods of activated clotting time (ACT) measurement during catheter ablation for atrial fibrillation

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Background: Guidelines for atrial fibrillation (AF) management recommend optimal activated clotting time (ACT) to monitor heparin administration during AF catheter ablation; however do not specify the type of ACT meter.
Purpose: This study aimed at comparing ACT levels measured by 3 types of ACT meters.
Methods: The study included 13 patients (5 females, 63±9 years), who underwent catheter ablation for AF. ACT was measured simultaneously from one blood sample by 3 systems (i-STAT Abbott - ABB, Haemochron Signature Elite Accriva - HEM, ACT Plus Medtronic - MDT), and at the same time, measurement by two types of cell - ,,low-range" (LR) and ,,high-range" (HR) - was compared for each system. Cells differ by the used agent (Celite vs. Kaolin). Cell HEM-LR does not specify ACT levels ≥400 seconds.
Results: In total, 87 samples of heparinized blood were evaluated. Comparison of measurements is shown in Table. Correspondence between the ACT levels obtained from cells HR vs. LR was poor for all three systems. ACT measured by the cells HEM-HR and MDT-HR corresponded with the ACT levels from ABB-LR. Cells MDT-LR and HEM-LR are sensitive to higher heparin levels and may not be suitable for heparin levels ranging between 2.5- 6.0 IU/mL. Correlation between the ACT levels measured by HEM-HR, MDT-HR and ABB-LR were relatively weak (R 0.60-0.65). In comparison with commonly used HEM-LR, the target ACT measured by HEM-HR, MDT-HR, or ABB-LR should be lowered by approximately 50, 25, and 40 seconds, respectively.