

Long-term Durability of High- and Very High-Power Short-Duration PVI by Invasive Remapping: HPSD Remap Study

BRIEF TITLE

Durability of HPSD and vHPSD PVI

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TWEET

Acute procedural efficacy and, based on invasive remapping, long-term durability of pulmonary vein isolation in atrial fibrillation were similarly high and with no complications with 90W and 50W power settings, with shorter procedural times with 90W compared with 50W.

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ABSTRACT

Background: High power short duration ablation has shown impressive efficacy and safety for pulmonary vein isolation (PVI) for atrial fibrillation (AF) ablation; however, initial efficacy results with very high power short duration ablation were discouraging.

Objective: To compare long-term durability of PVI performed with a 90W versus 50W power setting.

Methods: Patients were randomized 1:1 to undergo PVI with the QDOT catheter using power setting of 90W (QMODE+) or 50W (QMODE). At 3 months after the index procedure, all patients underwent a protocol-mandated repeat electrophysiology study, at which all sites of PV reconnection were identified and re-ablated.

Results: We included 40 patients (mean age, 65 years; female, 45%). Procedure (75 vs 84 minutes; $P=0.02$), left atrial dwell (63 vs 71 minutes; $P=0.01$), and radiofrequency (335 vs 1035 seconds; $P<0.0001$) times were shorter with 90W versus 50W procedures, while number of radiofrequency applications was higher with 90W versus 50W (85 vs 70; $P=0.01$). There was no difference in first-pass isolation (80% vs 85%; $P=1.0$) or acute reconnection (5% vs 15%; $P=0.6$) rates between 90W and 50W. During the repeat electrophysiology study, PV reconnection was seen in 4 and 7 patients in the 90W and 50W groups, respectively ($P=0.5$), while durable isolation on a per vein basis was 92% and 88%, respectively ($P=0.4$). No complications occurred.

Conclusions: Similar high rates of durable PVI were achieved with 90W and 50W power settings. Procedure, left atrial dwell, and radiofrequency times were shorter with a 90W compared with a 50W power setting (ClinicalTrials.gov Identifier: NCT05459831).

CONDENSED ABSTRACT

In the HPSD Remap study ($n = 40$), long-term durability of pulmonary vein isolation (PVI) was assessed when performed with a 90W versus 50W power setting. Patients underwent PVI using the QDOT catheter and one of the 2 power settings, followed by a repeat electrophysiology study at 3 months. Procedure, left atrial dwell, and radiofrequency times were shorter with 90W versus 50W procedures (all $P\leq 0.01$). There was no difference in first-pass isolation or acute reconnection rates between 90W and 50W, nor between rates of PV reconnection or durable isolation per vein after 3 months. No complications occurred.

KEYWORDS

very high power short duration, high power short duration, pulmonary vein isolation, atrial fibrillation, invasive remapping

ABBREVIATIONS

AF: atrial fibrillation

CTA: computed tomography angiography

ILD: inter-lesion distance

HPSD: high power short duration

LA: left atrium/atrial

PV: pulmonary vein

PVI: pulmonary vein isolation

RF: radiofrequency

vHPSD: very high power short duration

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INTRODUCTION

In the management of atrial fibrillation (AF), catheter ablation techniques have revolutionized treatment with established prognostic benefit. Pulmonary vein isolation (PVI) is the cornerstone of AF ablation (1), but despite current technological advancements, AF recurrence, primarily due to pulmonary vein (PV) reconnection, has remained an issue (2-4). PVI with high power and short duration (HPSD; >40W) creates smaller but more uniform lesions compared with low power energy settings, resulting in favorable safety and efficacy (5-9). Recently, a very high power short duration (vHPSD; 90W, 4 sec) technique has been introduced, but initial efficacy results are controversial regarding first-pass isolation rates, acute reconnection rates, and arrhythmia-free survival (10-14).

We hypothesized that vHPSD PVI could result in similar acute and long-term efficacy as ablation index-guided PVI with 50W (13). Therefore, we designed the HPSD Remap study (Efficacy Comparison of High and Very High Power Short Duration Pulmonary Vein Isolation, ClinicalTrials.gov Identifier: NCT05459831), in which durability of lesions was assessed by a repeat electrophysiology study after an index PVI performed with either a 90W or 50W power setting.

METHODS

Study design

We conducted an investigator-initiated, single-center, prospective, randomized, parallel-group, open-label study to assess the long-term durability of PVI performed with a 90W or 50W power setting. Eligible patients had symptomatic paroxysmal or “short standing” persistent AF; full details of inclusion and exclusion criteria are listed in the study protocol (**Supplemental**

Material). All participants gave written informed consent. Ethics approval was obtained from the Hungarian National Public Health and Medical Officer Service (9119-2/2022/EÜIG).

Forty patients were randomized in a 1:1 ratio to either undergo their first PVI procedure with very high power short duration ablation (90W, 4 sec) or ablation index-guided PVI with a 50W power setting. Randomization was performed using the www.studyrandomizer.com webpage. Three months after the index procedure, all patients underwent repeat left atrial (LA) high-density mapping to assess the long-term durability of the ablation (**Figure 1**). The study period was between February 2022. and November 2022.

Index procedure

All patients underwent transthoracic echocardiography before the procedure. The left ventricular ejection fraction and LA volume index values were measured using the biplane Simpson's method. Also, all patients underwent contrast-enhanced LA computed tomography angiography (CTA) by a 256-slice scanner (CardioGraphe, GE Healthcare) with prospective electrocardiogram-gated axial acquisition mode within 48 hours to exclude LA appendage thrombus. PV anatomy and diameter were analyzed on the cardiac CTA scans as previously described (15). If CTA was unable to exclude LA appendage thrombus, we performed transesophageal echocardiography for a definitive diagnosis.

Procedures were performed under conscious sedation using propofol and fentanyl. All patients were on non-vitamin K antagonist oral anticoagulants, a single dose of which was withheld on the morning of the procedure. Administration was resumed 4 hours after the ablation unless major bleeding events occurred. First, we obtained vascular access through the right femoral vein, then a double transseptal puncture was performed under fluoroscopy and pressure guidance. Intracardiac echocardiography was also used whenever it was necessary to perform

a safe puncture. After the transseptal puncture, intravenous unfractionated heparin boluses were administered to maintain an activated clotting time of >300 seconds. A fast anatomical map of the LA was created with an electroanatomical mapping system (CARTO 3, Biosense Webster Inc, Diamond Bar, CA), using a multipolar mapping catheter (either Lasso or PentaRay, Biosense Webster Inc, Diamond Bar, CA). After that, a point-by-point radiofrequency PVI was performed with a steerable sheath (either Agilis, Abbott, Chicago, IL, or Vizigo, Biosense Webster Inc, Diamond Bar, CA) and a contact-force sensing ablation catheter (QDOT Micro, Biosense Webster Inc, Diamond Bar, CA) in temperature-controlled mode, according to the randomization group (**Figure 2**).

For patients randomized to 90W, all radiofrequency (RF) applications were delivered for 4 seconds (QMODE+). Inter-lesion distance (ILD) was <5 mm at all sites, preferably <4 mm on the anterior wall. Target contact force was 5 g to 40 g. The radius of the lesion tags was 3 mm.

For patients randomized to 50W, ablation index-guided PVI was performed (QMODE) with the following protocol: ILD <5 mm, target contact force 5g to 40 g, and target ablation index 500 on the anterior and 400 on the posterior LA wall. VisiTag™ settings were as follows: for location stability, the minimum time was 3 seconds, and the maximum range was 2.5 mm; force over time was 30%, with a minimum force of 3 g. The radius of the lesion tags was 3 mm.

During PV encirclement, the mapping catheter was positioned in the contralateral PVs to blind the operator to the presence or absence of PV potentials. After finishing the ablation circle according to the study protocol described above, first-pass isolation was assessed with the multipolar mapping catheter. If there was evidence of residual conduction into the PVs, touch-up applications were delivered with the same energy setting until complete isolation of all PVs was reached. Then, acute reconnection was assessed after a 20-minute waiting period for all

PVs. In case of acute reconnection, further ablation was performed to isolate the veins. The gap locations in the first-pass circle and segments of acute PV reconnection were registered on a 16-segment PV model.

Repeat electrophysiology study

Patients underwent protocol-mandated repeat electrophysiology mapping 3 months after the index ablation, regardless of symptoms. Patients underwent transthoracic echocardiography and CTA prior to the repeat procedure. After femoral access and transseptal puncture, a high-density voltage and activation map during distal coronary sinus pacing were obtained with the CARTO3 mapping system using a multipolar catheter (PentaRay or OctaRay, Biosense Webster Inc, Diamond Bar, CA). The LA-PVs were assessed for PV reconnection by this high-density map (minimum of 2000 points in an even distribution at all LA sites; **Figure 3**). The segments of PV reconnection were registered on a 16-segment PV model. In case of PV reconnection, the exact site(s) of PV-LA conduction were marked and then re-ablated with the QDOT Micro catheter. Patients' symptoms, electrocardiogram-documented AF recurrences, and adverse events were also registered.

Endpoints

The primary endpoint was PV reconnection at the 3-month repeat procedure. Secondary efficacy endpoints of the index procedure were as follows: first-pass isolation rate, acute reconnection rate, procedure time, LA dwell time, ablation time (the time from the first until the last RF application), RF time (time of total RF energy delivery), number of RF applications, amount of irrigation fluid, and fluoroscopy time and dose. The secondary safety endpoint was the occurrence of any major procedure-related complication.

Statistical analysis

As long-term durability results of PVI with 50W and 90W power are lacking, a power analysis could not be performed. Considering the highly invasive nature of the follow-up procedure and the sample size of previous remap studies (19-40 remapped subjects), we planned to remap 40 patients in the current study (9, 16, 17). Calculating a 15% drop-out rate, we decided to enroll 46 patients.

Normal or non-normal distribution of the parameters was tested with the Shapiro-Wilk test. Continuous variables are presented as mean and standard deviation (SD) or median and interquartile range (25th–75th percentiles) where appropriate. Student t-test or the Mann–Whitney U test was used for unpaired group comparison. Categorical variables are presented as frequency and percentage and were compared by Fisher's exact test. Statistical analyses were performed using IBM SPSS 25 (Apache Software Foundation, United States) and GraphPad Prism 8 (GraphPad Softwares Inc., United States) software products. A two-tailed *P*-value of < 0.05 was considered statistically significant.

RESULTS

Baseline characteristics

Overall, 46 patients were screened and enrolled in the study, but 6 withdrew their consent from the repeat procedure. Thus, 40 patients completed the study, 20 in each treatment arm. Baseline characteristics are shown in **Table 1**. Mean (SD) age was 65 (8) years, 18 were female, and 23 had paroxysmal AF. The most frequent comorbidities were hypertension (n=32) and diabetes (n=14). Baseline characteristics were generally comparable for patients ablated with 90W

versus 50W, with the exception of body mass index, which was higher in the 50W group (median [interquartile range], 32 [29-33]) than in the 90W group (29 [25-30]; $P = 0.01$).

Index procedure

The parameters of the index procedure are shown in **Table 2**. All PVs were successfully isolated at the end of all index procedures. There was no difference in first-pass isolation rate (16 vs 17; $P = 1.0$) and acute reconnection rate (1 vs 3; $P = 0.6$) between patients ablated with 90W compared with 50W. Procedure time (75 vs 84 minutes; $P = 0.02$), LA dwell time (63 vs 71 minutes; $P = 0.01$), ablation time (29 vs 35 minutes; $P = 0.02$), and RF time (335 vs 1035 seconds; $P < 0.0001$) were shorter and the amount of irrigation fluid was lower (189 vs 257 ml, $P = 0.01$) in the 90W group compared with the 50W group. The distribution of gaps in the first-pass circle and locations of acute reconnection are shown in **Figure 4**.

Repeat electrophysiology study

Forty patients underwent the repeat electrophysiology study after a median of 91 (interquartile range, 91-98) days. Before the procedure, LA CTA was repeated to evaluate the potential PV narrowing. No significant PV stenosis occurred.

Durable isolation of all PVs was present in 29 out of 40 patients (72.5%), without any significant difference between the 90W and 50W groups (16 [80%] vs 13 [65%], respectively, $P = 0.48$). Analysis on a per PV basis showed that durable isolation was present in 140 out of 155 PVs (90%), also without significant difference between the 90W and 50W energy setting groups (72/78 [92%] vs 68/77 [88%], respectively, $P = 0.43$). On a per-segment basis, there was also no difference between the 90W and 50W groups (12/320 vs 12/320 reconnected

segments, respectively, $P = 1.0$). The distribution of late PV reconnection sites is shown in **Figure 5**. All reconnected PVs were successfully re-isolated.

No major complications occurred in any of the 80 procedures. Three patients had palpitations during the 3 months of follow-up, two of whom had late reconnection and one of whom had all PVs isolated.

DISCUSSION

Main findings

PVI with both 90W and 50W ablation results in impressive acute procedural efficacy and a high rate of long-term durability. PVI with vHPSD ablation (90W, 4 sec) is associated with shorter procedure, LA dwell, ablation, and RF times compared with the 50W power setting.

vHPSD PVI

The durability of electrical PVI is the most meaningful endpoint in AF ablation procedures. After ablation, the primary mechanism of recurrence is electrical PV reconnection (4). Previous studies of high power ablation showed good efficacy and a favorable safety profile, most likely because of the higher likelihood of a stable catheter position during the shorter RF applications (18, 19).

The vHPSD ablation technique (90 W, 4 sec) was recently introduced. The QDOT Micro catheter enables a unique temperature control mode of radiofrequency energy delivery with accurate surface temperature measurement. Preclinical data were encouraging as vHPSD resulted in improved linear continuity, shorter ablation time, and a good safety profile. Although vHPSD ablation results in a different lesion geometry and smaller size compared to

conventional lower-power ablation, the depth of the vHPSD applications is sufficient to create transmural lesions in the atria (5-8). These properties of vHPSD lesions raise a need for decreasing the ILD, verified in a clinical setting by our previous report (13).

The advantages of this novel technique have also translated into clinically meaningful results in previous studies, as evidenced by substantially shorter total procedure, LA ablation, and RF times compared to ablation with lower power (10, 13). Our current study strongly underpins these findings, as procedures performed with 90W were shorter than those with 50W.

Nevertheless, acute procedural efficacy outcome measures of vHPSD PVI have previously shown a huge variety; for example, first-pass isolation rates ranged from 18% to 80% and acute reconnection rates ranged from 27% to 32% (10, 12, 13). Studies that showed low first-pass isolation and high acute reconnection rate used larger (<6 mm) inter-tag distance which explains the difference from our current results (11, 12, 20). ~~Currently available data are scarce regarding mid- and long-term follow-up, such as AF-free survival.~~ Recently published papers show similar safety and one-year follow-up results with 90W and 25-50W energy settings (11, 13, 20-22). Although AF recurrence is a gold-standard measure of the efficacy of PVI, it is still not the most objective endpoint of procedural success, as there is not a one-to-one relationship between PV reconnection and AF recurrence. Invasive repeat LA mapping is considered the most accurate way to evaluate the durability of PVI and, thus, to validate a given technique's efficacy for PVI.

Comparison with previous remap studies

We acknowledge that trials that mandate invasive remapping procedures regardless of arrhythmia recurrence are challenging to conduct as asymptomatic patients' willingness to undergo a second procedure might be low. Thus, most data on chronic PVI durability result

from studies where repeat procedure was only performed in case of recurrent symptoms, which does not provide accurate feedback on the overall durability of PVI (4, 23-25).

A few studies are available in which an intentional, protocol-mandated invasive repeat procedure was performed to assess the durability of the PVI. The published rates of durable isolation on a per-vein and per-patient basis range widely. The SUPIR study evaluated 19 patients using a circular mapping catheter during the repeat procedure 3 months after the index cryoballoon ablation; all PVs remained isolated in 79% of patients and 91% of individual PVs overall remained isolated. Three out of 21 patients had complications during the index procedure (17). In the EFFICAS II study, 24 patients underwent repeat evaluation 3 months after the index procedure performed with a contact force-sensing ablation catheter and force-time integral guidance. The PVs were assessed with a circular mapping catheter, and showed durable PVI in 85% of PVs and isolation of all PVs in 62.5% of patients. Of note, in this early study, two patients had pericardial tamponade at the index procedure (26). The PRESSURE study had a treatment arm where 40 patients underwent repeat procedure at 2 months when PVs were assessed by circular mapping catheter. They used a 25W to 35W power setting, and ablation was guided by time (20-40 seconds) and electrogram amplitude attenuation. Durable PVI was achieved in 74% of the PVs, and all PVs remained isolated in 37.5% of the patients. Only one procedural complication occurred (16). The PRAISE trial evaluated the efficacy of PVI 2 months after an initial ablation index and CLOSE protocol-guided procedure with a 20W to 40W power setting. Chronic PV isolation was seen at repeat electrophysiology study in 78% of patients and 93% of PVs evaluated with a circular mapping catheter. No complications occurred (27). The latest advance in catheter ablation is the introduction of pulsed-field ablation, which has shown an impressive procedural safety and efficacy profile. Based on the summarized results of 3 trials with a single-shot device, 3-month remaps of 110 patients were evaluated. Durable PVI was achieved in 64.5% of patients and 85% of PVs. Of note, in a

subgroup analysis of those cases where optimized waveform was used, this rate improved to 84% of patients and 96% of PVs (28).

In our current study, 40 patients underwent initial PVI either with 50W and a modified CLOSE protocol or with 90W for 4 seconds with <5 mm ILD and completed the 3-month remap procedure. Despite the complexity of the study design arising from the mandatory repeat procedure, we included a substantial number of patients, most of whom underwent the second procedure. At 3 months, the PVs of these 40 patients were assessed with a high-density left atrial remap, showing durable PVI of all PVs in 72.5% of patients (80% with 90W and 65% with 50W) and 90% of PVs (92% with 90W and 88% with 50W). Our results are similar to the PRAISE study results, where the index procedure was performed with a similarly advanced ablation tool and protocol (9). Of note, we performed the repeat procedure at 3 months compared to 2 months in the PRAISE study. Moreover, this is the first study that used high-density mapping for the repeat procedure after initial RF ablation, which might enhance the detection of antral reconnection sites. No complications occurred during our study.

Clinical implications

Our results indicate that in contrast to previous study results, favorable acute and long-term efficacy is achievable with vHPSD PVI (90W, 4 seconds). The first-pass isolation and acute and chronic reconnection rates were similar to our comparator group, ablated with 50W and ablation index guidance, and similar to previously published data. This result could be achieved with a meticulous PVI protocol, where all 90W applications lasted 4 seconds, and the ILD was <5 mm at all sites (preferably <4 mm anteriorly). Important to note, as VisiTagTM and ablation index are not available for 90W applications, there is no accurate feedback on lesion quality. On the contrary, ablation points appear at the location where the application was started,

regardless of the contact force and stability. This requires special attention from the operating physician to maintain sufficient catheter-tissue contact and consider an additional overlapping application if poor stability or contact force is observed during the energy delivery.

Limitations

We acknowledge that our study has certain limitations. First, it was a single-center study with four operating physicians (each with experience of >300 PVIs). The number of included patients is low, yet, as 40 patients underwent repeat LA mapping, our trial is one of the largest among remap studies published to date. One should consider the highly invasive nature of the follow-up procedure when interpreting the sample size. On the other hand, the power of our study arises from the fact that the long-term results of the two study groups are also similar on a per PV (155 PVs) and per segment (640 segments) basis. We included both paroxysmal and “short-standing” persistent AF patients, but the left atrial size of the studied patients was normal. The follow-up period in our study was only 3 months; however, 2 to 3 months is the usual follow-up for remap studies. Still, the invasive assessment of durable PVI is a more objective endpoint than one-year arrhythmia-free survival. No complications occurred in our study population during the 80 procedures, the sample size is too small to conclude the safety of the high- and very high power short duration PVI. Considering the relatively low sample size and low incidence of complications associated to PVI, investigating the safety profile of the procedures is not possible in the current study. Further studies are needed to address the safety of this technology.

CONCLUSION

We demonstrate that, besides impressive acute procedural efficacy, the long-term durability of PVI was similarly high, both with 90W and 50W power settings. Procedure, LA dwell, and RF times were shorter with a 90W power setting compared with 50W.

CLINICAL PERSPECTIVES

Competency in Medical Knowledge: Pulmonary vein isolation (PVI) is the cornerstone of atrial fibrillation (AF) ablation. High power short duration (HPSD) ablation has shown impressive efficacy and safety for pulmonary vein isolation (PVI) for atrial fibrillation (AF) ablation; however, initial efficacy results with very high power short duration (vHPSD) ablation were discouraging.

Competency in Patient Care: Despite current technological advancements, AF recurrence, primarily due to pulmonary vein (PV) reconnection, remains an issue for patients undergoing radiofrequency ablation for AF.

Translational Outlook 1: Acute procedural efficacy and long-term durability of PVI in AF were similarly high, but with shorter procedural times with 90W versus 50W, in the HPSD Remap study. In contrast to previous study results, these results indicate that favorable acute and long-term efficacy is achievable with vHPSD ablation.

Translational Outlook 2: Although the population in this study is one of the largest among remap studies published to date and no complications were observed with either the 90W or 50W power setting, the sample size is too small to conclude the safety of the high- and very high power short duration PVI. Further studies are needed to confirm the safety of this technology in a larger population.

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FIGURE LEGENDS

Figure 1. Study design. Forty patients were randomized (1:1) to undergo PVI with very high power short duration ablation (90W, 4 seconds) or ablation index-guided PVI with a 50W power setting. Three months after the index procedure, all patients underwent repeat LA high-density mapping to assess the long-term durability of ablation. CTA = computed tomography angiography; LA = left atrial; PVI = pulmonary vein isolation; TTE = transthoracic echocardiography.

Figure 2. CARTO3 electroanatomical map of PVI by randomization group (posteroanterior view). Left panel: PVI performed with 90W and 4 seconds setting, ILD <5 mm at each site. Right panel: PVI performed with 50W energy and AI (white tags indicate AI <400, purple tags AI 400-500, and red tags AI >500), ILD <5 mm at each site. AI = ablation index; ILD = inter-lesion distance; L = left side; PVI = pulmonary vein isolation; R = right side.

Figure 3. High-density voltage map of patient with four isolated PVs. This voltage map was taken at the repeat procedure and shows the posteroanterior view, taken with the CARTO3 mapping system. L = left side; PV = pulmonary vein; R = right side.

Figure 4. Distribution of gaps in first-pass encirclement and acute reconnection sites. Distribution of gaps in first-pass encirclement are shown in the left panel, and sites of acute reconnection are shown in the right panel on the 16-segment PV model. Bold stars indicate gaps of the 90W group, while empty stars indicate gaps of the 50W group. PV = pulmonary vein.

Figure 5. Distribution of late PV reconnection sites with 90W and 50W. Distribution of the late PV reconnection sites with 90W are shown in the left panel as bold stars and with 50W are shown in the right panel as empty stars on the 16-segment PV model. PV = pulmonary vein.

Central Illustration.

HPSD = high power short duration; LA-PV = left atrium pulmonary vein; PV = pulmonary vein; PVI = pulmonary vein isolation.

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Table 1. Baseline Characteristics of the Study Population

Characteristic	Patients who completed study (N = 40)
Age, mean (SD), years	65 (8)
Female, n (%)	18 (45)
Body mass index, mean (SD), kg/m ²	30 (4)
Hypertension, n (%)	32 (80)
Diabetes, n (%)	14 (35)
Ischemic heart disease, n (%)	4 (10)
Stroke/transient ischemic attack, n (%)	4 (10)
Peripheral artery disease, n (%)	2 (5)
Left ventricular ejection fraction, median (IQR), %	51 (47-57)
Left atrial volume index, mean (SD), ml/m ²	30 (9)
Paroxysmal AF, n (%)	23 (57.5)

Continuous variables are presented as mean (SD) or median (IQR) where appropriate, whereas categorical parameters are counts and percentages.

AF = atrial fibrillation; IQR = interquartile range; SD = standard deviation

Table 2. Parameters of the index procedure

Procedural parameter	90W (n = 20)	50W (n = 20)	P-value
Procedure time, mean (SD), min	75 (11)	84 (14)	0.02
LA dwell time, mean (SD), min	63 (10)	71 (11)	0.01
Mapping time, mean (SD), min	8 (5–10)	6 (5–9)	0.33
Ablation time, mean (SD), min	29 (8)	35 (9)	0.02
RF time, mean (SD), sec	335 (85)	1035 (261)	<0.0001
Number of RF applications, mean (SD)	85 (22)	70 (14)	0.01
Irrigation fluid, median (IQR), ml	189 (174–252)	257 (54)	0.01
Fluoroscopy time, median (IQR), min	3.5 (2.6–5.6)	3.7 (2.6–6.1)	0.84
DAP, median (IQR), uGym ²	61.0 (45.8–140.9)	129.6 (86.0–171.2)	0.04
Absorbed dose, median (IQR), mGy	6.0 (4.0–13.3)	12.5 (8.0–18.3)	0.06
First-pass isolation of all PVs, n (%)	16 (80)	17 (85)	1.00
Acute reconnection at any site, n (%)	1 (5)	3 (15)	0.61

Continuous variables are presented as mean (SD) or median (IQR) where appropriate, whereas categorical parameters are counts and percentages. Bold-faced *P*-values indicated statistically significant difference between 50W and 90W group.

DAP = dose area product; IQR = interquartile range; LA = left atrial; PVs = pulmonary veins; RF= radiofrequency; SD = standard deviation.