Can All Stakeholders Benefit from Same Day Discharge Following Catheter Ablation of Atrial Fibrillation?

Dan Musat[1] and Suneet Mittal[1]

[1]Valley Health System Inc

May 17, 2022

Abstract

Same-day discharge after AF ablation procedure is becoming the preferred trend. Vascular closure devices have shortened the postprocedural bedrest, associated with increased patient satisfaction. Although this approach comes with a cost, it might benefit also the healthcare system.

Can All Stakeholders Benefit from Same Day Discharge Following Catheter Ablation of Atrial Fibrillation?

Dan Musat, MD; Suneet Mittal, MD

The Valley Hospital and the Snyder Center for Comprehensive Atrial Fibrillation

Ridgewood, NJ, USA

Word count : 1239

Disclosures: Dan Musat – none; Suneet Mittal – Consultant to Haemonetics

Funding - None

Address for correspondence :

Dan Musat, MD 970 Linwood Avenue

Paramus, NJ 07652 (201) 432-7837 (201) 432-7830 (fax)

musada@valleyhealth.com

Abstract

Same-day discharge after AF ablation procedure is becoming the preferred trend. Vascular closure devices use have shortened the post-procedural bedrest, associated with increased patient satisfaction. Although this approach comes with a cost, it might also beneficial to the healthcare system.

Catheter ablation has become an established treatment for atrial fibrillation (AF). The number of AF ablations in the US has increased exponentially over the past decade from an estimate of 75,000 procedures yearly in 2013[1], to an estimate of 240,000 procedures in 2020[2]. Factors that have contributed to this increase include improvement in technology and safety as well updates in AF management guidelines[3].

Adoption of ultrasound guided vascular access has led to a 2/3 decrease in procedural vascular complications[4]. Trans-septal puncture, which many physicians consider one of the most dreaded steps of the procedure, has become safer under direct visualization guided by intracardiac echo and 3D mapping, using special radiofrequency wires like VersaCross® (Baylis Medical, Montreal, Canada)[5]. Introduction of radiofrequency catheters with force or local impedance sensors and algorithms for lesion formation assessment, have led to

shorter radiofrequency application times, and along with second-generation single-shot cryoballoon ablation systems, have led to improved safety and decrease in ablation procedure time. In addition, performing the procedures on continuous anticoagulation has proven to be safe and has led to lower peri-procedural thromboembolic events[6]. These improvements in safety, along with the multiple randomized trials proving superior success of the ablation versus antiarrhythmic medication, have promoted the ablation as first line therapy for both paroxysmal and persistent AF[3].

The increase in procedural numbers has led to an increased desire for post procedural same day discharge (SDD) to avoid overnight bed occupancy. The need for SDD has become more pronounced as the COVID-19 pandemic occurred and bed occupancy was direly needed for the COVID-19 infected patients. Many series have demonstrated the feasibility and safety of SDD[7]. However, the last piece needed for widespread and streamline of this process was a better and shorter way than manual pressure to achieve and maintain hemostasis of the vascular access. This was provided by introduction of Vascade MVP (Cardiva Medical, Santa Clara, CA) in late 2018. The AMBULATE trial, reported in 2020, enrolled 204 patients that underwent cardiac ablation, via a total of 751 venous access sites; patients were randomized to hemostasis using either the Vascade MVP (VVS) device or standard manual compression (MC)[8]. In the device group, the time to hemostasis was 6.1 +- 3.7 min, time to ambulation was 2.2 +- 1.3 h and time to discharge eligibility was 3.1 +- 1.3 h, a decrease of 55%, 54% and 52%, respectively, compared with MC. There were no major complications, with similar minor complications between the 2 arms. Furthermore, there was a 63% increase in patients' satisfaction with the duration of bedrest, while opioid use was decreased by 58%.

In the current issue of the Journal, Steinberg and colleagues take a step further, analyzing the patient outcomes and cost of SDD with vascular closure in a routine clinical care[9]. The authors are to be commended for conducting such an important study and adding important information to the knowledge base of this emerging trend. The study included a prospective patient reported outcome cohort and a retrospective matched cohort for cost analysis of patients who underwent an AF ablation at University of Utah and in whom either the hemostasis was achieved manually and were discharged the next day or received vascular closure devices (when became available) and were discharged the same day.

In the prospective cohort patients were eligible if they underwent AF ablation and were deemed candidates for vascular closure devices. The postoperative hemostasis strategy was left at the primary operator discretion and patients were enrolled post-hoc in the device or MC arm. Each group included 25 patients and they were asked after the bedrest 3 questions about the satisfaction (on a scale of 1-10) with the duration spent, discomfort and the pain while lying on the back. Patients who had a prior ablation, were also asked to compare current experience with prior ablation. Both hemostasis strategies proved to be safe, with only one patient having a minor re-bleeding requiring additional bedrest in the device arm. The authors report a higher score in patients' satisfaction with the duration of bedrest (8.5 vs. 6 p=0.004) and the pain (8 vs. 5.1, p=0.009) in the closure device group. The differences were similar when patients compared the current experience with prior ablation, however, likely due to low number of patients (8 in each group), they did not reached statistical significance. These results reproduced the findings of the pivotal randomized trial, despite the bedrest duration for MC group in this study being shorter (5 +- 1.2 h) than in the AMBULATE trial (6.1 +- 1.6 h).

The retrospective cost-analysis cohort included 112 patients who underwent AF ablation between 2013 and 2020, hemostasis was achieved by MC and had an overnight stay and 28 matched patients who had SDD with vascular closure. The evaluated costs of the supplies, facility and pharmacy costs were lower by 7%, 89% and 71% in the SDD cohort, at the expense of the device closure implants. Surprisingly in their healthcare system the analysis resulted in a net even cost, with an actual overall 1.35% higher cost for SDD discharge using device closure implants, compared with overnight stay, despite the cost values being corrected for inflation. The authors provide a nice hypothetical graphic representation and guidance of possible savings of SSD with vascular closure vs overnight stay depending on the device cost and overnight stay expense. They provide an explicit example of a hypothetic vascular closure device cost of $250: if used for 4 vascular accesses, a cost saving would incur if overnight stay would cost more than $1000.

The study has several limitations including a small cohort, non-randomized design and possible bias selection in the prospective analysis, as the groin management strategy was left at the primary operator discretion. Comparing the two group characteristics, the procedure duration was shorter (170 +- 47 min vs. 230 +- 78 min), the number of sheaths was lower (3.8 +- 0.4 vs, 3.1 +- 1.1) and the maximum sheath size was smaller (8.9 +- 0.5 mm vs. 9.6 +- 0.9 mm) in the device group, thus possible leading to faster recovery and improved satisfaction of these patients.

The cost analysis presented in the study cannot be generalized, as different hospital systems have different contracted services and purchase costs, facility costs, however the hypothetical graphic cost correlation provides nice guidance in understanding relative savings. However, it raises the concerns about relative high costs of the closure devices. As the authors acknowledge, the cost analysis did not evaluate the potential benefits of unloading in-hospital personnel from an overnight observational patient stay or possible financial gains from having an overnight bed availability for other patients in need.

This study provides a great base for understanding the benefits of SDD from patient satisfaction standpoint and the need to explore other options for effective hemostasis at a lower cost, that would have comparable bedrest time, comfort and safety. More data about "figure of 8" suture or other closure devices, as Perclose (Abbott, Chicago, IL) are much needed. In the end the clear beneficiary for SDD with closure devices is the satisfied patient, and likely there are benefits for health care system overall, especially if the device costs can be lowered or lower cost alternatives can be found.

References

(1) Mansour, M.; Karst, E.; Heist, E. K.; Dalal, N.; Wasfy, J. H.; Packer, D. L.; Calkins, H.; Ruskin, J. N.; Mahapatra, S. The Impact of First Procedure Success Rate on the Economics of Atrial Fibrillation Ablation. *JACC: Clinical Electrophysiology* **2017** ,*3* (2), 129–138. https://doi.org/10.1016/j.jacep.2016.06.002.

(2) Thording, L. *EP Single-Use Device Reprocessing by the Numbers* ; ART0139 Rev. 1.

(3) Hindricks, G.; Potpara, T.; Dagres, N.; Arbelo, E.; Bax, J. J.; Blomstrom-Lundqvist, C.; Boriani, G.; Castella, M.; Dan, G.-A.; Dilaveris, P. E.; Fauchier, L.; Filippatos, G.; Kalman, J. M.; La Meir, M.; Lane, D. A.; Lebeau, J.-P.; Lettino, M.; Lip, G. Y. H.; Pinto, F. J.; Thomas, G. N.; Valgimigli, M.; Van Gelder, I. C.; Van Putte, B. P.; Watkins, C. L.; ESC Scientific Document Group. 2020 ESC Guidelines for the Diagnosis and Management of Atrial Fibrillation Developed in Collaboration with the European Association of Cardio-Thoracic Surgery (EACTS): The Task Force for the Diagnosis and Management of Atrial Fibrillation of the European Society of Cardiology (ESC) Developed with the Special Contribution of the European Heart Rhythm Association (EHRA) of the ESC. *European Heart Journal* **2020** , No. ehaa612. https://doi.org/10.1093/eurheartj/ehaa612.

(4) Wang, T. K. M.; Wang, M. T. M.; Martin, A. Meta-Analysis of Ultrasound-Guided vs Conventional Vascular Access for Cardiac Electrophysiology Procedures. *Journal of Arrhythmia***2019** , *35* (6), 858–862. https://doi.org/10.1002/joa3.12236.

(5) Demo, H.; Aranda, C.; Razminia, M. Fluoroless Left Atrial Access for Radiofrequency and Cryoballoon Ablations Using a Novel Radiofrequency Transseptal Wire. *Journal of Interventional Cardiac Electrophysiology* **2022** . https://doi.org/10.1007/s10840-022-01157-5.

(6) Asad, Z. U. A.; Akhtar, K. H.; Jafry, A. H.; Khan, M. H.; Khan, M. S.; Munir, M. B.; Lakkireddy, D. R.; Gopinathannair, R. Uninterrupted versus Interrupted Direct Oral Anticoagulation for Catheter Ablation of Atrial Fibrillation: A Systematic Review and Meta-Analysis.*Journal of Cardiovascular Electrophysiology* **2021** ,*32* (7), 1995–2004. https://doi.org/10.1111/jce.15043.

(7) Rashedi, S.; Tavolinejad, H.; Kazemian, S.; Mardani, M.; Masoudi, M.; Masoudkabir, F.; Haghjoo, M. Efficacy and Safety of Same-Day Discharge after Atrial Fibrillation Ablation: A Systematic Review and Meta-Analysis. *Clinical Cardiology* **2022** , *45* (2), 162–172. https://doi.org/10.1002/clc.23778.

(8) Natale, A.; Mohanty, S.; Liu, P. Y.; Mittal, S.; Al-Ahmad, A.; De Lurgio, D. B.; Horton, R.; Spear, W.; Bailey, S.; Bunch, J.; Musat, D.; O'Neill, P.; Compton, S.; Turakhia, M. P.; Natale, A.; Al-Ahmad, A. M.; Horton, R. P.; Bailey, S. M.; Cardinal, D. S.; Compton, S.; Balaban, K. W.; Rambur, D.; Mittal, S.; Preminger, M. W.; Musat, D. L.; Sichrovsky, T. C.; Bhatt, A. G.; Michel, K.; DeLurgio, D. B.; Shah, A. D.; Kavtaradze, N.; O'Neill, P. G.; Allen, S.; Spear, W. H.; Duggal, M.; Braun, D.; Han, F. T.; Marrouche, N. F.; Chelu, M. G.; Rivera, A. M.; Bunch, T. J.; Weiss, J. P.; Day, J. D.; Crandall, B. G.; Cutler, M. J.; Allen, M.; Tung, R.; Beaser, A. D.; Sarrafi, S.; Shah, M. H.; Lee, S. W.; Fischer, M. B.; Thomaides, A.; Durrani, S. A. K.; Strouse, D. A.; Eldadah, Z. A.; Kim, S.; Bashian, G. G.; Borek, P. P.; Darby, J.; Dukkipati, S. R.; Whang, W.; Koruth, J. S.; Miller, M. A.; Reddy, V. Y.; Biondo, F.; Viswanathan, M. N.; Magee, S. Venous Vascular Closure System Versus Manual Compression Following Multiple Access Electrophysiology Procedures: The AMBULATE Trial. *JACC: Clinical Electrophysiology* **2020** , *6* (1), 111–124. https://doi.org/10.1016/j.jacep.2019.08.013.

(9) Steinberg, B. A.; Woolley, S.; Li, H.; Crawford, C.; Groh, C.; Navaravong, L.; Rajan, R.; Zenger, B.; Zhang, Y.; Bunch, T. J. Patient-Reported Outcomes and Costs Associated with Vascular Closure and Same-Day Discharge Following Atrial Fibrillation Ablation. *Journal of Cardiovascular Electrophysiology* .