Outcomes with AV Node Ablation from the Pacemaker Pocket

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Abstract

Introduction: Atrioventricular (AV) nodal ablation performed during pacemaker or ICD implantation for management of atrial tachyarrhythmias. The ablation performed normally from the femoral vein while the device placed via the axillary or cephalic vein approach.

Objective: To improve patient safety, satisfaction, and outcomes, we performed AV nodal ablation from the axillary vein during device implantation.

Methods: 45 patients, (27 male, 18 female, age 72 yrs (range 57-91) underwent AV nodal ablation +/- pacemaker/ICD implantation from the axillary vein over an 19 month period. We recorded procedure time, fluoroscopic time, and radiation exposure. Patients followed for an average of 7.4 months (range 0.03-18 months). All adverse events documented.

Results: 44 of 45 (98%) underwent successful AV nodal ablation from the axillary vein approach. The second procedure was the only procedure that could not completed from the axillary vein. There were three minor pocket hematomas requiring a pressure dressing and one leads dislodgement. Average procedure time was 110 minutes SD 42 minutes and fluoroscopy time was 24 minutes SD 15 minutes. Average radiation exposure was 559 mGy IQR 180-721.

Conclusion: AV nodal ablation from the axillary vein is a viable approach without added risk or increase in procedure time, fluoroscopy time, or radiation exposure.

INTRODUCTION

For patients with difficult to control atrial tachyarrhythmias, medical therapy are often insufficient. AV nodal ablation (AVNA) and pacemaker implantation utilized for over two decades and has resulted in improvement in left ventricular function and marked improvement in quality of life [1-3]. Device placement is usually dual-chamber for patients with normal left ventricular ejection fraction and paroxysmal atrial fibrillation (PAF) or cardiac resynchronization devices (CRT) in patients with heart failure who have atrial fibrillation resistant to medical therapy [4]. AVNA typically performed from the femoral vein in tandem with pacemaker placement, which is usually from an axillary/subclavian vein approach. However, two different access sites can provide the opportunity for increased complications such as bleeding, infection, arterial puncture, pseudo-aneurysm, or arteriovenous fistula. While some technical improvements such as use of ultrasound can mitigate these risks, avoiding the groin completely would avoid these pitfalls [5]. Recently, ISSA published his second paper describing completion of AV nodal ablation procedures from the superior approach at the time of pacemaker placement. The papers concluded that ablation via the SVC proved to have very few complications, was effective and was safely accomplished at the time of pacemaker placement [6,7].

METHODS

Our study examined all the patients at our center who underwent AV nodal ablation from the axillary or subclavian vein prior to October 2015. The study approved by the local IRB. The indication for the procedures was symptomatic atrial tachyarrhythmias. We obtained baseline characteristics such as age, sex, and Body Mass Index (BMI). We also recorded procedural information such as procedure time, fluoroscopy time, device implanted and radiation exposure. Procedure and fluoroscopy times reported for the entire procedure rather than
the ablation portion of the procedure. We also recorded types of guiding sheaths used for the ablation catheter. Additionally, adverse events recorded. Finally, the results reported in a descriptive manner.

The procedural technique was as follows: Either axillary vein entered with multiple soft-tipped J-wires (depending on type of device implanted) using a micropuncture technique. Either ultrasound guidance or venogram with 10-15 cc of contrast injected through an ipsilateral peripheral intravenous line employed. The right ventricular lead placed via tear-away sheath using fluoroscopic guidance. Operators ensured adequate pacing threshold, sensing, and lead impedance. The lead secured and placed on a back-up setting. An8F trans-septal guiding catheter “Mullins” style (St. Jude Medical, St. Paul, MN) or Straight Right (Boston Scientific, St. Paul, MN) coronary sinus (CS) guide catheter then advanced to the right atrium. The ablation catheter (Biosense Webster or Boston Scientific 4 mm tip, non-irrigated) advanced though the guiding catheter and His bundle located using intra-cardiac electrogram and fluoroscopic guidance. Radiofrequency ablation carried out until complete AV block produced. The guide catheter removed over a soft wire and exchanged for a tear-away sheath placed over the same wire. The right atrial lead then placed in the typical manner. For CRT systems, the straight right coronary sinus (CS) catheter was moved from the His location to the CS and the ablation catheter was removed and the left ventricular lead was placed. A pocket was created and the device was placed, and the pocket was closed in the usual fashion.

RESULTS

Overall, there were 45 patients followed for 7.4 months of follow-up (range 0.03-18 months) underwent AV nodal ablation procedure from the axillary vein approach. All of the procedures could complete from this approach except for the second one. The subjects were 60% male with average BMI of 32 kg/m²(19.6-61.7 kg/m²). There were 13 patients with LVEF ≤ 35%, 15 (33%) of the procedures utilized of the “Mullins” style sheath (Tables 1,2). 18 patients (40%) had procedures had the straight right CS guide catheter to aid with performing the ablation (Table 2). The entire procedure, including the pacemaker implantation, performed in an average of 110 minutes SD 42 minutes. In cases where the “Mullins” type 8F St. Jude trans-septal guiding catheter was used the procedure, time, on average, was 90 minutes. Average radiation exposure was 559mGy (IQR 180-721 mGy) (Table 2). Twenty-three (51%) of the patients were discharged the same day. The average time to discharge was 2.7 hours (1.2-4.3 hours). Complications included three device pocket hematomas requiring pressure dressings and one LV lead dislodgement (Table 3). No patient required a second ablation procedure for return of AV conduction. There were no deaths deemed related to the procedure, however, three people died during follow up for unrelated reasons.

DISCUSSION

This study confirms that AV nodal ablation from the subclavian/axillary vein at the time of pacemaker placement is safe and effective. The procedure able to completed in 98% of patients and only minor complications are noted. This is comparable to study by Arenja et al., which demonstrated 94% completion of AV node ablation from the axillary vein compared to 100% in the femoral vein [8]. They also noted reported significantly decreased procedure times with the axillary vein approach compared with the femoral route and decreased electrophysiology lab occupancy time. Performing the procedure in this manner may improve patient outcomes, EP lab efficiency, and decrease costs. Patients with a high BMI have a greater tendency toward groin complications and may specifically benefit from this approach [9]. Over time, the operators performing the ablations improved their technique and decreased the time it took to complete the procedure. For those who are interested in adopting this type of procedure for AV nodal ablation, they may especially find the use of the “Mullins” style, CS guide catheter, or other large-curve guide-catheter to be particularly helpful in completing this procedure in an efficient manner.

LIMITATIONS

This is an observational study describing our center’s initial experience with a number of different operators beginning to utilize this new approach. There was no randomization to truly test time saved other than historic controls. Having said that, for CRT implants, simply using the CS catheter for both the ablation treatment.
guide catheter and cannulating the CS seems greatly speed that process as the ablation catheter is often useful to access the CS ostium. Patients remarked that they were pleased not have a femoral catheterization. One patient with an existing left-sided pacemaker specifically requested a right axillary approach to his AVNA to avoid a groin procedure and shorten his stay.

CONCLUSION

AV nodal ablation from the subclavian/axillary vein approach is safe and an acceptable alternative to the femoral approach with a favorable safety profile. Multiple operators with a short learning curve can adopt it quickly. Procedure time is acceptable and improved with operator experience. The fluoroscopic time and radiation exposure proved to be acceptable despite the being a new technique. Use of specific guide catheters such as the "Mullins" style guide catheter can improve the ease with which the procedure is completed. This approach may result in cost savings - one prep and drape and shorter hospital stays - as well as improved patient safety and comfort. Patients are able to ambulate sooner most were discharged the same day.

AUTHOR CONTRIBUTIONS

Dr. Worden: Concept/design, data analysis/interpretation, drafting article, critical revision of article, approval of article, statistics, data collection.

Dr. Joseph: Data analysis/interpretation, data collection, critical revision of article, approval of article.

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