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Case Report

The use of Dexmedetomidine in Pulmonary vein isolation as a Day case procedure : A case report

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ABSTRACT:
Atrial fibrillation (AF) is the predominant tachyarrhythmia seen in medical practice and is linked to considerable morbidity and mortality. Pulmonary vein isolation (PVI) done using Radiofrequency ablation (RFA) or Cryoablation has emerged as an important rhythm-control strategy and is by far the most common cardiac ablation procedure performed worldwide.Because these procedures are lengthy and necessitate patient immobility at certain critical times, deep sedation or general anesthesia is typically required. It has been common for AF ablation to require staying in the hospital overnight, but we believe that by using standardized procedural methods, we can get patients moving sooner and provide same-day discharge, making AF ablation a "day-case" option. We present a case of Paroxysmal AF coming for PVI using "Pulsed Field Ablation" (PFA) technique using Dexmedetomidine as a Day care procedure.

***Keywords**: Dexmedetomidine, Sedation, Catheter ablation, Pulmonary vein isolation, Atrial fibrillation, Day case, Pulsed field ablation.*

INTRODUCTION:

Atrial fibrillation (AF) is the commonest arrythmia encountered **(1)** in clinical practice and is associated with life threatening risks including stroke and heart failure. According to the American Heart Association estimates, the current prevalence of AF is between 2 and 4% in adults **(2)**, with almost 6% in people over 65.**(3)**

Haissaguerre et al. first demonstrated that most atrial premature beats initiate frequent paroxysms of AF in the pulmonary veins **(4,5)**. Therefore, radiofrequency ablation for AF is now achieved by encircling ipsilateral PVs to electrically isolate the PVs, termed pulmonary vein isolation **(6,7)**.

Treatment of AF can be done with Pulmonary vein isolation (PVI) acheived either by: Pulse field ablation (PFA), Radiofrequency ablation (RFA) or by cryoablation.

PFA is a novel ablative modality that by virtue of its putative preferential action on myocardial tissue will reduce the risk of serious procedural complications. **(8)**

The procedure typically lasts 1–3 hours, during which the patient is required to lie motionless. Patient movements can result in complications such as cardiac tamponade and may prolong the procedure if catheter stability is compromised or if a 3-dimensional mapping system is used and map shifts occur. Catheter ablation of atrial fibrillation is painful, and administration of sedation or general anesthesia is required. The best modality of anesthesia with catheter ablation for AF is still a matter of debate. Although general anesthesia is the standard in the majority of clinical centers, procedural sedation and/or local anesthesia is a good alternative and used in some centers. Sedation is not inferior to general anesthesia in terms of ablation time and freedom from atrial arrhythmia at 1 year and accompanied by reduced resource utilization and therefore costs. **(9)**

Dexmedetomidine is a highly selective α-2 adrenoreceptor agonist with sedative, analgesic, and anxiolytic properties with a short distribution half-life.It has been widely used for sedation for its minimal respiratory depression.

Due to increasing case load in hospitals, the economic health advantages and improved patient satisfaction, day case procedures are being increasingly performed in many centres. AF ablation has traditionally involved at

least one overnight stay in hospital; with systematic adoption of standardized procedural methods, it would allow early mobilization of patients and facilitate same-day discharge, enabling us to offer AF ablation as a "day-case" procedure.

We report a case of Pulmonary vein isolation using PFA for the treatment of Atrial fibrillation with Dexmedetomidine sedation, performed as a day case procedure.

CASE REPORT:

The patient was a 44 year old male (height 185 cm, weight 122 kg and BMI 35.6) with symptomatic paroxysmal AF and a history of Hypertension on oral Bisoprolol, scheduled for Pulmonary vein isolation using PFA.

He is a snorer and reformed smoker. He had no allergies to food or drugs and his medications included Flecainide and Rivoroxaban. Preoperative ECG showed sinus rhythm and X-Ray chest was normal. Sleep study was done and Obstructive sleep apnea was excluded. The results of other laboratory tests were within the acceptable range including blood and urine.Trans-esophageal echocardiogram done on admission did not reveal any intracardiac thrombi, patent foramen ovale, or atrial septal defect. The patient received explanation about the procedure and sedation after which written informed consent was obtained. We had decided to do as a day case procedure and the patient came fasting for 8 hours. His pre procedure vital parameters were within normal limits.

After entering the Cardiac cathlab and establishing peripheral venous access, vital signs were monitored including 5-lead electrocardiography, pulse oximetry, non-invasive blood pressure and ETCo2 and oxygen supply via a nasal prongs. His baseline heart rate was 101/minute in AF; BP 118/88 and oxygen saturation of 99% on room air.

A timeout was called and the patient was properly identified. The patient was prepped and draped. Sedation was initiated with an infusion of Dexmedetomidine beginning with a loading dose of 1 μg/kg for 10 minutes followed by a maintenance infusion of 0.6 μg/kg/h. Infiltration of local anesthetic was given to gain Femoral access.

A transeptal puncture was performed under intracavitary pressure and fluoroscopy guidance and a catheter was advanced into Left Atrium. Pulsed field ablation was performed around the Right and Left, Inferior and Superior Pulmonary veins respectively. Cardioversion was done at the end of the procedure and obtaining sinus rhythm.Unfractionated Heparin was given during the procedure and checked every 20 minutes to maintain an activated clotting time (ACT) between 250-350 seconds to avoid thrombus formation. Echocardiogram done post procedure was normal

The procedure took a total of 120 minutes from anesthetic induction to procedure completion. During the entire procedure patient remained hemodynamically stable and did not need any anesthetic or airway interventions. A total of 120 microgram of Fentanyl was given in two titrated boluses in anticipation of pain during the procedure. Patient did not move during the entire procedure of ablation nor there was any episodes of oxygen desaturation.

After the procedure, the patient was transferred to the post anesthesia care unit, monitored and received nasal oxygen supplementation until the Aldrete post anesthesia recovery score reached > 9 (full recovery). He was sleepy but arousable and was able to answer questions and fully able to obey commands within 30 minutes. The patient reported that he did not recall the procedure, nor recall or feel any discomfort. Clinical recovery from sedation was satisfactory without prolonged sedation.

The patient was discharged home after Echocardiogram and pressure dressing removal of the Femoral access site which was 7 hours after the proceduret completion.

DISCUSSION:

Sedation methods are crucial in cardiac catheterization procedures. Medications and techniques used for conscious sedation in cardiac cathlab must focus on safety, guaranteeing that patients remain conscious and do not trigger tachyarrhythmias. Additionally, the rising patient count with this medical condition and the heightened need for catheter ablation necessitates same-day discharge **(10)**. The appropriate sedation level should be customized for each patient, providing stress relief while not hindering protective reflexes and cognitive capabilities. Conventional conscious sedation frequently includes opioids and benzodiazepines. Recent evaluations have underscored dexmedetomidine's ability to deliver effective pain relief while minimizing reliance on opioids. Earlier research indicated that, in contrast to conscious sedation with fentanyl and midazolam, deep sedation using dexmedetomidine could enhance ablation accuracy and offer greater comfort for the patient. In contrast, the frequently administered sedative, propofol, can lead to respiratory depression and decreased oxygen levels. Dexmedetomidine, conversely, can reduce stress-triggered sympathetic overactivity, providing sedation, pain relief, anxiety reduction, and slight respiratory depression. Dexmedetomidine (DEX) is a powerful, versatile and highly selective alpha-2 agonist that provides analgesia and sedation without causing significant respiratory depression. It is a very selective alpha-2 agonist akin to Clonidine. In 2008, the FDA gave approval for the use of dexmedetomidine for procedural sedation. It also possesses anesthetic-sparing

and sympatholytic characteristics **(11)**. It generates centrally induced sedation through alpha-2 receptors in the locus ceruleus and centrally mediated pain modulation via the dorsal horn. Its electrophysiological effects consist of depression in the sinus node and atrioventricular (AV) node, along with increased atrial refractoriness. The primary adverse effect that healthcare professionals must be aware of when giving dexmedetomidine is hemodynamic instability, specifically bradycardia, hypotension, and hypertension. Song et al. discovered that patients who were given dexmedetomidine during surgery experienced nearly a 2-fold rise in bradycardia in comparison to the control group **(12)**. The administration of dexmedetomidine has demonstrated a reduction in the requirement for fentanyl and pain relief.

During the ablation procedure, patients experienced pain and this was probably attributed to esophageal warming. In addition to the pain, PFA may cause contraction of the diaphragm or transient cough, and for these reasons, most procedures were performed using general anaesthesia**(8,13,14)**. The recent inspIRE trial **(14)**, in fact, reported the use of general anaesthesia in 73% of patients.In our case, we did not observe muscle contractions or transient cough during PFA probably because the PFA catheter delivers only bipolar energy with a short electrodes distance.

The reason for selection of Dexmedetomidine in our case is that, we considered dexmedetomidine's bradycardia effect could be beneficial in reducing heart rate, and after the loading dose, we observed a successful decrease in heart rate which could possibly increase the catheter stability and thus a successful outcome.

Thus in our case, the sedation protocol proved to be effective in the successful conduct of Pulmonary vein isolation in a day care setting using Dexmedetomidine.

Conflict of interest:

The authors declare that there is no conflict of interest.

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