Deep sedation with propofol in patients undergoing left atrial ablation procedures—Is it safe?

Leonie Foerschner, MD, Nada Harfoush, MS, Mara Thoma, MS, Lovis Spitzbauer, MR, Miruna Popa, MD, Felix Bourier, MD, Tilko Reents, MD, Verena Kantenwein, MD, Martha Telishevska, MD, Katharina Wimbauer, MD, Carsten Lennerz, MD, Elena Risse, MD, Amir Brkic, MD, Susanne Maurer, MD, Patrick Blazek, MD, Fabian Bahlke, MD, Christian Grebmer, MD, Christof Kolb, MD, Isabel Deisenhofer, MD, FHRS, Gabriele Hessling, MD, FHRS, Marc Kottmaier, MD

From the Department of Electrophysiology, German Heart Center Munich, Technische Universitaet Munich, Munich, Germany.

BACKGROUND Catheter ablation for atrial fibrillation (AF) or left atrial tachycardia is well established. To avoid body movement and pain, sedative and analgesic agents are used.

OBJECTIVE The aim was to investigate safety of sedation/anti-pain protocol administered by electrophysiology (EP) staff.

METHODS A total of 3211 consecutive patients (61% male) undergoing left atrial ablation for paroxysmal AF (37.1%), persistent AF (35.3%) or left atrial tachycardia (27.6%) were included. Midazolam, fentanyl, and propofol were administered by EP staff. In case of respiratory depression, endotracheal intubation (eIT) or noninvasive ventilation (NIV) was implemented. Risk factors for eIT or NIV were analyzed.

RESULTS Mean doses of propofol, midazolam, and fentanyl were 33.7 ± 16.7 mg, 3 ± 11.1 mg, and 0.16 ± 2.2 mg, respectively. Norepinephrine was administered in 396 of 3211 patients (12.3%) because of blood pressure drop (mean arterial pressure <60 mm Hg). NIV was necessary in 47 patients (1.5%) and eIT in 1 patient (0.03%). Procedure duration, high body mass index (BMI), high $CHADS_2$-$VASC_2$ score, high age, low glomerular filtration rate, diabetes mellitus, and low baseline oxygen saturation were associated with NIV or eIT. The only independent predictor for NIV/eIT was high BMI (>30.1 ± 9.0 kg/m^2). Therefore, patients with a BMI of ≥30 had a 40% higher risk for the need of NIV/eIT during the procedure in our study.

CONCLUSION Sedation/anti-pain control including midazolam, propofol, and fentanyl administered by EP staff is safe, with only 1.53% requirement of NIV/eIT. High BMI (>30 kg/m^2) emerged as an independent predictor for eIT/NIV.

KEYWORDS Ablation; Atrial fibrillation; Deep sedation; Propofol; Periprocedural anesthesia

(Heart Rhythm O^2 2022;3:288–294)

Introduction

Atrial fibrillation (AF) is the most common cardiac arrhythmia worldwide, with a rising prevalence as the population ages. For more than 15 years, catheter ablation including pulmonary vein isolation has been a well-established and effective treatment option for AF or atrial tachycardia. Progress in ablation tools and techniques as well as new electrocardiography (ECG) monitoring devices have significantly improved outcome of AF ablation.[1]

The aim of catheter ablation is to achieve optimal ablation accuracy within a short procedure time with minimal pain or complications for the patient. The ideal sedation technique is crucial to reach this aim.[2] Currently, ablation procedures are generally conducted in 3 settings: (1) general anesthesia with endotracheal intubation, (2) deep sedation with propofol/midazolam, or (3) moderate/conscious sedation with fentanyl or midazolam.[3] Several trials have shown that general anesthesia/deep sedation has a major impact on procedural success. For patients with AF undergoing pulmonary vein isolation, administration of general anesthesia increases safety and efficacy of the procedure and lowers rate of reconnections.[4]

In recent years, the combination of intravenous propofol and midazolam has been increasingly used to provide deep unconscious sedation.[5] Using a combination of propofol and midazolam generates deep sedation, while fentanyl generates analgesia.[5,6] Propofol is a safe anesthetic agent frequently used for induction of general anesthesia during major surgery, for sedation during mechanical ventilation in adults, and for interventions such as endoscopy.[7,8] It binds to the $GABA_A$- and glycine-gated ion channels and thus agonizes and potentiates the inhibitory activity of the central

Address reprint requests and correspondence: Dr Leonie Foerschner, Department of Electrophysiology, German Heart Center Munich, Technische Universitaet Munich, Lazarettstraße 36, 80636 Munich, Germany. E-mail address: foerschner@dhm.mhn.de; leonie.foerschner@gmail.com.

2666-5018/

https://doi.org/10.1016/j.hroo.2022.02.011

KEY FINDINGS

- Sedation including midazolam, propofol, and fentanyl administered by electrophysiology staff is safe, with only 1.53% requirement of noninvasive ventilation (NIV) / endotracheal intubation (eIT).
- In our patients cohort norepinephrine was administered in 396 of 3211 patients (12.3%) because of blood pressure drop (mean arterial pressure <60 mm Hg).
- Procedure duration, high body mass index (BMI), high $CHADS_2$-$VASC_2$ score, high age, low glomerular filtration rate, diabetes mellitus, and low baseline oxygen saturation were associated with NIV or eIT. The only independent predictor for NIV/eIT was high BMI (>30.1 ± 9.0 kg/m^2).
- BMI was an independent risk factor for NIV or eIT.
- Therefore, patients with a BMI of ≥30 had a 40% higher risk for the need of NIV/eIT during the procedure.

nervous system. Multiple additional targets for propofol that lead to loss of consciousness are suggested but not yet proven.[8] Propofol has amnestic and antiemetic but no analgetic properties. Additional opioids are necessary to provide pain control during an intervention.[9] Compared to other sedative agents such as midazolam, fentanyl, or meperidine, propofol has faster recovery times, better sedation levels, and a greater patient cooperation, while having a lower or similar risk of complications (dose-dependent adverse events such as respiratory depression and hemodynamic compromise).[10–12] During colonoscopy, non-anesthesiologist administration of propofol for deep sedation is safe and equal to anesthesiologist-administered sedation in the rate of adverse events in low-risk patients.[13]

Sedation during electrophysiologic procedures is frequently performed by nursing staff and physician electrophysiologists without the presence of an anesthesiologist,[14] but up to now there is no standardized clinical guideline for sedation during electrophysiologic procedures in Germany or Europe. The Heart Rhythm Society regards deep sedation during electrophysiologic procedures as safe without giving practical recommendations.[15] The safety aspect of propofol sedation during catheter ablation is a frequently discussed issue.

Therefore, we sought to investigate the safety of a sedation/anti-pain regime including propofol administered by non-anesthesiologic staff in patients undergoing left atrial ablation procedures. Predictors of noninvasive ventilation or intubation were analyzed.

Methods

Patient cohort

The study cohort included 3211 consecutive patients who underwent left atrial radiofrequency ablation procedures for paroxysmal AF (n = 1191, 37.1%), persistent AF (n = 1132, 35.3%), or left atrial tachycardia (n = 886, 27.6%) from June 2017 to May 2019 at our center. All patients undergoing left atrial ablation during this time frame received deep sedation with propofol, midazolam, and fentanyl and were included. None of the patients received elective general anesthesia. No patient had to be excluded from the study. Deep sedation with propofol, midazolam, and fentanyl has been used in our center since 2012. Patient mean age was 65.8 ± 11.6 years, 61% of patients were male, and the mean CHA_2DS_2-VASC score was 2.6 ± 1.7. Informed consent was obtained from all participants. The study was approved by the Ethics Committee of the Technical University Munich, Germany. The research reported in this paper adhered to the human research Helsinki Declaration as revised in 2013.

Periprocedural management and sedation

All patients refrained from eating for at least 12 hours before the procedure. A contrast-enhanced cardiac computed tomography using a Siemens SOMATOM definition flash dual-source CT (Siemens, Forchheim, Germany) and a special protocol to allow cardiac segmentation and esophagus localization and to exclude intracardiac thrombus formation <24 hours had been performed prior to ablation. If intracardiac thrombus was not excluded or contrast agent could not be administered, a transesophageal echocardiogram was performed. All procedures were performed under deep sedation with midazolam and propofol infusion in combination with fentanyl. Levels of sedation were classified as minimal, moderate, and deep according to the American Society of Anesthesiologists.[16]

All electrophysiology (EP) nurses were trained in management of sedation, had intensive care experience, and participated in annual basic life support and advanced cardiac life support training similar to nurses administering sedation in endoscopy.[17,18] Operators in the EP laboratory received a minimum of 6 months intensive care training.

In all patients, femoral access was achieved through a puncture of the femoral vein and insertion of 2 8F sheaths and 1 11.7F sheath. In patients with persistent low mean arterial pressure (MAP) and the need for catecholamines, an additional 4F sheath was placed into the femoral artery for invasive blood pressure monitoring. All patients underwent fluoroscopy-guided single transseptal puncture with double access to the left atrium with a steerable 11.7F sheath. After transseptal puncture, a heparin bolus of 80–100 UI/kg (depending on the baseline activated clotting time [ACT] with a cutoff of 160 seconds) was administered, followed by continuous heparin administration. ACT was checked every 30 minutes with a target ACT of 300 seconds. Sheaths were either removed directly after purse-string suture or were removed 4 hours after the procedure without assessing ACT. A groin compression bandage was implemented for 6 hours. Patient's full recovery was examined after the procedure. Echocardiography was performed at the end of the

procedure and on the following day to exclude pericardial effusions. All patients were checked for groin complications before discharge. Follow-up appointments for late bleeding or thromboembolic complications were performed 1 month after persistent AF and 3, 6, and 12 months after paroxysmal AF or atrial tachycardia ablation.

Equipment needed for resuscitation was available in the operating room. To support our team and in case of need for emergency intubation, an anesthetic consultant was available at any time in our EP laboratory. During the procedure, clinical data and all procedural steps including procedural duration (time from induction of sedation to sheath removal) were recorded. Vital signs including blood pressure, oxygen saturation, heart rate, and ECG were monitored and continuously recorded using a Philips vital signs monitoring system (IntelliVue MP5SC; Hamburg, Germany). Airway patency was maintained using an oropharyngeal Guedel airway tube and continuous oxygen therapy at 2–4 L/min via nasal cannula.

Deep sedation was initiated with midazolam (starting dose for patients <60 kg: 1 mg; for patients >60 kg: 2 mg) and a bolus of propofol (20–30 mg) with consequent continuous infusion of intravenous 1% propofol (weight adapted, 3–4 mg/kg/h; starting with 100–150 mg/h) by an EP nurse supervised by the operating physician (usually 1 cardiac electrophysiologist and 1 EP nurse in the room). The continuous infusion dose of propofol was elevated to 250–300 mg/h or higher until the Richmond Agitation and Sedation Scale (RASS) score of -4 was reached. A starting dose of 0.025–0.05 mg of fentanyl was administered to control discomfort or pain. An additional dose of 0.025–0.05 mg fentanyl was administered prior to the beginning of radiofrequency application. Additional fentanyl dose was adapted to patient's weight, persistence of pain during the procedure, and procedure time. Medication dose was adapted to patient's body weight. Deep sedation with propofol was maintained throughout the procedure. RASS was applied to evaluate the level of sedation. A RASS score of -4 was considered as deep sedation.

Periprocedural sedation-related complications

Development of hypoxemia or hypotension during the procedure was regarded as sedation-related complication. In case of mild transient oxygen saturation drop <95%, reclination of the head, administration of Guedel airway tube, enhancement of oxygen therapy, and change from nasal cannula to oxygen mask was conducted. In case of severe persistent hypoxemia (oxygen saturation <85%, pH <7.25, and pCO2 >50 mm Hg), noninvasive ventilation (NIV) or endotracheal intubation (eIT) was implemented. Hypotension (MAP <60 mm Hg) was treated with norepinephrine infusion or a decrease in propofol infusion rate.

Statistical analysis

Categorical data are presented as frequencies and percentages. Continuous variables are presented as mean ± standard deviation. Statistical comparisons for categorical variables were performed using Fisher exact test. Univariate comparisons for continuous variables were performed using the Student *t* test. A *P* value of <.05 was considered to be statistically significant. Multivariate analysis was performed to detect predictive factors for NIV or eIT. All analyses were performed using SPSS (Version 27; IBM Corp, Armonk, NY).

Table 1 Baseline characteristics

	N (%) / mean (SD)
Total	3211
Sex (male)	1955 (61%)
Age	65.8 ± 11.6
CHA_2DS_2-VASc score	2.6 ± 1.7
NOAC	2649 (82%)
BMI, kg/m^2	27.9 ± 4.9
EF (%)	53.4 ± 10.8
Heart failure	367 (11%)
Vascular disease (CAD, PAD)	868 (27%)
Hypertension	951 (30%)
Diabetes	389 (12%)
Stroke	263 (8%)

Continuous values are expressed as mean ± standard deviation. Categorical values are expressed as number (percentage).

BMI = body mass index; CAD = coronary artery disease; EF = ejection fraction; NOAC = new oral anticoagulation; PAD = peripheral artery disease.

Results

Baseline characteristics

Baseline characteristics of the 3211 patients are shown in Table 1. The mean age of patients (61% male) was 65.8 ± 11.6 years. Most of the patients had an elevated body mass index (BMI) (mean BMI 27.9 ± 4.9) and 868 of 3211 (27%) suffered from coronary artery disease or peripheral artery disease. The most common cardiac comorbidity was arterial hypertension (29.6%). The amount of clinically diagnosed obstructive sleep apnea (OSA) was not recorded. Nevertheless, OSA is often not diagnosed prior to ablation, since it is not systematically evaluated in our hospital. In a recently published study of from institution, "Role of the ambulatory assessed apnea-hypopnea index for predicting recurring atrial fibrillation after ablation therapy," the apnea-hypopnea index was used to screen patients with OSA. The comparable patient collective of nearly 200 patients with paroxysmal or persistent AF showed 24.1% of patients with apnea-hypopnea index >15, as an indicator for moderate OSA. Consequently, we can assume similar incidence of OSA in our patient cohort.[19]

Procedural data are listed in Table 2.

Mean procedural duration was 133.7 ± 52.7 minutes. Mean propofol dose was 440.7 ± 237.3 mg/h, mean midazolam dose was 3 mg ± 11.1 mg, and mean fentanyl dose was 0.16 ± 2.2 mg. Sufficient oxygen saturation was maintained in all patients during the procedure (mean oxygen saturation drop was 4.5% ± 27.5%). An additional 4F arterial sheath was used in 859 of 3208 patients (27.8%) for invasive blood

Table 2 Procedural data

	N (%) / mean (SD)
Procedural duration	133.7 ± 52.7
Creatinine (mg/dL)	1.1 ± 2.7
EF (%)	53.4 ± 10.8
RF duration (min)	42.5 ± 20.6
Fluoroscopy time (min)	8.9 ± 5.9
Fluoroscopy dose (cGym^2)	575.6 ± 976.1
Total amount of propofol (mg)	922.9 ± 499
Propofol (mg/h)	440.7 ± 237.3
Midazolam (mg)	3.0 ± 11.1
Flumazenil	9 (0.3%)
Fentanyl (mg)	0.16 ± 2.2
Naloxone	27 (0.8%)
Heparin dose (IE)	15,015.7 ± 20,180.1
Mean ACT (s)	322 ± 39
Min ACT (s)	289 ± 57
Max ACT (s)	344 ± 58
Baseline oxygen saturation (%)	95 ± 4
Lowest oxygen saturation (%)	90 ± 4
Norepinephrine administration	396 (12.5%)
eIT	1 (0.03%)
NIV	47 (1.5%)

Continuous values are expressed as mean ± standard deviation. Categorical values are expressed as number (percentage).

ACT = activated clotting time; EF = ejection fraction; eIT = endotracheal intubation; NIV = noninvasive ventilation; RF = radiofrequency.

pressure control and/or for arterial blood gas analysis. Norepinephrine was administered in 396 patients (12.3%) because of blood pressure drop (MAP <60 mm Hg). NIV had to be implemented in 47 patients (1.5%) but only 1 patient (0.03%) needed eIT. Sedation-related hypotensive events occurred in 396 patients (12.3%) and norepinephrine was administered to correct the hypotension.

Comparison of baseline characteristics/procedural data between patients with or without eIT/NIV is shown in Table 3. Compared to patients without sedation complications, patients needing eIT or NIV had significantly longer procedure durations, a higher BMI, and higher CHA_2DS_2-VASC score; were significantly older; had a lower glomerular filtration rate; suffered more often from diabetes mellitus; and had a lower baseline oxygen saturation.

Naloxone to reverse fentanyl was used in 27 cases (0.8%). The number of patients that required NIV or eIT received naloxone significantly more often (7/48; 14.5%) compared to patients without complications (20/3163; 0.6%) ($P < .001$). To reverse midazolam (9/3211; 0.3%), patients received flumazenil; again, patients that required NIV or eIT significantly more often received flumazenil (4/48; 8.3%) in comparison with patients without complications (5/3163; 0.2%) ($P < .001$).

In the multivariate analysis, all baseline characteristics were included as covariates. The analysis showed that an elevated BMI (>30 kg/m^2; OR 1.6; $P = .03$) was the only independent predictor for eIT/NIV use. The subgroup analysis of patients showed that the absolute risk for the need of NIV/eIT in patients with a BMI <30 was 0.27 whereas the absolute risk for patients with a BMI ≥30 was 0.375, resulting in a relative risk of 1.4. Therefore, patients with a BMI of ≥30 had a 40% higher risk for the need of NIV/eIT during the procedure.

Discussion

In this study of a large patient population of >3200 patients undergoing left atrial catheter ablation procedures, a protocol including propofol and midazolam for deep sedation as well as fentanyl for analgesia administered by EP staff was safe and had a low incidence of complications. Our center is experienced in deep sedation with propofol, midazolam, and fentanyl using deep sedation since 2012. EP nurses as well as operators received special instruction for cardiac sedation and participate in annual cardiac life support training. Unfortunately, until now, there has been no specific training for EP staff for cardiac sedation, as it is already available for endoscopic nurses. We strongly recommend to establish a standardized training for EP staff. Only 1 patient (0.03%) needed eIT and 47 patients (1.5%) required NIV because of a permanent oxygen saturation drop below 85%. These findings are in accordance with other studies that describe the use of propofol and other opioids like piritramide instead of fentanyl for catheter ablation.[5,6] In the multivariate analysis, only an elevated BMI >30 kg/m^2 was an independent predictor for NIV/eIT. Other studies confirm these findings.[20]

Safety and side effects of propofol administered by EP staff

Propofol sedation is considered safe, and the most common (rare) side effect of propofol is hypotension.[21] Other side effects include bradyarrhythmia, respiratory depression, and allergic reactions. High-dose propofol infusion has been associated with the "propofol infusion syndrome," which is rare, but more severe and characterized by metabolic acidosis and circulatory collapse.[21]

In 2012, Wutzler and colleagues[5] investigated the safety of propofol during 424 ablation procedures. Oxygen saturation, blood gas, ECG, and blood pressure were assessed. No anesthesia-associated complications were observed. In our study, the risk of noninvasive ventilation or endotracheal intubation using a combination of propofol, midazolam, and fentanyl was very low. Norepinephrine was necessary in 12.3% of patients because of arterial hypotension. In line with these findings, Wutzler and colleagues observed an occasional decrease of oxygen saturation <90% during deep sedation with propofol/midazolam for catheter ablation. The majority of patients were treated by a reduction or termination of propofol infusion, and respiration via a breathing bag was necessary in <5% of cases. At a dosage of 4 mg/kg/h propofol, systolic and diastolic blood pressure dropped. In the study of Salukhe and colleagues[22] that assessed 1000 patients, only 1 patient needed 4 minutes of mechanical bag and mask ventilation during deep sedation with propofol and fentanyl for catheter ablation. In the position paper of the German Society of Cardiology on cardio-analgo-sedation, Tilz and colleagues[23] regard a combination of fentanyl,

Table 3 Baseline characteristics and procedural data in patients with or without sedation complications

	No complications n (%) / mean (SD)	eIT or NIV n (%) / mean (SD)	*P* value†
Total (N = 3211)	3163	48	
Sex (male)	1927 (60.9%)	21 (43.8)	.8
Age (years)	65.7 ± 11.6	70.0 ± 10.0	.01*
BMI (kg/m^2)	27.8 ± 4.8	30.1 ± 9.0	.01*
CHA_2DS_2-VASc score	2.6 ± 1.7	3.2 ± 1.5	.002*
Hypertension	2158 (68.2%)	47 (98%)	.05
Diabetes mellitus	378 (12%)	11 (23%)	.04*
History of stroke	259 (8.2%)	4 (8.3%)	1.0
CAD or PAD	853 (27%)	15 (31.3%)	.5
Congestive heart failure	361 (11.4%)	6 (12.5%)	.81
GFR (mg/dL)	76 ± 21	69 ±17	.02*
Creatinine (mg/dL)	1.1 ± 2.7	1.1 ± 0.2	.9
Procedural data			
Procedural duration (min)	133.3 ± 52.6	160.5 ± 51.9	.001*
RF duration (min)	42.5 ± 20.6	41.8 ± 23.5	.8
Fluoroscopy dose (cGym^2)	593.4 ± 1387.1	829.6 ± 997.7	.11
Propofol dose (mg)	923.4 ± 496.4	910.9 ± 651.9	.86
Midazolam dose (mg)	3.0 ± 11.2	2.4 ± 1.7	.05
Flumazenil	5 (0.2%)	4 (8.3%)	.001
Fentanyl dose (mg)	0.16 ± 2.2	0.10 ± 0.04	.1
Naloxone	20 (0.6%)	7 (14.5%)	.001
Baseline oxygen saturation (%)	95.5 ± 3.8	93.8 ± 4.1	.003*
EF (%)	53.4 ± 10.9	52.9 ± 8.1	.9

Continuous values are expressed as mean ± standard deviation. Categorical values are expressed as number (percentage).

BMI = body mass index; CAD = coronary artery disease; EF = ejection fraction; eIT = endotracheal intubation; GFR = glomerular filtration rate; NIV = noninvasive ventilation; PAD = peripheral artery disease; RF = radiofrequency.

†Significant results are marked with an asterisk (*).

midazolam, and propofol appropriate for longer EP procedures. Potential risk factors for complications like higher age, BMI, or comorbidities should be considered and continuous oxygen supply via nasal cannula and equipment for intubation are potential strategies for those patients at risk. In summary, our and other studies found that deep sedation with propofol during catheter ablation is safe and has a low incidence of complications such as intubation or NIV.

In their review, Thomas and colleagues[14] compared different sedation techniques for catheter ablation. The data were derived from cardiologists. According to our approach, sedation was performed by non-anesthesiologic staff under the supervision of cardiologists in the majority of cases. Procedures were performed in a setting where continuous monitoring and emergency equipment were available. Anesthesiologists were rapidly available for emergency assistance.[14] Salukhe and colleagues[22] stated that sedation with 2% propofol infusion administered by electrophysiologists without assisted ventilation is safe and effective. In several studies, deep sedation with propofol administered by nurses during EP and non-EP interventions was considered safe and feasible.[24–26]

Conscious sedation vs deep sedation

Compared to conscious sedation with fentanyl/midazolam, deep sedation with propofol might lead to higher ablation accuracy and is more comfortable for the patient. In 2019, Li and colleagues[3] indicated in a meta-analysis of 9 studies that catheter ablation under general anesthesia/deep sedation contains a higher likelihood of procedural success compared to conscious sedation. In 2011, Di Biase and colleagues[27] reported on a total of 257 AF patients undergoing catheter ablation with either conscious sedation (fentanyl/midazolam) or general anesthesia. Procedures performed under general anesthesia / deep sedation showed a higher success rate with freedom from AF after a single procedure at 17 ± 8 months follow-up. As a conclusion, general anesthesia/deep sedation likely reduces the prevalence of pulmonary vein reconnection owing to better catheter stability and a lower risk of tissue edema. Deep sedation with propofol has therefore been suggested as favorable anesthetic technique for catheter ablation in several studies.[3,22]

Predictors of NIV

In 2019, Vevecka and colleagues[20] analyzed predictive factors and safety of NIV used in combination with propofol deep sedation during left atrial ablation procedures. In accordance with our results, procedural data from 252 patients using sedation with 1% propofol showed that increased BMI is a significant predictive factor for NIV ($P = .008$). Other significant predictive factors for NIV were high-dose propofol sedation ($P = .010$), persistent AF ($P = .029$), prolonged procedure time ($P = .006$), and presence of OSA ($P < .001$). No patient needed endotracheal intubation. In contrast

to our study, OSA was an independent factor for NIV analyzed by Cox regression ($P = .016$). In our study, the only independent predictive factor for NIV/eIT was a higher BMI (>30.1 kg/m^2). Thus, patients with these risk factors should be treated with special care, including early preparation of mask ventilation or lower propofol dose. Vevecka and colleagues[20] concluded that propofol deep sedation for patients undergoing left atrial ablation is safe. Additionally, using NIV in high-risk patients with OSA, high BMI, or long procedure duration might improve long-term procedure results.[20]

Patients' satisfaction with invasive procedures often correlate with their experience of pain and discomfort. Münkler and colleagues[28] analyzed patient satisfaction with periprocedural sedation (propofol/midazolam) during catheter ablation administered by EP staff. Using a standardized questionnaire, he found that deep sedation was generally well tolerated, and patients showed a high satisfaction with such a protocol. Only few patients reported pain (7.7%) and postprocedural side effects (16%), eg, nausea and episodes of headache.[28] In conclusion, deep sedation with propofol seems to make the procedure better tolerable for patients.

Limitations

The study was retrospective by design and patients were not randomized to an alternative form of sedation. Our observations were limited to ablation of paroxysmal or persistent AF or left atrial tachycardia. We cannot transfer our findings to other cardiac interventions. However, we believe that this study containing more than 3000 patients has shown evidence that propofol sedation administered by EP staff is safe and feasible. Other studies showed that OSA was a relevant risk factor for NIV. Unfortunately, we did not screen our patients for OSA, because it is often not diagnosed prior to ablation and not systematically evaluated in our hospital.

Conclusion

In conclusion, deep sedation with propofol for catheter ablation administered by EP staff is safe, with a low incidence of NIV or eIT. The most common periprocedural complication was blood pressure drop leading to consecutive norepinephrine administration (in 396 of 3211; 12.3%). On multivariate analysis, the only independent predictive factor for NIV or eIT was a higher BMI. That should alert operators that patients with a BMI of >30.1 kg/m^2 are more likely to require NIV or eIT during catheter ablation procedures. Patients with a BMI >30 had a 40% higher risk for NIV or eIT, highlighting the importance of intensified weight control prior to ablation and special preparation of the procedure in those patients. This patient population should be treated with special care and early preparation of mask ventilation. Overall, deep sedation with propofol administered by EP staff is safe and well tolerated by patients.

Funding Sources: This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Disclosures: The authors have no conflicts to disclose.

Authorship: All authors attest they meet the current ICMJE criteria for authorship.

Patient Consent: Informed consent was obtained from all participants.

Ethics Statement: The study was approved by the Ethics Committee of the Technical University Munich, Germany. The research reported in this paper adhered to the human research Helsinki Declaration as revised in 2013.

Disclaimer: Given her role as Associate Editor, Isabel Deisenhofer had no involvement in the peer review of this article and has no access to information regarding its peer review. Full responsibility for the editorial process for this article was delegated to Editors Nazem Akoum and Jeanne E. Poole.

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