

Description of patients aged 80 or older undergoing surgery in the electrophysiology lab of a tertiary care hospital

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Abstract

Introduction: fourth age patients have been cared for in the electrophysiology unit of a tertiary care hospital in Manizales, Caldas; however, there is little clarity in the literature regarding therapeutic conduct in this age group. We present our experience of care and intervention in patients over the age of 80 between September 20, 2017 and October 7, 2019.

Methods: a longitudinal cohort study in which data was collected from a chart review. Telephone follow up was performed three and six months after the procedure. Patients over the age of 80 who had undergone any procedure in the electrophysiology lab were included. Patients without follow up information were excluded.

Results: data were collected on 75 patients undergoing a procedure: 62.7% of the patients were men, ages ranged from 80 to 95, and 32.7% of the patients had a diagnosis of sinus dysfunction. The most prevalent comorbidity was arterial hypertension (92%). The most frequently performed procedure was dual chamber pacemaker implantation. The median hospital stay was one day. Seventy percent of the patients had a medium or low risk according to the CHA2DS2-VASc scale. Over a six-month period, a 4% cumulative incidence of complications was found, with 8% reconsultation and 1.3% mortality.

Conclusions: postsurgical complications, the need for and length of hospitalization, the rate of reconsultation and the mortality associated with procedures in this age group are similar to those seen in studies of populations under 80 years old. (Acta Med Colomb 2021; 46. DOI: <https://doi.org/10.36104/amc.2021.1860>).

Key words: *elderly person aged 80 or older; sick sinus syndrome; artificial pacemaker; cardiac electrophysiology.*

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Introduction

The intention of this study is to describe the invasive electrophysiology procedures, with their respective follow up, in patients 80 years old or older undergoing procedures at a tertiary care hospital in the city of Manizales, along with their clinical, social and demographic characteristics, in order to provide relevant information regarding invasive procedures in this age group.

The reasons for performing this study are the following: first, an increased life expectancy in the general Colombian population has been noted over the last three decades. In the department of Caldas, the population between 65 and 79 years of age (the third stage of life) and 80 years old or older (the fourth stage of life) has increased, which has had an effect on the number of general medicine and hospital consults, with chronic disease care being more frequent, including care for cardiovascular diseases such as arrhythmias (1-4).

Second, there is insufficient information in the literature today on this type of surgical interventions in this specific

population group, which leads to clinical practice being very limited, with more conservative patient management and less optimal results, and patients possibly not receiving appropriate care for their illnesses (5).

The objective of this study was to describe the clinical and epidemiological characteristics (age, comorbidities, diagnosis, type of procedure, length of hospital stay and reasons for reconsultation, complications and mortality) of patients in the fourth stage of life seen in an electrophysiology lab. Patients admitted to the electrophysiology specialty are referred by the following specialties: cardiology, internal medicine, geriatrics and the intensive care unit of the department of Caldas. For this study, data was collected from the patient's medical charts, and postoperative telephone follow up was performed up to six months following the intervention.

Materials and methods

This was a longitudinal cohort study in which data was collected retrospectively based on a clinical chart review.

Data were collected on the procedure, hospital stay and follow up appointments from the hospital's electrophysiology lab database. Telephone follow up was conducted three and six months after the procedure. Clinical chart follow up of patients who reconsulted at the hospital during follow up was conducted. Patients over the age of 80 who underwent any procedure in the electrophysiology lab of a tertiary care hospital in Manizales, Caldas were included. Patients without information on the data being followed were excluded.

The CHA2DS2-VASc scale was used to describe each treated patient's score. Its variables include: a history of heart failure (LVEF <40%), arterial hypertension, age >65 years, diabetes, ischemic cerebrovascular accident, transient ischemic attack, thromboembolism, peripheral vascular disease, and female sex. It has a minimum score of zero and a maximum score of nine, and has been validated in patients with nonvalvular atrial fibrillation to assess the one-year risk of ischemic cerebrovascular accident or thromboembolism (6).

The decision to perform each patient's electrophysiology procedure is made according to the indications published in the international guidelines for each disease. Since patients over the age of 80 are the minority in the clinical studies which support the management guidelines, many of the decisions are systematically extrapolated by the specialists.

The SPSS version 22 licensed for the Universidad de Caldas was used for statistical analysis. Nominal categorical variables were analyzed using graphs with percentage distribution and frequency distribution tables. Ordinal categorical variables were presented in tables. For numerical variables, normality was determined using the Kolmogorov-Smirnov statistic and Spearman's correlation was used.

Ethical aspects

It was submitted to and approved by the ethics committee of the Universidad de Caldas. The Declaration of Helsinki guidelines were followed.

Results

Considering the study variables, the results will be presented as follows: demographic data, intervention diagnoses, comorbidities, electrophysiological interventions performed, hospital stay, CHA2DS2-VASc scale, complications, consults after hospital discharge and deaths.

Demographic data

During the period between September 20, 2017 and October 7, 2019, 75 patients over the age of 80 underwent procedures in the electrophysiology lab of a tertiary care hospital in the city of Manizales, 62.7% of whom were male. The ages ranged from 80 to 95 years; the median age at the time of intervention was 83 years (IQR=5 years).

Most of the patients (47.0%) were from Manizales, 16.0% were from Riosucio, 8.0% were from Neira, and 6.7% were from Aranzazu, followed by other towns (Table 1).

The tertiary care institution in which the patients were

treated is known for providing public health care, and therefore the predominant type of health insurance at the time of the procedure was subsidized insurance. The healthcare insurance frequency distribution is shown in Figure 1.

Intervention diagnoses

The most prevalent intervention diagnosis was sinus dysfunction, present in 30.6%, followed by complete atrioventricular block in 26.7% of the patients (Table 2).

Comorbidities

The most prevalent comorbidity in this group of patients was arterial hypertension in 92.0%, followed by dyslipidemia in 37.3% and chronic obstructive pulmonary disease in 30.7% of the patients (Figure 2). The combinations of comorbidities were not explored due to their quantity; instead, the CHA2DS2-VASc score is shown.

Electrophysiological interventions performed

With regard to procedures performed, we found that the most frequent procedure was dual-chamber pacemaker implantation, followed by pacemaker explantation/implantation and diagnostic electrophysiological studies (Table 3).

Hospital stay

Inpatient days were found to range from 0 to 29. The median hospital stay was one day, with an interquartile range of 5. Postsurgical hospitalization was mainly due to causes other than the intervention (Table 4). Tables 5 and 6 detail the median days of hospitalization according to the procedure performed.

CHA2DS2-VASc scale

The most prevalent CHA2DS2-VASc score was 3 (3.2% annual risk of ischemic cerebrovascular accident), found in 37.0% of the patients, with a score of 6 (9.8% annual risk of ischemic cerebrovascular accident) in 11.0% of the patients (Figure 3). The CHA2DS2-VASc and days of hospitalization variables were proven to have a non-normal distribution (the Kolmogorov-Smirnov statistic, $p < 0.001$ was used for both variables). No significant correlation was shown between the CHA2DS2-VASc score and days of hospitalization (Spearman's Rho was used, $p = 0.643$).

Complications

Three peri-procedural complications were reported, with a 4.0% prevalence, as follows:

A 90-year-old female patient with a CHA2DS2-VASc score of 5, in whom a single-chamber pacemaker was implanted, developed a hemothorax in the medium-term (48 hours), with no reintervention required.

An 80-year-old male patient, with a CHA2DS2-VASc score of 3, in whom a dual-chamber pacemaker was implanted, developed pericardial effusion and tamponade, and required pericardiocentesis.

A 90-year-old female patient with a CHA2DS2-VASc score of 4 was admitted to the procedure room with a temporary stimulation electrode. Following dual-chamber pacemaker implantation, and when the temporary electrode was being removed, she developed pericardial effusion and cardiac tamponade, requiring emergency pericardiocentesis.

Consults after hospital discharge

During follow-up, 8% of the patients were found to have consulted again. The reasons for consult were dyspnea (33%) and dizziness (50%), and were managed without further interventions being required. One 86-year-old female patient with a cardioverter-defibrillator presented with an appropriate discharge of her high-voltage device, and was diagnosed with severe single-vessel coronary disease, requiring coronary angiography intervention.

Deaths

Two deaths occurred during follow up, corresponding to two women with CHA2DS2-VASc scores of 4. The first patient died due to the electrophysiology procedure (cardiac tamponade) nine days after the intervention. The other death occurred 86 days after single-chamber pacemaker implantation due to a cause unrelated to the electrophysiology procedure (abdominal sepsis). The six-month mortality found in the study was 1.3%.

Discussion

The most prevalent disease in this case series was sinus dysfunction: almost 31% of the population had a diagnosis of sinus dysfunction or symptomatic sinus bradycardia, concordant with what was reported by Orjuela et al. (7). Undoubtedly, this was an expected finding given the physiological bases of heart rate change and conduction disorders which become more significant with age. For some authors, aging and the accumulation of calcium deposits may explain the changes in the conduction system that lead to developing symptomatic bradycardia, known as Lev-Lenegre syndrome (8). All of the patients with this diagnosis underwent dual-chamber pacemaker implantation, which preserves atrioventricular synchronization and thus tolerance of physical activity (9, 10). All of the implanted devices were programmed in dual-chamber stimulation mode (11, 12).

In this cohort of patients, taking all the implanted stimulation devices (single-chamber, dual-chamber and triple-chamber pacemakers; cardioverter-defibrillators and cardioresynchronizers) together, a 52% prevalence was found, greater than what had been reported by other authors in other populations. These other studies found a prevalence of 40% in mostly male European patients over the age of 80, with ischemic cardiomyopathy and New York Association functional class III, who received triple-chamber stimulation devices (13, 14).

The DAVID trial showed that, in patients over the age of 75 with an indication for high-voltage device implanta-

Table 1. Frequency distribution of town of origin.

Town	n	%
Manizales	35	46.7
Riosucio	12	16.0
Neira	6	8.0
Aranzazu	5	6.7
Anserma	3	4.0
Salamina	1	1.3
Others	13	17.3
Total	75	100
Others: Chinchiná, Supía, Victoria, Aguadas, Armenia, Marmato.		
Source: Tertiary care hospital in the city of Manizales. Compiled by the authors.		

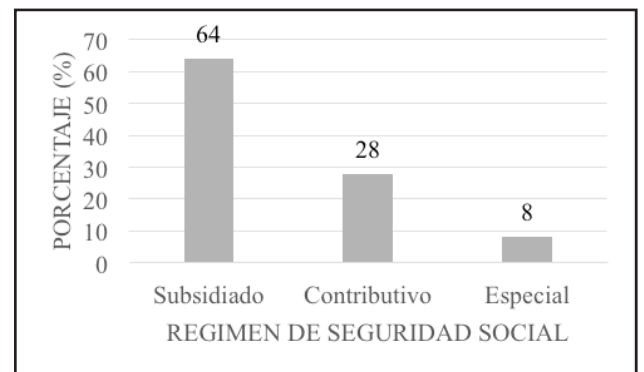


Figure 1. Distribution by type of health insurance. Source: compilation by the authors.

Table 2. Frequency distribution of working diagnoses.

	n	%
Sinus dysfunction	23	30.6
Complete AV block	20	26.7
Atrial fibrillation	6	8.0
Syncope	6	8.0
Dilated cardiomyopathy	6	7.9
Advanced blocks	4	5.3
Supraventricular tachycardia	3	4.0
Ischemic CVA	2	2.7
Ventricular extrasystole	1	1.3
Atrial lead dysfunction	1	1.3
Presyncope	1	1.3
Cardiac tamponade	1	1.3
Ventricular tachycardia	1	1.3
Total	75	100
Source: Tertiary care hospital in the city of Manizales. Compiled by the authors.		

Table 3. Frequency distribution of surgical procedures.

	n	%
Dual-chamber pacemaker implantation.	33	44.0
Explantation/implantation of a dual-chamber pacemaker	10	13.3
Electrophysiology study	8	10.7
Ablation using a three-dimensional mapping system	4	5.3
Implantation of a triple-chamber pacemaker	3	4.0
Electrical cardioversion	3	4.0
Implantation of a single-chamber pacemaker	2	2.7
Implantation of an events monitor	2	2.7
Explantation/implantation of a single-chamber pacemaker	2	2.7
Explantation/implantation of a dual-chamber cardioverter defibrillator	2	2.7
AV node ablation	1	1.3
Implantation of a single-chamber cardioverter defibrillator	1	1.3
Electrophysiology study, mapping and ablation	1	1.3
Downgrade of a dual-chamber cardioverter defibrillator to a dual-chamber pacemaker	1	1.3
Downgrade of a cardioresynchronizer to a resynchronizer	1	1.3
Explantation/implantation of a cardioresynchronizer	1	1.3
Total	75	100

Source: Compilation by the authors.

Table 3.1. Frequency distribution of stimulation devices.

	n	%
Implantation of a dual-chamber pacemaker	33	44
Implantation of a triple-chamber pacemaker	3	4
Implantation of a single-chamber pacemaker	2	2.7
Implantation of a single-chamber cardioverter defibrillator	1	1.3
Total	39	52

Source: Compilation by the authors.

tion, the use of single-chamber devices does not differ from the use of dual-chamber devices in terms of mortality and frequency of hospitalization (15). However, in this group of patients there was only one primo-implantation of a single-chamber high-voltage device in an 86-year-old woman, who experienced appropriate therapy for ventricular tachycardia.

In patients under the age of 80, the prevalence of complications related to the implantation of cardiac stimulation devices is 6%, with lead displacement being the most frequent complication (16). In patients termed “extremely elderly” (over the age of 80), the reported prevalence of

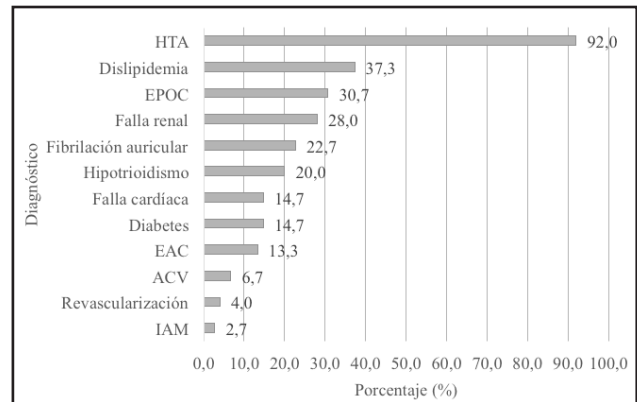


Figure 2. Grouped bar. Prevalence of comorbidities in patients undergoing procedures. HTN: Coronary arterial hypertension, COPD: Chronic obstructive pulmonary disease, CAD: Coronary artery disease, CVA: Cerebrovascular accident, AMI: Acute myocardial infarction (Source: Tertiary care hospital in the city of Manizales. Compiled by the authors.

Table 4. Frequency distribution of the causes of postoperative hospitalization.

	n	%
Not hospitalized	48	64.0
Hemothorax	1	1.3
Hematoma	1	1.3
Cardiac tamponade	1	1.3
Lead displacements	1	1.3
Other*	23	30.4
Total	75	100

*Other: urinary retention, subtherapeutic anticoagulation, bridge therapy, medications, new intervention, decompensated heart failure, postoperative follow up, new arrhythmias, cardiac rehabilitation, other surgical interventions unrelated to electrophysiology, infections, coronary disease.
Source: Tertiary care hospital in the city of Manizales. Compiled by the authors.

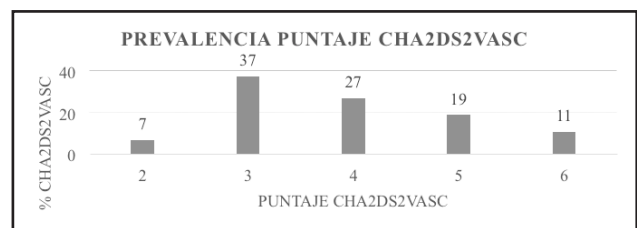


Figure 3. CHA2DS2-VASc Score Prevalence

complications related to implantation is 5.4% (17). In this study, we found a prevalence of complications of 5.2%, with lead displacement constituting 1.3% of the cases. The prevalence of complications is similar even to that reported in studies of single-chamber (3.5%) and dual-chamber (4.7%) high-voltage device implantation (18-20).

In this cohort of patients, 2.7% (n=2) required event monitor implantation, which allowed one of the patients to be diagnosed with sinus dysfunction and asystole. As a result, he received a dual-chamber stimulation device with which

Table 5. Inpatient days according to frequent procedures.

	Median	Mean	n
Single-chamber pacemaker implantation	14	14	2
Explantation/implantation of a dual-chamber cardioverter defibrillator	3.5	3.5	2
Electrophysiology study	2.5	6	8
Ablation using a three-dimensional mapping system	1.5	4	4
Event monitor implantation	5	5	2
Dual-chamber pacemaker implantation	1	3.1	33
Dual-chamber pacemaker explantation/implantation	1	3	10
Triple-chamber resynchronization pacemaker implantation	1	1.3	3
Total			64
Source: Compilation by the authors.			

syncope episodes were avoided. The current recommendations for this procedure have been established for patients under the age of 80 (21), but no literature was found on the use of this device in patients over the age of 80.

With regard to high-voltage device implantation, 30-day mortality reaches 3% in patients over the age of 80, of whom 57% had a history of aborted sudden death and 47% syncope (22). In patients over the age of 80, a 2% mortality has been reported in relation to cardiac stimulation device implantation (17). A 1.3% six-month mortality rate was found in this study, corresponding to one patient who died due to the procedure, before the first 30 days.

Unlike what has been reported in patients undergoing electrical cardioversion, with a 33% recurrence at three weeks (23), no recurrences were found at six months in this cohort of patients.

Four patients in this cohort underwent ablation using a three-dimensional mapping system, one of them an 88-year-old man with unceasing ventricular tachycardia, who had satisfactory clinical progress after the procedure, with no evidence of recurrence. This contrasts with the results of the study reported by Vakil et al. (24), who reported an inpatient mortality of 4.4% and 15% mortality at one year in patients over the age of 70. In that same study, almost 33% of the patients over the age of 80 had greater mortality and greater recurrence of ventricular tachycardia (24). One 85-year-old patient who had ventricular dysfunction with a left ventricular ejection fraction of 43% underwent supraventricular tachycardia ablation with satisfactory control of the arrhythmia, no recurrence during follow up and no associated complications, just as was seen in Epstein et al.'s study in which patients between the ages of 70 and 85 underwent ablation of supraventricular tachycardia, with

Table 6. Inpatient days in low frequency events.

	Inpatient days	n
<i>Downgrade of a dual-chamber cardioverter defibrillator to a dual-chamber pacemaker</i>	14	1
Atrioventricular node ablation	13	1
<i>Downgrade of a cardioresynchronizer to a resynchronizer</i>	10	1
Single-chamber cardioverter defibrillator implantation	7	1
Single-chamber pacemaker explantation/implantation	1	2
Electrophysiology study with mapping and ablation	1	1
Electrical cardioversion	0	3
Cardioresynchronizer explantation/implantation	0	1
Total		11
Source: Compilation by the authors.		

a 7.4% incidence of complications (25). One 86-year-old male patient with a diagnosis of symptomatic frequent ventricular extrasystoles refractory to pharmacological treatment required one day of hospitalization and was subsequently discharged with no associated complications. One 86-year-old male patient with a diagnosis of atrial flutter with a normal ventricular function of 63%, whose heart rate could not be controlled with maximum dose negative chronotropes, underwent cavo-tricuspid isthmus ablation and was discharged after two days, without complications.

This study contributes bases for new, future studies, and offers information regarding the characteristics and clinical results of extremely elderly patients undergoing electrophysiological interventions in the context of a developing country.

Conclusions

In patients over the age of 80 seen at a tertiary care institution in Manizales, the most frequent diagnoses were sinus dysfunction and complete AV block. As a result, the most frequently performed procedure was dual-chamber pacemaker implantation. Electrophysiological interventions in this age group were more frequent in men than in women.

Postoperative complications, the need for and length of hospitalization, rates of repeat consults and procedure-related mortality in this age group are similar to those seen in people under the age of 80.

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