

Analysis of Infectious Complications of Conventional Heart Stimulation at the Cardiology Department of Grand Yoff General Hospital

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Abstract

Introduction: The objectives of this study were to assess the late or early infectious complications associated with the implantation of pacemakers in the cardiology department of the Grand Yoff General Hospital.

Methodology: This was a retrospective study concerning the infectious complications of conventional cardiac stimulation in patients who received a pacemaker between January 1, 2006 and December 31, 2014 in the cardiology department of Grand Yoff General Hospital. The different parameters studied included socio-demographic, clinical, paraclinical data, indications and data on definitive stimulation. Infectious complication, type, treatment and course had also been studied. Early complications are those observed in the first six weeks and late ones beyond six weeks after implantation. The data were analyzed using sphinx 4.5 software. The significance threshold was used for a value of $P < 0.05$.

Results: We had collected 09 cases of infectious complications secondary to definitive cardiac stimulation on 252 implantations either a hospital prevalence of 3.6%. The average age of the patients was 72 years. There was a predominance of women with a sex ratio M/F at 0,5. During the infectious complication phase, fever was present in 2 (0.038%) patients, a leukocytosis found in 3 (5.8%) patients and a high CRP in 10 (19.2%). Blood culture was positive for *Staphylococcus aureus* in 1.9% of cases.

There are 3 early infectious complications (7.3%) including 2 cases (3.03%) of infection of the pocket and one case infectious endocarditis (1.5%). Late infectious complications were 6 (24%) cases including 5 cases of infection of the pocket (1.98%) and 1 case of endocarditis (0.4%). Extraction followed by sterilization, antibiotic therapy and reimplantation were performed in 8 (0.89%) patients and antibiotic therapy alone in 1 (0.11%) patient. The evolution was favorable in 89% of the cases.

Conclusion: Pacemaker implantation procedures are associated with a risk of infection and the treatment consists of adequate antibiotic therapy combined with extraction of the infected material.

Keywords: Conventional cardiac stimulation • Infectious complications • Senegal

Introduction

The pacemaker or pacemaker (PM) is an electrical pulse generator that stimulates the myocardium to establish a normal rhythm when the heart rate slows or a conduction defect occurs [1,2]. The use of intracardiac devices such as pacemakers has extended the lifespan and improved the quality of life of patients. However, it is sometimes complicated by localized and systemic infections. Systemic infections are rare, but in some cases severe and potentially life-threatening [3-6].

These complications can be early occurring within the first six weeks or late infectious or non-infectious. It may be an infection of the operating site following implantation or late onset endocarditis. These complications

can be early occurring within the first six weeks or late infectious or non-infectious [5,7]. As the rate of pacemaker implantation is increasing worldwide, the number of infections after cardiac stimulation is increasing. However, no large-scale study supports this suggestion and the overall statistics for post-stimulation infections remain largely [8].

In the absence of a pacemaker registry in Africa in general and in Senegal in particular, these complications are very little studied [9]. So it was with this in mind that we carried out this work. The objectives of this study were to assess infectious complications, whether late or early, linked to the implantation of pacemakers in the cardiology department of the Grand Yoff General Hospital.

Methodology

The study focused on the records of patients of both male and female implanted with a conventional cardiac pacemaker in the cardiology department of Grand Yoff General Hospital during the study period. We had carried out a transversal, descriptive and retrospective study from January 1, 2006 to December 31, 2014, a period of eight (8) years. Were included in our study, all the files of patients carrying a definitive pacemaker that it is a first implantation or a reimplantation during the period of study and having presented during the hospitalization or the followed an infectious

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complication. Early complications are those observed in the first six weeks and late complications those occurring more than six weeks after implantation. Excluded from the study were patients who had pacemaker outside of the study period, patients carrying a pacemaker but having a non-infectious complication, and those fitted with a triple-chamber pacemaker or an implantable automatic defibrillator.

The different parameters studied included socio-demographic (age, sex, profession, address), clinical, paraclinical data (history, symptoms, physical examination, electrocardiogram and cardiac Doppler ultrasound data), indications for stimulation and data on definitive stimulation (mode, site, route first). The complications sought were those of infection and the type of infectious complication, the time of onset, treatment and course had been determined.

Data were collected from patient files and operative reports using an individual survey sheet entered on Microsoft word 2010. The quantitative variables were summarized on average and standard deviations or in median. The qualitative variables have been summarized in number and percentage. For the comparison of the percentages, we used the Chi-square test or the exact Fisher test according to the theoretical numbers. The significance threshold was used for a value of $P < 0.05$.

Results

We had collected 09 cases of infectious complications secondary to definitive cardiac stimulation on 252 implantations either a hospital prevalence of 3.6%. The average age of the patients was 72 years. There was a predominance of women with a sex ratio M/F at 0,5. Hypertension was the main cardiovascular history (56.2%) followed by diabetes (37.8%). The functional symptoms before implantation were dominated by dyspnea (51.6%) and dizziness (27.2%). A physical examination all patients had bradycardia with an average heart rate of 37 beats per. min. A complete electrocardiographic atrioventricular block was also found in all patients before implantation. The approach was the left subclavian vein. A double-chamber pacemaker was implanted in 5 patients and a right-ventricular single-chamber pacemaker in 1 patient. During the infectious complication phase, fever was present in 2 (0.038%) patients, a leukocytosis found in 3 (5.8%) patients and a high CRP in 10 (19.2%) patients and a blood culture was positive at *Staphylococcus aureus* either 1.9% of cases.

There were 3 early infectious complications either 7.3% of early complications, 4.54% compared to all of the complications. There were 2 cases (3.03%) of infection of the compartment appearing 14 days and 1 month after implantation and one case of infective endocarditis (1.5%) occurring 10 days after implantation with evidence of vegetation at the level of the aortic sigmoid on cardiac ultrasound. Late infectious complications were 6 (24%) of all late complications (25 cases or 39%). There were 5 cases of infection of the compartment (1.98%) occurring respectively at 2 months (1 case), 8 months (1 case), 1 year (3 cases) and 1 case of endocarditis (0.4%) one year after implantation. Extraction followed by sterilization, antibiotic therapy and reimplantation were performed in 8 (0.89%) patients and antibiotic therapy alone in 1 (0.11%) patient. The evolution was favorable in 89% of the cases. There was 1 (0.11%) case of recurrence of infection of the compartment at 2 years then 3 years after treatment.

Discussion

The installation of a pacemaker has become a common act in cardiology. During our study, we collected 252 files of stimulated patients. This rate remain lower than those in the northern countries where thousands of pacemakers are implanted per year [10]. In Denmark, Johansen et al. [8] reports a cohort of 46,299 patients from 1982 to 2007. This shows that stimulation remains underdeveloped in sub-Saharan Africa despite its significant growth in recent years. The average age of our patients with an infectious complication was 72 years and we could not demonstrate in our study a correlation between age and the occurrence of infectious

complications. Risk factors associated with an increase in infection after cardiac stimulation have been identified such as congestive heart failure, chronic renal failure, long-term use of corticosteroids, dialysis, anticoagulation, disease chronic obstructive pulmonary, female and patients with fever within 24 hours of implantation [11].

The presentation of infection after implantation of a pacemaker may be evident in some cases. Symptoms can range from local pocket erosion to generalized sepsis [12]. In our study, a blood culture was positive for *Staphylococcus aureus* either 1.9% of cases. The main reason for negative blood cultures in the context of post-cardiac stimulation endocarditis is probably previous antibiotic treatment [12].

Despite improvements in surgical techniques, infections occupy a privileged place since they can jeopardize the prognosis vital. The average time to onset of local infections is 2.5 weeks with extremes ranging from 1 to 56 weeks [13]. Conversely, probe infections occur on average 33 weeks after implantation with extremes of 2 to 95 weeks, or even several years depending on the germ involved. In our series, the rate of infectious complications was 3.6%. Early infectious complications represented 1.2% with 2 cases of infection of the compartment (0.8%) and one case of endocarditis (0.4%). In South Korea, ANN WH et al. [14] found 0.7% of cases of infections including 5 cases of pocket infection (0.4%) and 4 cases of endocarditis (0.3%). In Tunisia HATEM et al. [15] found 2.9% of cases of early infections.

Rates of pacemaker-pocket infection varying between 0.5% and 5.1% have been reported in retrospective and prospective studies [16,17] whereas bacteremia and endocarditis have also been reported in up to 0.5% of patients [3,4] Primary antibiotic prophylaxis to prevent device-related infections is recommended on the basis of the results of studies on surgical wound infection [18,19] but this practice is not supported by the results of individual randomized clinical trials of sufficient size [20,21].

A recent meta-analysis of 7 randomized studies examining the impact of systemic antibiotics on the risk of pacemaker-related infections suggested that systemic antibiotic prophylaxis to prevent device-related infections significantly reduces the incidence of serious infective complications after pacemaker implantation [22]. However, complex schemes of prophylaxis were proposed in these studies, and the efficacy of antibiotic prophylaxis was rarely evaluated after the first 12 months.

Infections of the pocket should benefit from 7 to 14 days of antibiotic therapy instituted immediately after taking the samples and cover the usual bacterial spectrum, taking into account local resistance [11].

The average duration of antibiotic therapy in infective endocarditis is 4 to 6 weeks. Any infection involving the device and/or the probe should be removed. Extraction can be done transcutaneously or intravenously. Resettlement is done on the side opposite the site of infection. There is no general recommendation regarding the optimal time for reimplantation [23]. Treatment recommendations are based on expert advice and are included in current guidelines [24].

Conclusion

Cardiac stimulation is increasing in sub-Saharan Africa. Pacemaker implantation procedures are associated with an infection risk. Due to the diversity of the clinical picture, the diagnosis is still difficult. The treatment of these infections consists of adequate antibiotic therapy combined with extraction of the infected material. Improving the intake of these infections requires primary prevention with better application of aseptic methods. These results show an improvement in the implantation technique and a better application of aseptic methods. Difficulty diagnosing these infections with bacteriological samples which are not always contributory.

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