

Epidemiology of Sudden Cardiac Death: Necropsic Studies at Aristide Le Dantec Hospital

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ABSTRACT

Introduction: Sudden cardiac death (SCD) remains a major public health issue. In Senegal, there is a lack of data on this phenomenon; this underlies the relevance of this study whose objective is to study the epidemiological profile of victims experiencing unrecovered sudden cardiac arrest at Aristide LE DANTEC Hospital.

Patients and Methods: This is a transverse study with retrospective data collection from January 1, 2016 to January 31, 2017. Included, in the study were all victims of sudden cardiac death in Dakar who had a necropsy in the morgues of Aristide Le Dantec Hospital.

Results: We recorded 69 cases of sudden death of cardiovascular origin from 169 forensic autopsy reports, or 40.8% of autopsies. The average age was 44 years with a male predominance in 76.81%. The large majority of death occurred at home (26%), without witnesses (48%) and at rest (36%). Two cases of sudden death, or 3%, occurred at exertion. These deaths were recorded in 16% of cases in the middle of the day. The highest death rate was recorded during the month of December (15.9%). Malaise was the predominant symptom (13%) followed by emotional stress (6%). The existence of a history could only be clarified in 4% of cases. The electrocardiogram was only performed in 1 case. At necropsy, ischemic heart disease was the leading disease (46%), 26% of which was due to myocardial infarction, followed by hypertrophic cardiomyopathy (16%) and mixed cardiomyopathy (13%). Tamponade, dilated cardiomyopathy and aortic dissection were found in 9%, 6% and 4% of cases, respectively.

Conclusion: Sudden cardiac death is a major public health problem. In the Senegalese population, victims of unrecovered SCD are relatively young with a predominance of men. Coronary artery disease is the most frequently implicated pathology. Faced with this observation, a national program for the integrated control of cardiovascular risk factors is necessary.

Keywords

Sudden cardiac death, Epidemiology, Necropsy, Ischemic heart disease, Dakar.

Introduction

Sudden cardiac death (SCD) is defined as a natural death occurring

within one hour of the onset of symptoms in a subject with or without pre-existing heart disease [14]. The timing and manner of occurrence is unexpected. Epidemiologically, sudden cardiac death has become a frequent phenomenon around the world although the rates vary from country to country depending on the methodology used as well as the temporal definition. It is estimated between

40,000 and 60,000 deaths per year in France [17]. In Africa, the data are imprecise. In a recent study, Bonny A et al. is estimated it at 9.4% in subjects over 18 years of age [5]. The lack of data in Senegal justifies the relevance of our work whose objective is to study the epidemiological profile of sudden cardiac deaths received at the Aristide Le Dantec hospital.

Materials and Method

This is a (cross-sectional), descriptive study with retrospective collection of data over a period of thirteen (13) months (from 1st January 2016 to 31st January 2017) at the Department of Anatomy and Pathological Cytology at Hospital Aristide Le Dantec in Dakar. We included all victims of sudden death of cardiovascular origin that occurred in Dakar during the study period and who had a necropsy.

Not included were cases of sudden death with putrefaction (a corpse in advanced decay) or unusable or lost records.

A pre-established sheet made it possible to collect data from these victims ou (the data were collected using a counting sheet from the hospitalization register). Socio-demographic, clinical, temporal and autopsy data were collected.

The studied parameters were:

- Socio-demographic data: age, sex.
 - Clinical data: family history of heart disease or sudden death, personal medical history, symptoms preceding death.
 - Temporal data: time of death in the day and period in the year.
 - Place and circumstances of death: place of death, circumstances of occurrence (rest, effort, sleep and emotional stress), presence or absence of witnesses.
 - The performance or not of resuscitation maneuvers (Whether or not resuscitation maneuvers were performed) if death occurs in the presence of a witness.
 - Anatomopathological data: description of anatomical lesions.
- Statistics: All these data were collected from patient records and entered on an Excel spreadsheet and analyzed using the same software.

Results

We collected 69 cases of sudden cardiovascular death out of a total of 169 forensic autopsies, representing a frequency of 41.81% and an incidence of 5.3 deaths per month.

The study population included 53 men and 16 women, for a sex ratio of 3.3. The average age was 44 years with extremes ranging from 0 to 80 years? The most common age group was between 45-54 years old. Personal history (Medical history) was specified in 4% of cases. Malaise represented the dominant symptom with 13% of cases found.

The majority of deaths occurred either at home (26%) and without witnesses (48%), or in a public highway (17%). Most of the deaths occurred without witnesses (48%). In cases with witness presence

(30%), resuscitation attempts were made in 5% of cases. Death occurred in 36.23% at rest and 6% during emotional stress. The highest death rate was recorded during the month of December (15.9%).

On pathological examination, the causes of SCD were dominated by ischemic heart disease at 46% including 26% of myocardial infarction, followed by hypertrophic cardiomyopathy at 16% and mixed cardiomyopathy (combining hypertensive and ischemic heart disease) at 13%. Tamponade, dilated cardiomyopathy, aortic dissection were found in 9%, 6% and 4% of cases, respectively. Other pathologies consisted of endocarditis, pulmonary embolism, aneurysm of the aortic arch and transposition of the great vessels.

Discussion

According to the data emerging from our study, the profile of victim is a male young adult.

We noted a clear male predominance (77.3%). These results are in line with all most previous studies. Byerne R et al. estimate it at 75.5% in the West of Ireland [7]. (This could be explained by the fact that in men the incidence of coronary artery disease is highest and earliest. In addition, estrogens would play a protective role) [6]. In our study, the average age is 44 years. The age group most representative is 45-55 years old. In industrialized countries, the average age is higher [19]. Thus it is 69.5 years in the Netherlands [4]. In our study, the lower mean age is consistent with several studies which assert that black subjects appear to experience SCD at a much younger age compared to white subjects [11].

In most cases, deaths occurred at home (26%). This majority death occur in home is similar to studies in France [18], the United States [9], the Netherlands [4] and Ireland [7]. There is no witness in 48% of cases. These results are similar to those observed in studies done in the United States [2] and the Netherlands [12]. SCD, which occurred at rest in 36.26% of our population, was the most frequent circumstance of death. It was noted in 13% during the period of activity. These data corroborate those of different studies [13]. This underlines the unpredictable feature of sudden death [20].

In our study, sudden cardiac death mainly occurred in the afternoon. This result is not in line with the data of most authors [3,10,15], which report a morning peak mortality. However other authors reported the existence of a second late afternoon peak in mortality [16].

In terms of etiology, ischemic heart disease is the most common cause (46%) with 26% of myocardial infarction. This prevalence of coronary artery disease is similar to studies done in the industrialized countries [8]. Thus, in Italy, Anfredini R et al. [1] found a predominance of coronary artery disease of 80%, including 56% of myocardial infarction over a period of 11 years. These results emphasize the importance of primary prevention by correcting cardiovascular risk factors.

Limitations of the study

The following were noted

- The frequent absence of data concerning in particular the exact address as well as the medical history of the patients
- The failure to perform histological examinations
- Sometimes the lack of data on the measurement of the ventricular wall
- Sometimes the absence of dissecting the coronary arteries

Conclusion

Sudden cardiovascular death is a major public health problem. In the Senegalese population, victims of unrecovered SCD are relatively young and predominantly male. Coronary artery disease is the most frequently implicated pathology. In almost all cases, the resuscitation maneuvers were not performed. In view of these observations, an integrated national program control of cardiovascular risk factors is necessary. All effort must certainly be focused on prevention with the research and correction of risk factors, but above all on education and awareness of the population in resuscitation maneuvers.

References

1. Anfredini R, Portaluppi F, Grandi E, et al. Out-of hospital sudden death referring to an emergency department. *J Clin Epidemiol.* 1996; 49:865-868.
2. Becker LB, Han BH, Meyer PM, et al. Racial differences in the incidence of cardiac arrest and subsequent survival. The CPR Chicago Project. *N Engl J Med.* 1993; 329: 600-606.
3. Behrens S, Lampe F, Wegscheider K, et al. Annual distribution of ventricular tachycardias and ventricular fibrillation. *Am Heart J.* 2003; 146: 1061-1065.
4. Bleumink GS, Dieleman JP, Strauss SM, et al. The incidence of sudden cardiac death in the general population. *J Clin Epidemiol.* 2004; 57: 98-102.
5. Bonny A, Tibazarwa K, Mbouh S, et al. Epidemiology of sudden cardiac death in Cameroon: the first population-based cohort survey in sub-Saharan Africa. *Int J Epidemiol.* 2017; 46: 1230-1238.
6. Burke AP, Farb A, Malcom GT, et al. Effect of risk factors on the mechanism of acute thrombosis and sudden coronary death in women. *Circulation.* 1998; 97: 2110-2116.
7. Byrne R, Constant O, Smyth Y, et al. Multiple source surveillance incidence and aetiology of out-of-hospital sudden cardiac death in a rural population in the west of Ireland. *Eur Heart J.* 2008; 29: 1418-1423.
8. Castellanos A, Huikuri HV, Myerburg RJ. Sudden death due to cardiac arrhythmias. *N Engl J Med.* 2001; 345: 1473-1482.
9. Chugh SS, Jui J, Gunson K, et al. Current burden of sudden cardiac death: multiple source surveillance versus retrospective death certificate-based review in a large U.S Community. *J Am Coll Cardiol.* 2004; 44: 1268-1275.
10. Cobb LA, Fahrenbruch CE, Hallstrom AP, et al. Circadian variations in the occurrence of cardiac arrests: initial and repeat Episodes. *Circulation.* 1998; 98: 31-39.
11. Croft JB, Giles WH, Mensah GA, et al. Sudden cardiac death in the United States, 1989 to 1998. *Circulation.* 2001; 104: 2158-2163.
12. De Vreede-Swagemakers JJ, Dubois-Arbouw WI, Gorgels AP, et al. Out-of-hospital cardiac arrest in the 1990's: a population-based study in the Maastricht area on incidence, characteristics and survival. *J Am Coll Cardiol.* 1997; 30: 1500-1505.
13. De Vreede-Swagemakers J, Gijbbers C, Gorgels AP, et al. Out-of-hospital cardiac arrest –the relevance of heart failure. The Maastricht Circulatory Arrest Registry. *Eur Heart J.* 2003; 24: 1204-1209.
14. Engelstein ED, Zipes DP. Sudden cardiac death. In: Alexander RW, Schlant RC, Fuster V. *The Heart, Arteries and Veins.* New York: McGraw-Hill. 1998: 1081-1112.
15. Giorgi H, Orsel L. Techniques générales des nécropsies. *Ann Pathol.* 1999; 19: 659-735.
16. Goldberg RJ, Maclure M, Muller JE, et al. Increased onset of sudden cardiac death in the first three hours after awakening. *Am J Cardiol.* 1992; 70: 65-68.
17. Milliez P, Messali A, A. Maltret A, et al. Recommandations pour la prévention de la mort subite cardiaque Guidelines for the prevention of sudden cardiac death. *La Lettre du Cardiologue.* 2007; 403: 19-23.
18. Milliez P. La mort subite. *Cardio.* 2005; 1: 169-180.
19. Pierce LC, Courtney DM. Clinical Characteristics of Aortic Aneurysm and Dissection as a Cause of Sudden Death in Outpatients. *Am J Emerg Med.* 2008; 26: 1042-1046.
20. Wellens HJ, Zipes DP. Sudden cardiac death. *Circulation.* 1998; 98: 2334-2351.
21. Zipes DP. ACC/AHA/ESC 2006 guidelines for management of patients with ventricular arrhythmias and the prevention of sudden cardiac death: a report of the American College of Cardiology/American Heart Association task force and the European Society of Cardiology committee for practice guidelines (writing committee to develop guidelines for management of patients with ventricular arrhythmias and the prevention of sudden cardiac death): developed in collaboration with the European Heart Rhythm association and the Heart Rhythm Society. *Circulation.* 2006; 114: 385-484.