Original Article

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A REAPPRAISAL OF INFECTION CONTROL IN THE CARDIAC CATHETERIZATION LAB; IMPACT ON CARDIAC DEVICE INFECTIONS

Sabeen Khurshid Zaidi, Azmat Hayat*, Syed Muhammad Imran Majeed*

Combined Military Hospital Rawalpindi Pakistan, *Armed Forces Institute of Cardiology / National Institute of Heart Diseases Rawalpindi Pakistan

ABSTRACT

Objective: To determine the impact of Society for Cardiac Angiography and Interventions (SCAI) infection control guidelines on cardiac device infection rates

Study Design: Quasi experimental

Place and duration of study: This study was conducted at AFIC / NIHD from June 2011 to December 2011.

Methodology: Data for cardiac device infection rates was collected pre- and post-intervention. Historical controls were taken from Jan 2011 to May 2011. Infection control measures in the cardiac catheterization lab where these devices are implanted were implemented as per Society for Cardiac Angiography and Interventions (SCAI) infection control guidelines for the cardiac catheterization laboratory as the intervention.

Results: From Jan 2011 to May 2011 out of total one hundred and thirty-five (n= 135) patients who underwent cardiac device implantation; nine (n=9) patients developed culture proven pocket infections with an overall infection rate of 12.1%. Post intervention; from June 2011 to December 2011, there were a total of one hundred and forty-six (n=146) cardiac device implants. During this period there was only one (n=1) pacemaker pocket infection with an overall infection rate of 1.46%. The decline in cardiac device infection rate was statistically significant (*p*=008.)

Conclusion: After implementation of targeted infection control guidelines in the cardiac catheterization lab there was a significant decline in cardiac device infection rates.

Keywords: Cardiac, Device, Infection control, Intervention.

INTRODUCTION

Infections of cardiovascular implantable devices may necessitate removal of the device and require prolonged antibiotic therapy because they carry a risk of development of lead endocarditis[1]. These infections may require extraction procedures which can be fatal and re –implantation may be required[2]. Infection rates for cardiac devices have been reported as varying from between 2 and 25%[3].

METHODOLOGY

This single center study was conducted at the Armed Forces Institute of Cardiology and National Institute of Heart Diseases (AFIC & NIHD), a high throughput center with more than hundred cardiac device insertions annually. The study protocol received institutional Review Board approval. Adult patients greater than 18 years of age were included. The study strategy included determination of the Cardiac device infection rate at AFIC NIHD, a tertiary cardiac center pre and post intervention. Historical controls were taken from Jan 2011 to May 2011, by retrieval of records from the Electrophysiology and Pathology departments at AFIC / NIHD. All cardiac device placements comprising: Permanent Pacemaker (PPM), Implantable Cardioverter Defibrillator (ICD) and Cardiac Resynchronization Therapy (CRT) device placements and pocket infections of these devices were determined. The intervention was introduced in June 2011 inclusive of implementing infection control measures in the cardiac catheterization lab where these devices were implanted, as per Society for Cardiac Angiography and Interventions (SCAI) infection control guidelines for the cardiac catheterization laboratory[4] with special emphasis on patient preparation and hygiene, timely and adequate dose of prophylactic

Correspondence: Dr Sabeen Khurshid Zaidi, Pathologist CMH Pano Aqil, Pakistan (*sabeenkhurshid@gmail.com)*

antibiotic, aseptic technique including use of chlorhexidine-alcohol prep, stringent training standards for Cath lab staff on non-touch aseptic technique and dedicated clean room for the implants with routine surface disinfection using a high level disinfectant.

Post intervention data was collected to determine the Cardiac device infection rate from June 2011 to December 2011. The data was entered in SPSS version 18 and Chi square test was used to determine significant difference in cardiac device infection rates during the two periods with a *p* value of <0.05 as significant.

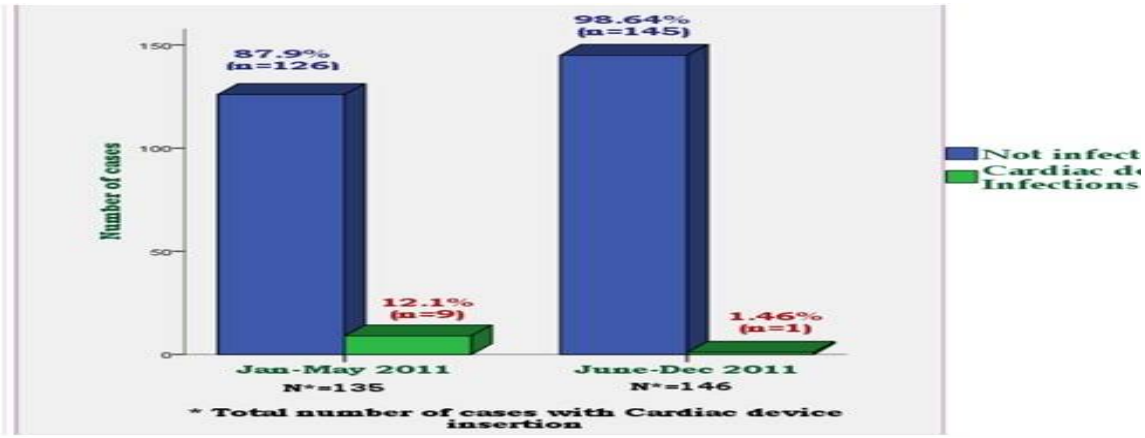

Figure-1: Frequency (N) of cardiac device infections pre- and post- intervention.

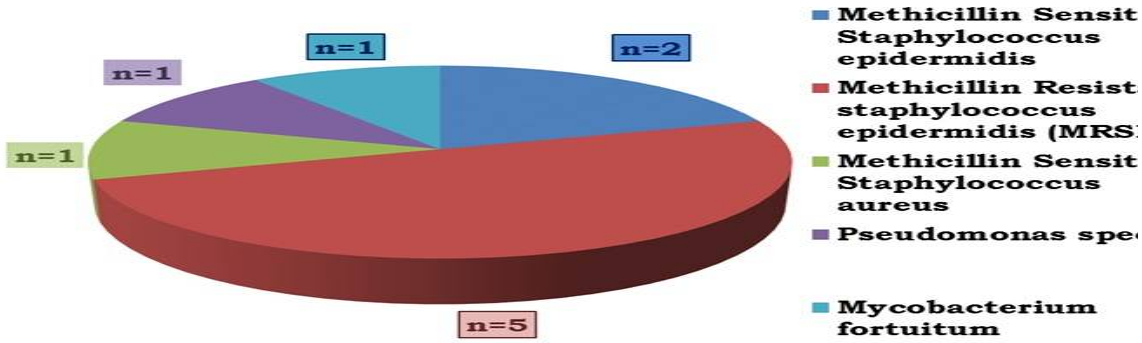

Figure-2: Microbiology of cardiac device infections (N=10).

RESULTS

Prior to the imlementation of the SCAI Infection control Guidelines; from Jan 2011 to May 2011, a total of one hundred and thirty five (n= 135) patients underwent cardiac device implantation, including one hundred and twenty one (n=121) PPM placements and thirteen (n=13) ICD implants and one (n=1) CRT Device implant. Seven (n=7) patients with PPMs and one (n=1) with ICD implant and one (n=1) with CRT device implant developed culture proven pocket infections with an overall infection rate of 12.1% (fig-1). From June 2011 to December 2011 there were a total of one hundred and forty six (n=146) cardiac device implants with fourteen (n= 14) ICD placements and one hundred and thirty two (n= 132) PPM implants. During this period there was only one (n=1) pacemaker pocket infection with an overall infection rate of 1.46%(fig-1). The decline in cardiac device infection rate was statistically significant (*p*=008) after revision and implementation of targeted infection control guidelines in the cardiac catheterization lab. None of the patients with pocket infections developed infective endocarditis. The most frequent microbe isolated was Methicillin Resistant Staphylococcus Epidermidis (fig-2).

DISCUSSION

Cardiac device infections are a cause of increased morbidity and mortality, often leading to device removal[5]. The implantation of cardiac devices usually lies within the domain of the cardiac catheterization laboratory. Infection control measures involve the patient, the cardiac catheterization laboratory personnel and the cardiac catheterization lab environment. Adherence to stringent sterile technique decreases the patient infection rate. Hand hygiene is a pivotal procedure for preventing infections. Donning of personal protective equipment is necessary for maintenance of a sterile field. The cardiac catheterization laboratory environment requires appropriate cleaning, limited traffic, and appropriate ventilation[4].

Preventive efforts should focus on strategies to minimize the chances of contamination of the generator, leads, and pocket during implantation[6]. Use of chlorhexidine for surgical-site antisepsis has been shown to reduce the risk of surgical site infection[7]. Moreover, all patients should receive antibiotic prophylaxis before implantation of a cardiac device. Most institutions use a first-generation cephalosporin, such as cefazolin for this purpose[8]. Cefazolin was the prophylactic antibiotic used post intervention in our study as per SCAI guidelines.

Infection prevention is the major intervention necessary to decrease cardiac device infection rates also reported by Rehman et al.

A major limitation of our study was that the patients were not followed up for longer periods because some infections develop several years after device implantation but they are attributed to endogenous hematogenous spread[2].

It is indeed challenging to implement stringent infection control measures in a busy cardiac catheterization suite at par with those measures implemented in operatin rooms (ORs). Remmelts et al reported no difference in the infection incidence of ICD implants in the OR and implants in the cardiac catheterization lab[10]. During the entire study all cardiac device implants were carried out in the cardiac catheterization lab.

CONCLUSION

The morbidity associated with Cardiac device infections is extremely high, and there is risk of mortality with extraction procedures. After implementation of targeted infection control guidelines in the cardiac catheterization lab there is a significant decline in cardiac device infection rates.

CONFLICT OF INTEREST

This study has no conflict of interest to declare by any author.

AUTHORS CONTRIBUTION

Sabeen Khurshid Zaidi, conception, design analysis, manuscript writing, Azmat Hayat, design and interpretation, Syed Muhammad Imran Majeed, conception.

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