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Faisal Wasim Ismai

M. Tariq

Aga Khan University, muhammed.tariq@aku.edu

Mahboob Alam

Raymond A Smego

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SPECTRUM OF NEUROLOGICAL INVOLVEMENT IN ADULT PATIENTS WITH BACTERIAL ENDOCARDITIS

Faisal Wasim Ismail, Mohammad Tariq, Mehboob Alam, Mohammad Ata Khan and Raymond Smego Jr

ABSTRACT

Objective: To describe the spectrum of neurological involvement, and document in-hospital mortality in adult patients with bacterial endocarditis.

Design: Descriptive, non-interventional.

Place and Duration of Study: Department of Gastroenterology, The Aga Khan University Hospital, Karachi from November 1999 to October 2002.

Patients and Methods: Patients were enrolled from the emergency and outpatient departments, using purposive, non-probability sampling, provided they fulfilled pre-defined inclusion and exclusion criteria. Case records of patients admitted to hospital with a diagnosis of bacterial endocarditis were prospectively analyzed. Data was entered and analyzed on SPSS 11. Frequency, Mean, Mode and Percentage were calculated.

Results: Neurological complications were observed in 14 out of 40 patients (35%). The most frequent complication was embolic infarction (33%), followed by intra-cranial hemorrhage (22%). Seizures, encephalopathy, abscess and meningitis were all observed in decreasing order of frequency. Out of a total of 14 patients who suffered neurological complications, 06 died (42%).

Conclusion: The nervous system is frequently involved in patients with bacterial endocarditis. The nature of neurological involvement can vary from a fatal embolic infarction to infective complications, such as cerebral abscess or meningitis, to mild encephalopathy. The most frequently noted complication was embolic infarction. In-hospital mortality is significantly high in patients who suffer neurological complications.

KEY WORDS: *Bacterial endocarditis. Infection. Neurological complication. Mortality. Embolic infarction.*

INTRODUCTION

Bacterial endocarditis (BE) is the proliferation of microorganisms on the endothelium of the heart. A similar process, involving arteriovenous shunts, arterioarterial shunts, or coarctation of the aorta is called bacterial endarteritis, but the patho-physiological process is the same.¹ Bacterial endocarditis can be divided into acute or sub-acute, or native or prosthetic valve endocarditis. In developed countries, the incidence of native valve endocarditis ranges from 1.5 to 6.2 cases per 100,000 populations per year.² The incidence in the United States is 2-4 cases per 100,000.² In Pakistan, the incidence is reported to be 0.43% in a single hospital based study.³

Endocarditis affects not only the heart, but also produces a wide variety of systemic signs and symptoms through several mechanisms, including both sterile and infected emboli, and a variety of immunological phenomena.⁴ Most patients with infective endocarditis have a heart murmur (most commonly pre-existing), and patients may have petechiae on the skin, conjunctivae, or oral mucosa, as well as splenomegaly and other peripheral manifestations. Sterile and infected emboli, and a variety of immunological phenomena underlie the peripheral manifestations. Among these are glomerulonephritis, Osler nodes, Roth spots, subungual (splinter)

hemorrhages, and possibly, various musculoskeletal abnormalities. Janeway lesions usually arise from infected microemboli.⁵

The nervous system is a common site of involvement in BE, which can have profound and devastating neurological consequences. In 10-15% of patients with BE, the nervous system yields the first clinical signs.² The incidence of central nervous system (CNS) complications in BE is approximately 30%, but ranges, according to various studies, from 15-55%. The nervous system can be involved in a wide variety of ways in BE, ranging from mild encephalopathy to a fatal cerebral hemorrhage or embolic infarction.⁶ In-hospital mortality is globally very high in these patients, but data regarding the spectrum of neurological involvement, and associated mortality is lacking from developing countries. Therefore, the objective of this study was to describe the spectrum of neurological involvement, and document in-hospital mortality in adult patients with bacterial endocarditis.

PATIENTS AND METHODS

The study was a non-interventional, descriptive study conducted for a period of three years, starting November 1999 to November 2002. Patients were enrolled from the emergency and outpatient departments, using purposive, non-probability sampling.

Data was collected with the help of a proforma, which was concise and relevant to the objectives of the study. Main

Department of Medicine, The Aga Khan University Hospital, Karachi, Pakistan.

Correspondence: Dr. Faisal Wasim Ismail, Department of Medicine, The Aga Khan University Hospital, Karachi, Pakistan. E-mail: faisal.ismail@aku.edu

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from seizures to be between 10-30 %. Le Cam reports 24 %¹⁰, and Kanter⁹ reports 19% in their studies on the frequency of seizures in adults suffering from bacterial endocarditis. Results from other studies also support this finding.^{12,13}

Cerebral abscesses (Figure 3), occurring as a complication of endocarditis, has been reported in literature. Similar observations were made by Lerner¹², Kanter⁹ and Jones¹⁴ who reported frequencies of 10.5%, 15%, and 16.4% respectively. Le Cam¹⁰ reported a frequency of 4 out of 48 patients, with a percentage of 8.3%. However, a study by Patel reported a high frequency of 31% of abscesses.¹⁵ This may be because this was a study based on autopsy material, where small micro abscess are picked up in higher numbers compared to other studies where imaging is the modality for identifying abscesses in the living.

Encephalopathy was observed in 11.2 %. Encephalopathy is said to be present in 5-15% of patients with endocarditis, which can be attributable purely to non-metabolic causes.² In this study, only those patients suffered from encephalopathy in whom other causes for an encephalopathic state, such as renal, hepatic or septic abnormalities were not present. In this way, the results of this study reflect similar observations as in various published data. Kanter reported encephalopathy in 22% of patients with endocarditis, but after excluding other contributing factors, reported a percentage of 14%⁹, which was attributable to endocarditis. Francioli reported encephalopathy in 10 % of patients in his study.¹⁶

Meningitis occurred in 5.5 % of patients. Kanter observed a frequency of 5 %⁹, although Le Cam reported a frequency of 6 cases of meningitis in 48 patients (12.5 %)¹⁰, and Patel reported meningitis to occur in 14% of patients.¹⁵ Other data have reported the frequency of meningitis between 5-15%.^{14,16,17}

The present results of an in-hospital mortality rate of 42.86 % are consistent with global literature that document similar figures. Multiple studies have shown that neurological complications are associated with increased mortality in patients with endocarditis. However, Millaire reported no increase in mortality rates in patients with neurological complications.¹⁷

Most studies have, however, reported an increased mortality in patients with neurological complications in endocarditis.^{18,19} Chen reported a 50% mortality rate⁷, while Santoshkumar reported a mortality of 41.4 %.¹¹ Le Cam observed a very high mortality rate of 83% in patients with neurological complications.¹⁰ The majority of studies, though, have observed mortality rates between 40-55 %.²⁰⁻²⁴ In contrast, in the 36 patients without neurological involvement, only 4 patients died (11%), which clearly demonstrates that neurological involvement is related to increased mortality.

CONCLUSION

The nervous system is frequently involved in patients with bacterial endocarditis. The nature of neurological involvement can vary from a fatal embolic infarction to infective complications, such as cerebral abscess or meningitis, to mild encephalopathy. The most frequently noted complication is embolic infarction. In-hospital mortality is significantly high in patients who suffer neurological complications. The focus must be on better preventive, diagnostic and therapeutic

measures to prevent the development of neurological complications.

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