

Infective endocarditis : a study of 61 definite, autopsied cases of staphylococcus aureus VS Non-staph endocarditis at Chulalongkorn Hospital, 1968 - 1989.

Pongsepeera Suwangool*
Panpit Suwangool**

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By using the strict case definition, 61 definite cases of infective endocarditis (IE) at Chulalongkorn Hospital were studied from 1968-1989. Staphylococcus aureus was the causative organism in 19 patients (31%). Of non staphylococcal endocarditis streptococci were the most common pathogen (39%), 3 patients had fungal endocarditis which developed after prosthetic valve replacement. Pathogens were not identified in 14.7%. Enterococcal endocarditis occurred in a somewhat older group of patients over all. Sixty-eight percent of staphylococcal IE had no underlying heart disease while 79 percent of non-staphylococcal IE had valvular diseases. Heart murmur was detected in 52% of staphylococcal IE. There was a predilection for the infection to affect the left sided valves in staphylococcal endocarditis (63%). Splenic enlargement and embolic phenomenon were common in both groups. Infarction of spleen, kidney and brain were more common in nonstaphylococcal than staphylococcal endocarditis.

Reprint request : Suwangool P, Department of Pathology, Faculty of Medicine, Chulalongkorn University, Bangkok 10300, Thailand.

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* Department of Pathology, Faculty of Medicine, Chulalongkorn University.

** Department of Internal Medicine, Faculty of Medicine, Chulalongkorn University.

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โดยการใช้เกณฑ์การวินิจฉัยที่แน่นอนการศึกษาผู้ป่วยโรคลิ้นหัวใจอักเสบติดเชื้อ 61 ราย ในช่วงเวลา 21 ปี ระหว่าง พ.ศ. 2511-2532 พบเชื้อสแตปฟีโลคอคคัส เป็นเชื้อก่อเหตุถึงร้อยละ 31 เชื้อสเตรปโตคอคคัส ร้อยละ 39 เชื้อรา ร้อยละ 4.9 ซึ่งทุกรายเกิดหลังจากการผ่าตัดเปลี่ยนไส้ลิ้นหัวใจ ร้อยละ 14.7 ตรวจไม่พบเชื้อทั้งก่อนและหลังผู้ป่วยเสียชีวิต ลิ้นหัวใจอักเสบจากเชื้อเอ็นเทอโรคอคคัส ส่วนมากพบในอายุค่อนข้างสูง ผู้ป่วยลิ้นหัวใจติดเชื้อสแตปฟีโลคอคคัสส่วนใหญ่ไม่มีโรคหัวใจอยู่เดิมสูงถึงร้อยละ 68 ในขณะที่ผู้ป่วยลิ้นหัวใจติดเชื้อสแตปฟีโลคอคคัส เป็นที่ลิ้นหัวใจข้างซ้ายสูงถึงร้อยละ 63 และได้ยินเสียงเมอร์เมอร์ (murmur) ถึงร้อยละ 52 ม้ามโตและปรากฏการณ์เอ็มโบลิก พบได้บ่อยทั้งสองกลุ่ม Infarction ของม้าม, ไต และสมอง ในผู้ป่วยลิ้นหัวใจอักเสบจากเชื้อสแตปฟีโลคอคคัส พบน้อยกว่าจากเชื้ออื่น

The incidence of infective endocarditis is difficult to determine and varies from hospital to hospital since the criteria for diagnosis or the methods of reporting vary with different series. An analysis based on strict case definition, presence of direct evidence of infective endocarditis based on histology from surgery or autopsy, or on bacteriology (Gram stain or culture) of valvular vegetation or peripheral embolus, often reveals that only a small proportion of clinically diagnosed cases are categorized as definite infective endocarditis.^(1,2) In an autopsy study there were on change in the yearly number of cases of infective endocarditis.⁽³⁾ Despite the advances in medical and surgical treatment, infective endocarditis remains a prevalent disease with a significant morbidity and mortality in the antibiotic era.⁽⁴⁻⁶⁾ The classification of acute and subacute bacterial endocarditis is mainly of historic interest and the disease is now preferables classified by etiological agents responsible since it has implications for the prognosis, the likelihood of underlying (pre-existing) heart disease, host factor, and the appropriate duration of antimicrobial therapy.^(7,9) The purpose of this study is to report, the clinical profile manifestations, valvular involvement and pathology of definite cases of infective endocarditis to provide a more accurate picture of the disease.

Materials and Methods

Infective endocarditis was considered to be present if patients met strict case definition described by von Reyn⁽¹⁾ as follows: histology from autopsy or surgery or on bacteriology (Gram stain or culture) of valvular vegetation or peripheral embolus. Data obtained for each case included the patient's age, sex, the presence, absence, or development of a new or changing murmur, the presence of fever (37.5°C or greater), as were the duration of fever before admission. Embolic phenomena, skin lesions including Osler node, splinter hemorrhage or petechiae and retinal lesion. were also noted. The etiological microorganism, underlying diseases, presence

or absence of a prosthetic valve and histological proof of definite infective endocarditis were recorded. Autopsy cases of infective endocarditis in Chulalongkorn Hospital during 1968 to 1989 were reviewed clinically and pathologically.

Blood cultures were done using the standard method by inoculating 3-5 ml. of blood into trypticase soy broth. All blood cultures were held for 7 days. Organisms were identified using the standard bacteriological techniques.

Statistical analysis was done using Chi-Squares and Fisher exact test.

Results

Sixty-one patients met the inclusion criteria for the diagnosis of definite infective endocarditis. The organisms causing endocarditis, the clinical profiles and physical signs of these patients are presented in Table 1,2 and 3 respectively. Staphylococcus aureus was a common causative agent.(31%) (Figs 1-4) Of non-staphylococcal endocarditis, streptococci were the most common etiological organism; of these streptococci, enterococci were the most common agent. Three patients had fungal endocarditis which developed after prosthetic valve replacement.(Fig.5). In nine patients (12.7%), pathogens were not identified by all means. The age of the patients was highly variable, including patients in the first and tenth decades of life. Enterococcal endocarditis occurred in a somewhat older group of patients overall. Male to female ratio of S.aureus and non-staphylococcal endocarditis were 10:9 and 22:20 respectively. Fifty-two percent of patients (10 of 19) with S.aureus endocarditis presented with symptoms of less than one week's duration, whereas 66 percent of patients (26 of 39) with non-staph endocarditis presented with symptoms of more than three weeks duration. (Table 3) Twenty percent of patients (12 of 61) were discharged from the hospital alive at the first admission. Five of these patients died shortly after discharge, or were readmitted and died within 3 months of the previous admission.

Table 1. Organism causing definite Infective Endocarditis.

	Number	Percent
Staphylococcus aureus	19	31.1
Streptococcus viridans	4	6.5
Streptococcus gr G	2	3.2
Alpha - hemolytic streptococci	4	6.5
Non hemolytic streptococci	3	4.9

Table 1. (Cont'd)

	Number	Percent
Streptococcus gr D (non enterococcus)	3	4.9
Enterococci	8	13.1
Escherichia coli	2	3.2
Pseudomonas aeruginosa	2	3.2
Pseudomonas pseudomallei	1	1.6
Enterobacter sp	1	1.6
Fungus (Post op cardiac surgery)	3	4.9
Candida albicans	1	
Aspergillus	1	
Mucormycosis	1	
Unkown	9	14.7
Total	61	

Table 2. Clinical profiles of 61 Definite IE Patients

	Staph.IE	Non staph. IE	P-value
No. Patients	19	42	
Age (years)			
Mean	32.7	40.8	
Sex			
M : F	10:9	22:20	
Heart disease	No. (%)	No. (%)	
None	13 (68.4)	9 (21.4)	.001
Rheumatic	5 (26.3)	27(64.3)	.013
Congenital	1 (5.2)	5 (11.9)	NS
Syphilitic	0	1 (2.3)	-
Valve Prosthesis	0	3 (71.41)	-
Underlying Diseases			
Diabetes mellitus	1 (5.2)	2 (4.7)	NS
Cirrhosis	0	2 (4,7)	-
Alcoholic	1 (5.2)	4 (9.5)	NS
Intravenous Heroin users	8 (42.1)	0	-
CRF	1 (5.2)	0	-

CRF = chronic renal failure with hemodialysis

NS = No statistical significance ($p > 0.05$)

Table 3. Physical Signs of 61 definite IE patients.

Physical signs	Staph. I.E. (N=19) No (%)	Non staph. I.E. (N=42) No (%)	P-value
Fever (>37.5°C)	16 (84.2)	37 (88)	NS
Heart murmur	10*(52.6)	39 (92.8)	.009
New murmur	0	4 (9.5)	-
Splenomegaly	9 (47.3)	23 (54.7)	NS
Hepatomegaly	8 (42.1)	20 (47.6)	NS
Embolic phenomena	10 (52.6)	23 (54.7)	NS
Skin lesions (Osler nodes, splinter hemorrhage, petechiae)	7 (36.8)	12 (28.5)	NS
Retinal lesion	6 (31.5)	12 (28.5)	NS
Mycotic aneurysm	0	2 (4.7)	-

* 6 Cases with previous heart murmur

Table 4. Duration of fever before admission (N=58)

	Staph. I.E. No. (%)	Non Staph. I.E. (Fungus excluded) No. (%)	P-value
Fever (days)			
1-6	10 (52.6)	3 (7.7)	.0004
7-14	5 (26.3)	3 (7.7)	NS
15-21	4 (21)	7 (17.9)	NS
7-21	0	18 (46.1)	-
7-30	0	8 (20.5)	-
Total	19	39	

Table 5. Valves infected (N=61).

Valve	Staph. I.E. No. (%)	Non staph. I.E. No. (%)	P-value
AV	3 (15.7)	10 (23.8)	NS
MV	6 (31.5)	8 (20.5)	NS
TV	6 (31.5)	4 (9.5)	NS

Table 5 (Cont'd)

Valve	Staph. IE No. (%)	Non staph. IE No. (%)	P - value
PV	0	1 (2.3)	-
MV + AV	2 (10.5)	13 (30.9)	NS
MV + TV	1 (5.2)	0	-
Mural endocardium	0	2 (4.7)	-
VSD	1 (5.2)	2 (4.7)	NS
TV + PV	0	1 (2.3)	-
Endarteritis (Mycotic aneurysm)	0	1 (2.3)	-
Total	19	42	

AV - Aortic valve

MV - Mitral valve

TV - Tricuspid valve

PV - Pulmonic valve

VSD - Ventricular septal defect

Table 6. Pathology of 61 Definite IE Patients (N=61)

	Staph IE No. (%)	Non staph IE No. (%)	P-value
Myocarditis, Myocardial abscess	10 (52.6)	3 (7.1)	.0002
Recent myocardial infarction	4 (21.1)	0	-
Pericarditis	6 (31.6)	3 (7.1)	.03
Valve ring absces	2 (10.5)	0	-
Infarction of spleen, kidney or brain	7 (36.8)	18 (42.8)	NS



Figure 1. Staphylococcal infective endocarditis involving tricuspid valve. Note vegetation involve all leaflets of the right sided valve. (Arrows)

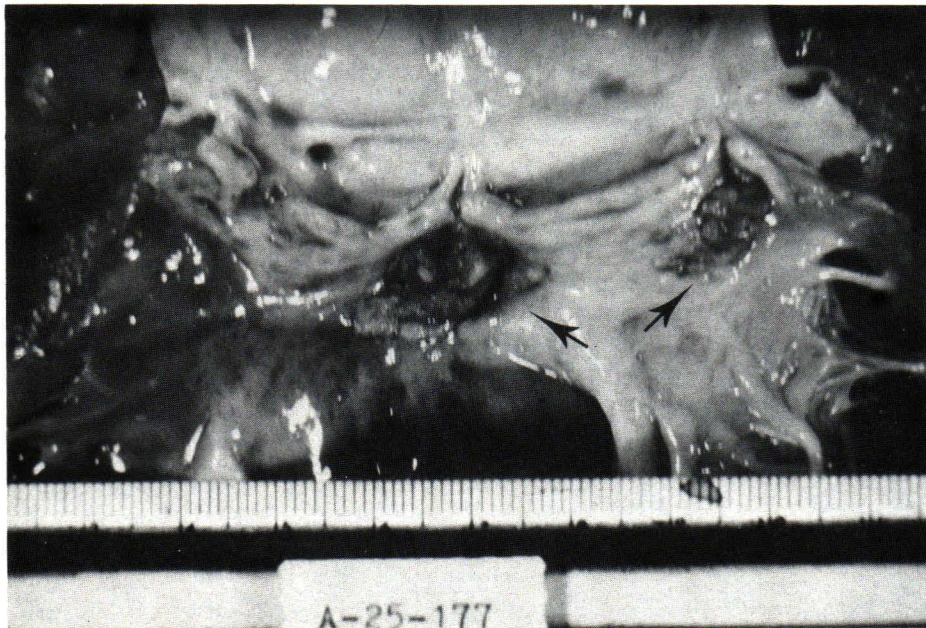


Figure 2. Staphylococcal infective endocarditis involving aortic valve. Note two large vegetations involving commissures. (Arrows)

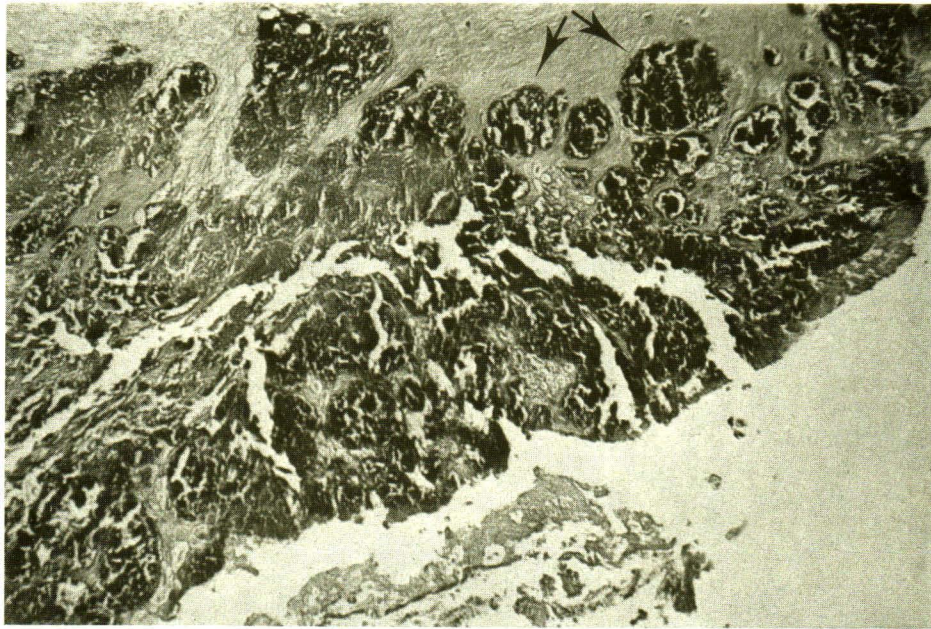


Figure 3. Section of vegetation showing clumps of bacteria invading tissue of valve. H & E \times 100 (Arrows)

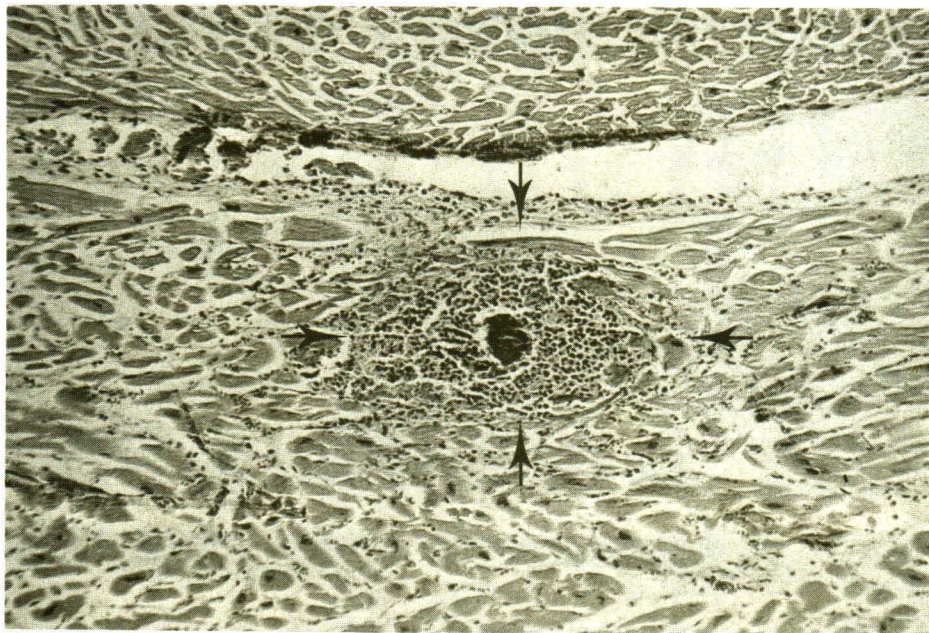


Figure 4. Showing acute myocarditis with small abscess. Note clump of bacteria located at the center. H & E \times 100 (Arrows)

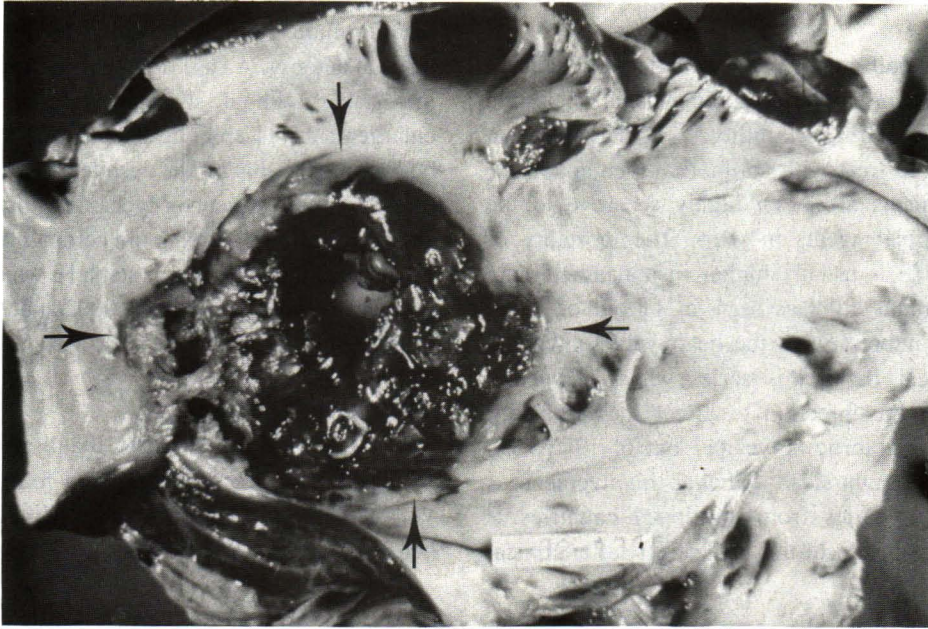


Figure 5. Showing a large vegetation involving a prosthetic valve. (Arrows) Note dilated left atrium in a patient who survived 17 years after valve replacement.



Figure 6. Nonstaphylococcal infective endocarditis showing large vegetations involving leaflets of mitral valve and mural endocardium of left atrium. (Arrows)

Discussion

The overall mortality of staphylococcus aureus endocarditis remains high, approximately 40% despite in vitro antimicrobial susceptibility.⁽¹⁰⁻¹²⁾ The infection is still difficult to treat with antibiotic even though the infecting organisms are often highly sensitive to the given antimicrobial agents in vitro. The mortality of staphylococcal IE is usually higher in nonaddicts than drug addict-patients^(13,14) as seen in 11 out of 19 in this series. Of interest were the heart valves involved in staphylococcal IE in this series which showed a predilection for the infection to affect the left-sided, that is, mitral and aortic valves, (11 out of 19 (63%)) in contrast with right-sided valvular involvement as reported in most series from developed countries.⁽⁷⁾ All cases of fungal endocarditis died shortly after clinical

manifestations of endocarditis and the diagnosis was made at autopsy. A case of fungal endocarditis is virtually impossible without surgical intervention.⁽¹⁵⁾ Splenic enlargement and embolic phenomena were common in both groups in this report despite a rather short duration of fever in most patients. Myocarditis, myocardial abscess and pericarditis occurred more commonly in staphylococcal endocarditis than in non-staph IE which is statistically significant with P-values of 0.0002 and 0.03, as reported in most series.⁽¹⁶⁻¹⁸⁾

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