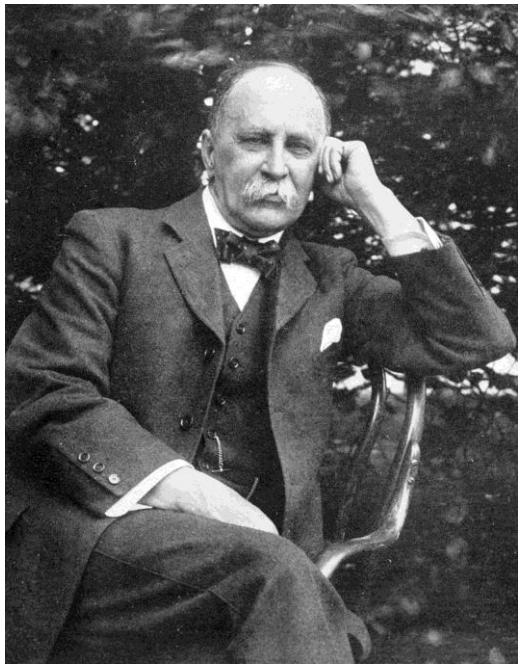
Dilemma of IE in Egypt
KAH experience

Marwa Sayed Meshaal
MD, Cardiology
Cairo University

- Endocarditis was first recognized almost 350 yr ago
- In Paris in 1806, Jean Corvisart first used the term *vegetations* to describe the abnormalities seen at heart autopsy in patients dying from fever and heart disease
- Then in 1885 ***Sir William Osler gave his famous lecture describing the syndrome of endocarditis*** emphasizing on presence of fever and occurrence of new murmur
- By this time, it was well recognized that it was an infectious disease caused mainly by bacteria



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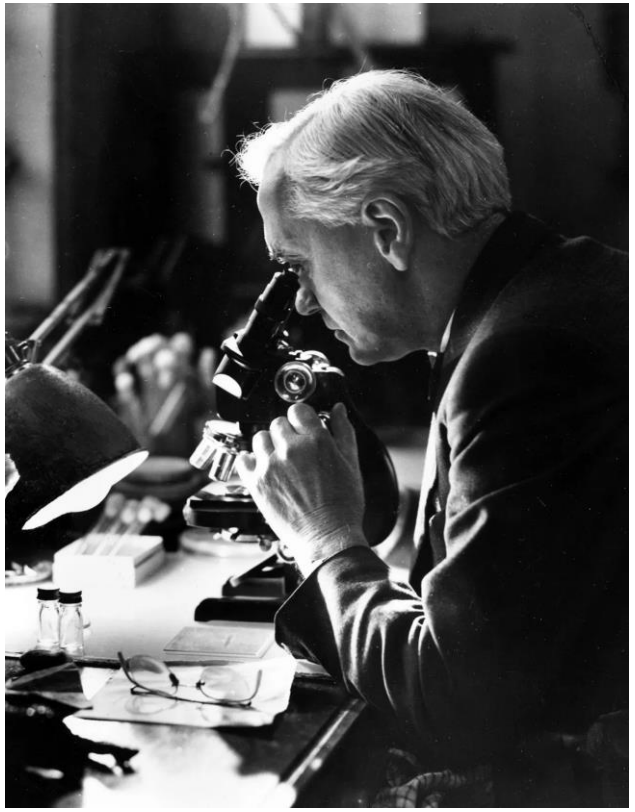
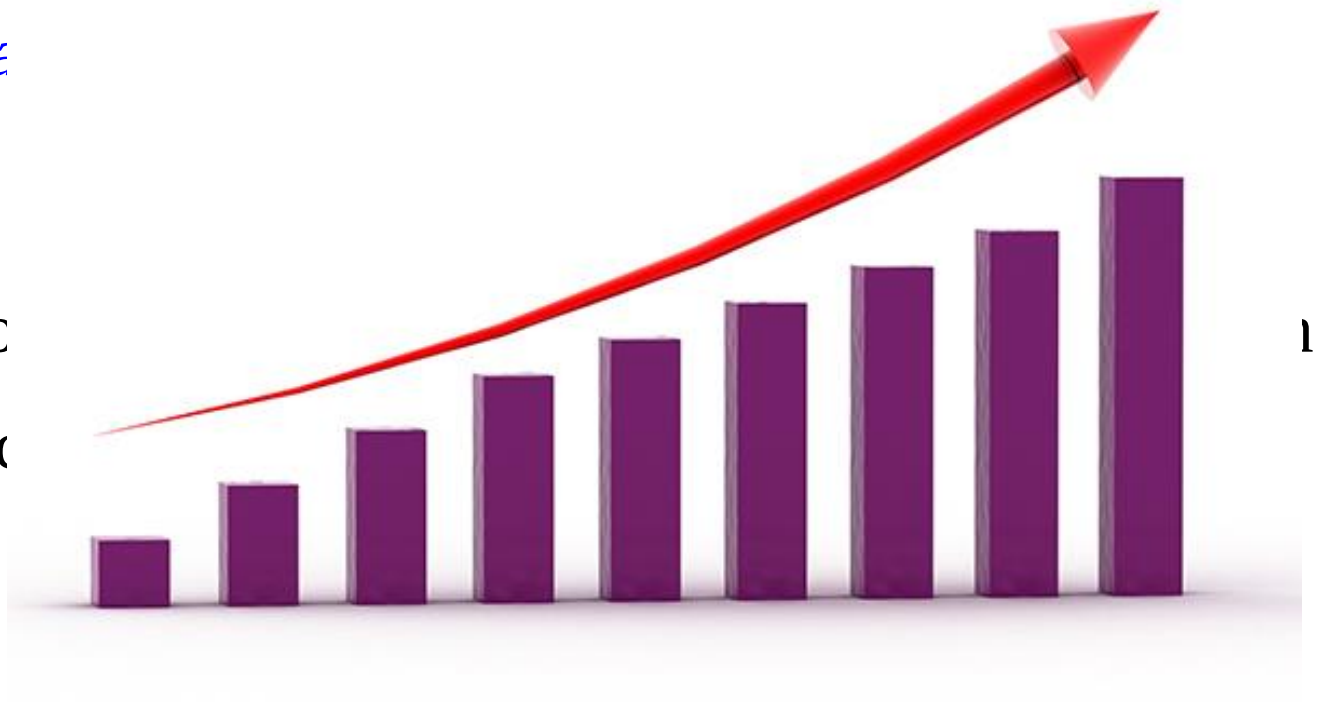
“When I woke up just after dawn on September 28, 1928, I certainly didn’t plan to revolutionize all medicine by discovering 3ut I suppose tha





- It was nc ı
  antibiotic
- Now we
- Yet, unfc

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- In Egypt, specially with the high incidence of RHD, we are facing a growing problem of IE
- Kasr Al-Ainy Hospital, Cardiovascular Medicine Department Experience started in 2000
- Simple observational data base registry that continued till 2005
- Enrolled around 104 patients

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- This was followed by the IE project
- Supported by the HEEPF fund in Feb. 2005, PI ***Prof. Dr. Hussein Rizk*** and continued for 2 years
- Continued as IE working group up till now
- Managed to join ICE by year 2007
- Managed to join EuroEndo Reg. in 2016
- 33 international publications

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Some statistics

- Total no in the registry 104
- Total no since the project started ≈ 650
- Total no enrolled in ICE 95
- Total no enrolled in EuroEndo Registry 88
- Mile stones;
  - 400 patients by end of 2016,
  - 500 end of 2019,
  - 35 patients in COVID time (April 2020- Dec. 2021)
- Mortality started with 47% declined to 18.6% (yr. 2016), with noticeable increase again last 3 yr

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From January – October 2023

- Total No. Admitted, 78 patients
- Left sided IE (53 cases)
- Right sided IE (25 cases)
- Survival; 61 survived (78.2 %), 17 died (21.7 %)
- Response to treatment;
    - Medical ttt 50 cases
    - Indicated for surgery 28 cases

The Growing Incidences

frontiers in Medicine

ORIGINAL RESEARCH
published: 09 March 2022
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The Global, Regional, and National Burden and Trends of Infective Endocarditis From 1990 to 2019: Results From the Global Burden of Disease Study 2019

Huilong Chen[1†], Yuan Zhan[2†], Kaimin Zhang[3], Yiping Gao[4], Liyuan Chen[5], Juan Zhan[6], Zirui Chen[7] and Zhilin Zeng[1*]*

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Introduction: Infective endocarditis (IE) presents with increasing incidence and mortality in some regions and countries, as well as serious socioeconomic burden. The current study aims to compare and interpret the IE burden and temporal trends globally and in different regions from 1990 to 2019.

Methods: Data on the incidence, deaths and disability-adjusted life years (DALYs) caused by IE were extracted and analyzed from the Global Burden of Disease Study 2019. Estimated annual percentage changes (EAPC) were adopted to quantify the change trends of age-standardized rates (ASRs). Besides, potential contributors of serious IE burden were also evaluated including age, gender, social-demographic index (SDI), and age-standardized incident rate (ASIR) in 1990.

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Specialty section:

- ***Globally, the number of IE cases and deaths has increased sharply***
- ***Both presented an upward temporal trend annually***
- ***However, the age-standardized DALYs demonstrated a negative temporal trend***
- ***Moreover, older patients and men were more severely affected***
- ***Different SDI regions had different disease burdens***

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ESC European Society of Cardiology

European Heart Journal - Quality of Care and Clinical Outcomes (2019) **00**, 1–4
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ORIGINAL ARTICLE

Cohort profile: the ESC-EORP EURO-ENDO (European Infective Endocarditis) registry

Gilbert Habib[1,2]*, Patrizio Lancellotti[3,4], Paola-Anna Erba[5,6], Anita Sadeghpour[7], Marwa Meshaal[8], Antonia Sambola[9], Shumaila Furnaz[10], Rodolfo Citro[11], Julien Ternacle[12], Erwan Donal[13], Bernard Cosyns[14], Bogdan Popescu[15], Bernard Iung[16], Bernard Prendergast[17], Cécile Laroche[18], Pilar Tornos[19,20], Michal Pazdernik[21], Aldo Maggioni[22], and Chris P. Gale[23]; on behalf of the EURO-ENDO Investigators[†]

[1]Cardiology Department, APHM, La Timone Hospital, Boulevard Jean Moulin, 13005 Marseille, France; [2]Aix Marseille Univ, IRD, APHM, MEPHI, IHU-Méditerranée Infection, Marseille, France; [3]Department of Cardiology, Heart Valve Clinic, University of Liège Hospital, GIGA Cardiovascular Sciences, CHU Sart Tilman, Avenue de l'hôpital, n1, 4000Liège, Belgium; [4]Gruppo Villa Maria Care and Research, Anthea Hospital, Bari, Italy; [5]Department of Nuclear Medicine, University of Pisa, Pisa, Italy; [6]University of Groningen, University Medical Center Groningen, Medical Imaging Center, Groningen, The Netherlands; [7]Rajaie Cardiovascular Medical and Research Center, Echocardiography Research Center, Iran University of Medical Sciences, Tehran, Iran; [8]Cairo University Hospitals (Kasr Al Ainy Hospitals), Cairo, Egypt; [9]Department of Cardiology University Hospital Vall d'Hebron, Barcelona, Spain; [10]National Institute of Cardiovascular Disease, Karachi, Pakistan; [11]University Hospital San Giovanni di Dio e Ruggi d'Aragona, Salerno, Italy; [12]Department of cardiology, SOS Endocardites, Henri Mondor Hospital, Creteil, France; [13]University of Rennes, CHU Rennes, Inserm, LTSI – UMR 1099, F-35000 Rennes, France; [14]Centrum voor Hart en Vaatziekten (CHVZ), Unversitair Ziekenhuis Brussel, Laarbeeklaan 101, 1090Brussel, Belgium; [15]Department of Cardiology, University of Medicine and Pharmacy "Carol Davila"—Euroecolab, Emergency Institute of Cardiovascular Diseases "Prof. Dr. C. C. Iliescu", Sos. Fundeni 258, Sector 2, 022328Bucharest, Romania; [16]Hopital Bichat, Paris, France; [17]Guy's and St Thomas', London, UK; [18]EURObservational Research programme (EORP), European Society of Cardiology, Sophia-Antipolis, France; [19]Department of Cardiology, Hospital Universitari Vall d'Hebron, Barcelona, Spain; [20]Universitat Autònoma de Barcelona, Barcelona, Spain; [21]Institute for Clinical and Experimental Medicine (IKEM), Prague, Czech Republic; [22]EURObservational Research Programme, European Society of Cardiology, France ANMCO Research Center, Florence, Italy; and [23]Leeds Institute of Cardiovascular and Metabolic Medicine, University of Leeds, Leeds, UK

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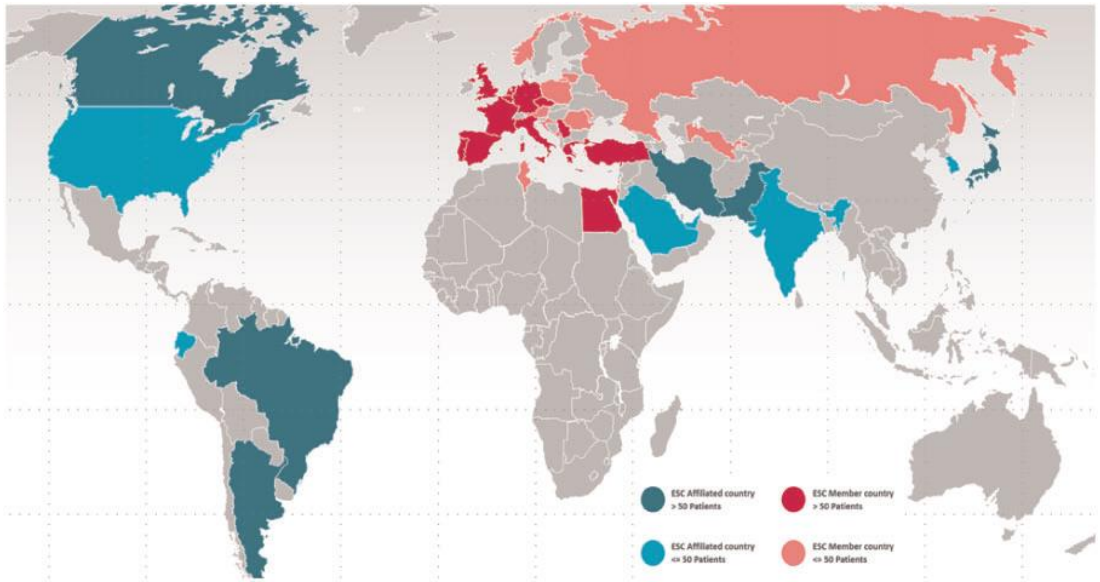

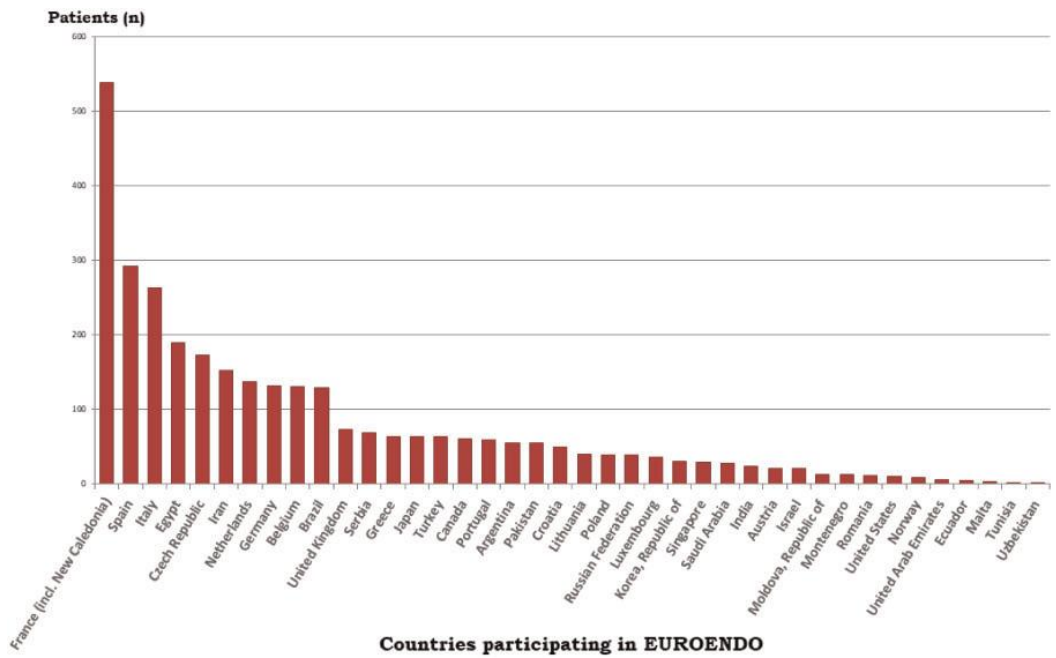

Endocarditis Team &Multisystem Involvement

Definition

- Infective endocarditis, is infective inflammation of the *endothelial lining (endocardium) of the heart*; valvular or mural
- Infection of the endothelial lining of the *great vessels*
- Infection of *intracardiac devices*
- Infection of *intracardiac end welling catheters*
- Infection of *A-V fistula*

Diagnosing IE

Definite:

Pathological

Clinical; 2 major, 1 major & 3 minor, 5 minor

Possible:

1 major criterion and 1 minor criterion; or

3 minor criteria

Rejected:

Firm alternative diagnosis explaining evidence of IE; or

Resolution of IE syndrome with antibiotic therapy for 4 days; or

No pathological evidence of IE at surgery or autopsy, with antibiotic therapy for 4 days; or

Does not meet criteria for possible IE

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European Heart Journal Advance Access published August 29, 2015

European Heart Journal
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ESC GUIDELINES

2015 ESC Guidelines for the management of infective endocarditis

The Task Force for the Management of Infective Endocarditis of the European Society of Cardiology (ESC)

Endorsed by: European Association for Cardio-Thoracic Surgery (EACTS), the European Association of Nuclear Medicine (EANM)

Authors/Task Force Members: Gilbert Habib* (Chairperson) (France), Patrizio Lancellotti* (co-Chairperson) (Belgium), Manuel J. Antunes (Portugal), Maria Grazia Bongiorni (Italy), Jean-Paul Casalta (France), Francesco Del Zotti (Italy), Raluca Dulgheru (Belgium), Gebrine El Khoury (Belgium), Paola Anna Erba[a] (Italy), Bernard Iung (France), Jose M. Miro[b] (Spain), Barbara J. Mulder (The Netherlands), Edyta Plonska-Gosciniak (Poland), Susanna Price (UK), Jolien Roos-Hesselink (The Netherlands), Ulrika Snygg-Martin (Sweden), Franck Thuny (France), Pilar Tornos Mas (Spain), Isidre Vilacosta (Spain), and Jose Luis Zamorano (Spain)

Document Reviewers: Çetin Erol (CPG Review Coordinator) (Turkey), Petros Nihoyannopoulos (CPG Review Coordinator) (UK), Victor Aboyans (France), Stefan Agewall (Norway), George Athanassopoulos (Greece), Saide Aytekin (Turkey), Werner Benzer (Austria), Héctor Bueno (Spain), Lidewij Broekhuizen (The Netherlands), Scipione Carerj (Italy), Bernard Cosyns (Belgium), Julie De Backer (Belgium), Michele De Bonis (Italy), Konstantinos Dimopoulos (UK), Erwan Donal (France), Heinz Drexel (Austria), Frank Arnold Flachskampf (Sweden), Roger Hall (UK), Sigrun Halvorsen (Norway), Bruno Hoen[b] (France), Paulus Kirchhof (UK/Germany),

The present Task Force on the management of IE of the ESC strongly supports the management of patients with IE in reference centres by a specialized team; the 'Endocarditis Team'

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ESC European Society of Cardiology
European Heart Journal (2023) **44**, 3948–4042
https://doi.org/10.1093/eurheartj/ehad193

ESC GUIDELINES

2023 ESC Guidelines for the management of endocarditis

Developed by the task force on the management of endocarditis of the European Society of Cardiology (ESC)

Endorsed by the European Association for Cardio-Thoracic Surgery (EACTS) and the European Association of Nuclear Medicine (EANM)

Authors/Task Force Members: Victoria Delgado *†, (Chairperson) (Spain), Nina Ajmone Marsan ‡, (Task Force Co-ordinator) (Netherlands), Suzanne de Waha‡, (Task Force Co-ordinator) (Germany), Nikolaos Bonaros (Austria), Margarita Brida (Croatia), Haran Burri (Switzerland), Stefano Caselli (Switzerland), Torsten Doenst (Germany), Stephane Ederhy (France), Paola Anna Erba [1] (Italy), Dan Foldager (Denmark), Emil L. Fosbøl (Denmark), Jan Kovac (United Kingdom), Carlos A. Mestres (South Africa), Owen I. Miller (United Kingdom), Jose M. Miro [2] (Spain), Michal Pazdernik (Czech Republic), Maria Nazarena Pizzi (Spain), Eduard Quintana [3] (Spain), Trine Bernholdt Rasmussen (Denmark), Arsen D. Ristić (Serbia), Josep Rodés-Cabau (Canada), Alessandro Sionis (Spain), Liesl Joanna Zühlke (South Africa), Michael A. Borger *†, (Chairperson) (Germany), and ESC Scientific Document Group

The Endocarditis Team

- *The diagnosis and management of patients with IE should be discussed with the **Endocarditis Team** **I B***

- *Uncomplicated IE can be managed in a **Referring Centre** that remains in early and regular **communication with the Endocarditis Team** **I B***

- *Patients with **complicated** IE should be treated in the **Heart Valve Centre & Endocarditis team** **I B***

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ESC Guideline on IE, 2023

- Emphasized the concept of the IE team
- The main characteristics of the Endocarditis Team and the referring indications were also settled
- Patients with complicated IE i.e. HF, abscess, embolic or neurological complication or CHD, ***should be referred*** early and managed in a reference centre
- Patients with non-complicated IE can be initially managed in a nonreference centre, but with regular communication with the reference centre

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Characteristics of the reference centre

1. Immediate access to diagnostic procedures; *TTE, TEE, MSCT, MRI, and PET/CT*

2. Immediate access to cardiac surgery

3. Several specialists should be present; ***Endocarditis Team***

Including

- at least cardiologists, cardiac surgeons, anaesthesiologists, ID specialists, microbiologists and
- specialists in valve diseases, CHD, pacemaker extraction, cardiac imaging techniques, neurologists, and facilities for neurosurgery and interventional neuroradiology

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Working Group (IE team)

1. Cardiology team
2. Cardiothoracic surgery
3. Clinical microbiology
4. Cooperation work with GI , Pulmonology, Vascular surgery, Radiology esp. Radiointerventionists, Neurology

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Neurological Complications

- In 2007 we started to recognize the increased patient loss due to sudden neurologic complications even after complete cure

- So, we started protocol of routine cerebral CTA

- In KAH study:
  - 81 consecutive patients had definite lt. side IE, underwent CTA within 1 wk
  - 34 patients had symptomatic CNS embolization
  - ICMA occurred in 26(32%) patients; ***15(18.5%) were silent***
  - CTA findings ***changed treatment plan*** in 21patients (25.6%); 11 were neurologically free

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May 30, 2015

- Cited 29 times
- 2021 Guidelines for the prevention of stroke in patients with stroke and TIA from the AHA/ASA
- 2023 Guidelines for the management of endocarditis

PLOS ONE

RESEARCH ARTICLE

Impact of Routine Cerebral CT Angiography on Treatment Decisions in Infective Endocarditis

Marwa Saved Meshaal[1]*, Hussein Heshmat Kassem[1], Ahmad Samir[1], Ayman Zakaria[2], Yasser Baghdady[1], Hussein Hassan Rizk[1]

1 Department of Cardiovascular Medicine, Cairo University, Cairo, Egypt, 2 Department of Radiology, Cairo University, Cairo, Egypt

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Abstract

Background

Infective endocarditis (IE) is commonly complicated by cerebral embolization and hemorrhage secondary to intracranial mycotic aneurysms (ICMAs). These complications are associated with poor outcome and may require diagnostic and therapeutic plans to be modified. However, routine screening by brain CT and CT angiography (CTA) is not standard practice. We aimed to study the impact of routine cerebral CTA on treatment decisions for patients with IE.

Methods

From July 2007 to December 2012, we prospectively recruited 81 consecutive patients with

OPEN ACCESS

Citation: Meshaal MS, Kassem HH, Samir A, Zakaria A, Baghdady Y, Rizk HH (2015) Impact of Routine Cerebral CT Angiography on Treatment Decisions in Infective Endocarditis. PLoS ONE 10(3): e0118616. doi:10.1371/journal.pone.0118616

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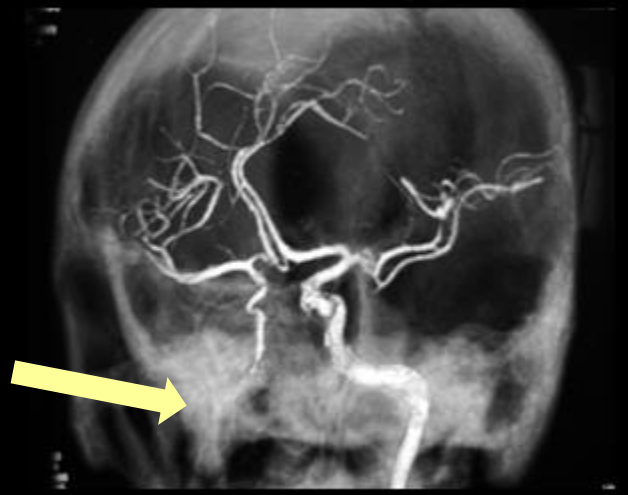

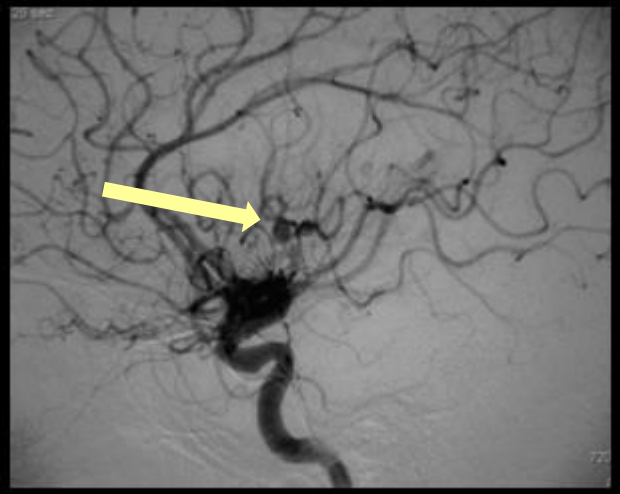

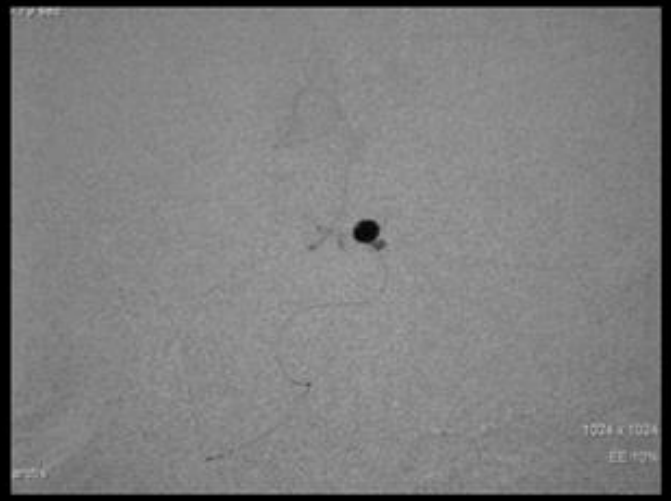

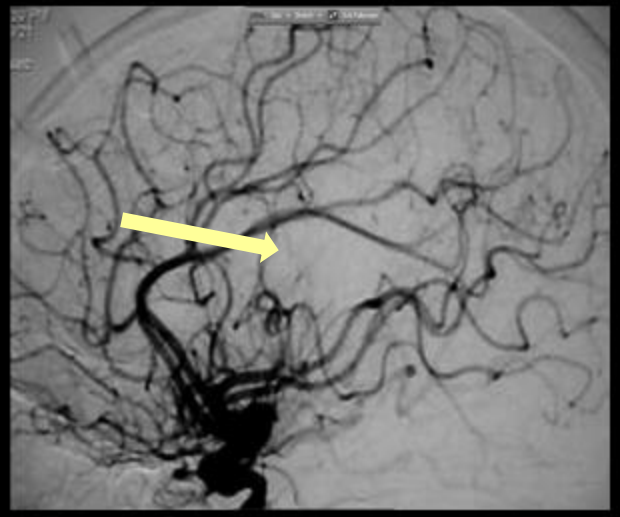

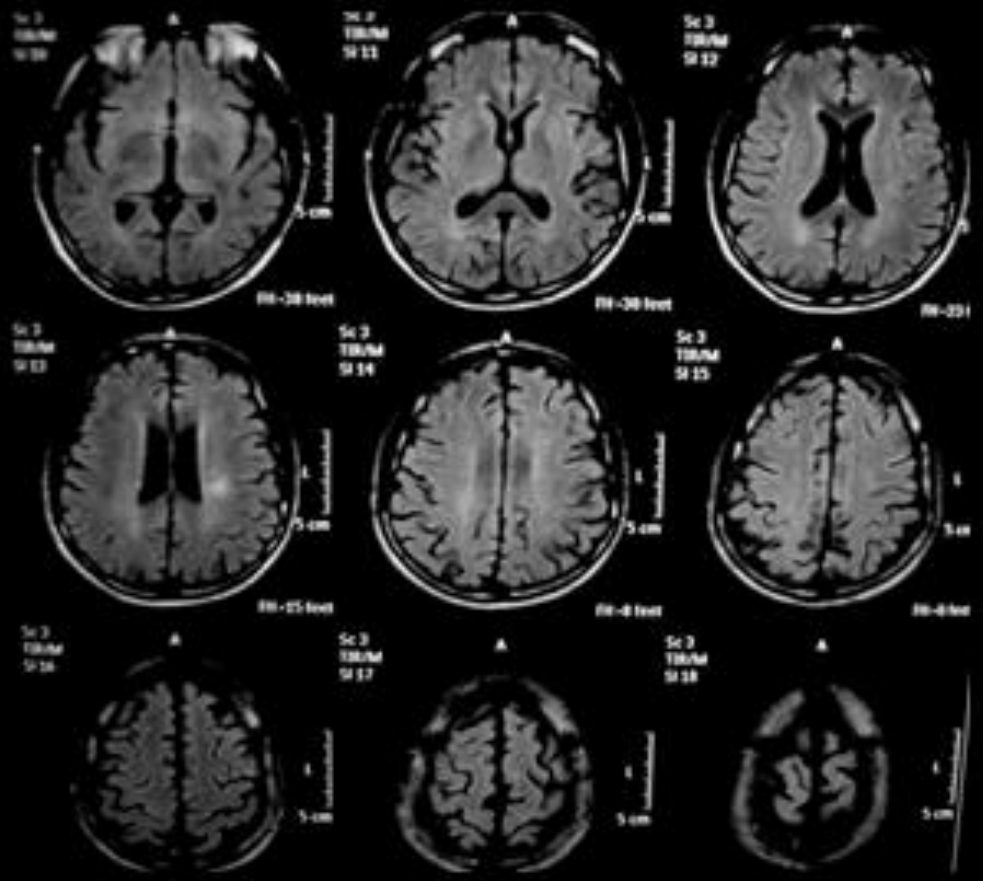

Increasing Incidence of IVDU- IE

The Egyptian Heart Journal

RESEARCH Open Access

Clinical features and outcomes of infective endocarditis in Egypt: an 11-year experience at a tertiary care facility

Hussein Hassan Rizk[1], Ahmed Adel Elamragy[1*], Ghada Sayed Youssef[1], Marwa Sayed Meshaal[1], Ahmad Samir[1], Ahmed ElSharkawy[2], Karim Said[1], Hussien Heshmat Kassem[1], Mervat Gaber Elanany[3], Amani Ali El-Kholy[3], Al Sayed Akl[2], Soheir M. Mahfouz[4] and Khaled Ali Sorour[1]

Abstract

Background: Few data are available on the characteristics of infective endocarditis (IE) cases in Egypt. The aim of this work is to describe the characteristics and outcomes of IE patients and evaluate the temporal changes in IE diagnostic and therapeutic aspects over 11 years.

Results: The IE registry included 398 patients referred to the Endocarditis Unit of a tertiary care facility with the diagnosis of possible or definite IE. Patients were recruited over two periods; period 1 (n = 237, 59.5%) from February 2005 to December 2011 and period 2 (n = 161, 40.5%) from January 2012 to September 2016. An electronic database was constructed to include information on patients' clinical and microbiological characteristics as well as complications and mortality. The median age was 30 years and rheumatic valvular heart disease was the commonest underlying cardiac disease (34.7%). Healthcare-associated IE affected 185 patients (46.5%) and 275 patients (69.1%) had negative blood cultures. The most common complications were heart failure (n = 148, 37.2%), peripheral embolization (n = 133, 33.4%), and severe sepsis (n = 100, 25.1%). In-hospital mortality occurred in 108 patients (27.1%). Period 2 was characterized by a higher prevalence of injection drug use-associated IE (15.5% vs. 7.2%, p = 0.008), a higher staphylococcal IE (50.0% vs. 35.7%, p = 0.038), lower complications (31.1% vs. 45.1%, p = 0.005), and a lower in-hospital mortality (19.9% vs. 32.1%, p = 0.007).

Conclusion: This Egyptian registry showed high rates of culture-negative IE, complications, and in-hospital mortality in a largely young population of patients. Improvements were noted in the rates of complications and mortality in the second half of the reporting period.

Keywords: Endocarditis, Registries, Egypt

- Divided the registry into two periods
  - Period 1 (n = 237, 59.5%) patients referred till December 2011
  - Period 2 (n = 161, 40.5%) patients referred till September 2016

- Period 2, ***significant increase in IVDU***

- Significant decrease in those with RHD, HAE, and previous antibiotic use

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- IVDU associated IE doubled in *phase 2* (Jan 2012- Dec 2016, *15.5%*) compared to *phase 1* (Feb 2005 –Dec 2011, *7.2%*)
- In more recent years incidence might be as high as 25%- 30%
- Incidence of IE associated with IVDU is significantly increasing worldwide
- In USA, admissions for IVDU-IE nearly doubled, from 6.9% to 12.1%, from 2005 – 2016 (Health Care and Utilization Project National Inpatient Sample)

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Integrated Approach

- Multidisciplinary teams that ideally include experts in addiction management, case management, social work, and psychiatry
- Recognition and treatment of SUD
- Life-long management

Antimicrobial therapy

- Drug to drug interaction with substances abused, most serious is serotonin syndrome of linezolid with tramadol, opiates, amphetamines
- Empiric antibiotic should cover MRSA
- When Gm –ve organism is suspected, antibiotic treatment should cover Pseudomonas spp.

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Fungal IE

- Cited 47 times
- Fungal Endocarditis: Pathophysiology, Epidemiology, Clinical Presentation, Diagnosis, and Management, ***Clinical Microbiology Reviews (IF 22.556)***

PLOS ONE

RESEARCH ARTICLE

Aspergillus endocarditis: Diagnostic criteria and predictors of outcome, A retrospective cohort study

Marwa Sayed Meshaal[1☯]*, Dina Labib[1☯], Karim Said[1☯], Mohammed Hosny[1☯], Mohammed Hassan[1☯], Said Abd Al Aziz[2☯], Amani Elkholy[3☯], Mervat Anani[3☯], Hussien Rizk[1☯]

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OPEN ACCESS

Citation: Meshaal MS, Labib D, Said K, Hosny M, Hassan M, Abd Al Aziz S, et al. (2018) Aspergillus endocarditis: Diagnostic criteria and predictors of outcome, A retrospective cohort study. PLoS ONE 13(8): e0201459. https://doi.org/10.1371/journal.pone.0201459

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Accepted: July 15, 2018

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Abstract

Background

Fungal Endocarditis (FE), a relatively rare disease, has a high rate of mortality and is associated with multiple morbidities. *Aspergillus* endocarditis (AE) is severe form of FE. Incidence of AE has increased and is expected to rise due to an increased frequency of invasive procedures, cardiac devices and prosthetic valves together with increased use of immune system suppressors. AE lacks most of the clinical criteria used to diagnose infective endocarditis (IE), where blood culture is almost always negative, and fever may be absent. Diagnosis is usually late and in many cases is made post-mortem. Late or mistaken diagnosis of AE contribute to delayed and incorrect management of patients. In the current study we aimed to describe the clinical, laboratory and imaging characteristics of AE, to identify predictors of early diagnosis of this serious infection.

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- ***Lack of fever*** and ***Acute limb ischemia*** at presentation were significantly associated with AE ($p < 0.001$, $p = 0.014$)

- Health care associated endocarditis ***(HAE)*** and prosthetic valve endocarditis ***(PVE)*** were the only significant risk factors associated with AE ($p < 0.001$ for each)

- ***Mitral, non-valvular, and aortotomy*** site vegetations, as well as ***aortic abscess/pseudoaneurysm,*** were significantly associated with AE ($p = 0.022$, $p = 0.004$, $p < 0.001$, and $p < 0.001$)

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- The probability of a patient having AE accompanied by HAE, PVE, and abscess/pseudoaneurysm, but no fever, is ***0.99***

- Prediction of AE based on these four variables has
  - sensitivity of 97.4%
  - specificity of 80.8%
  - overall diagnostic accuracy of 95.4%

- Combination antifungal therapy was strongly linked to decreased mortality (p = 0.012)

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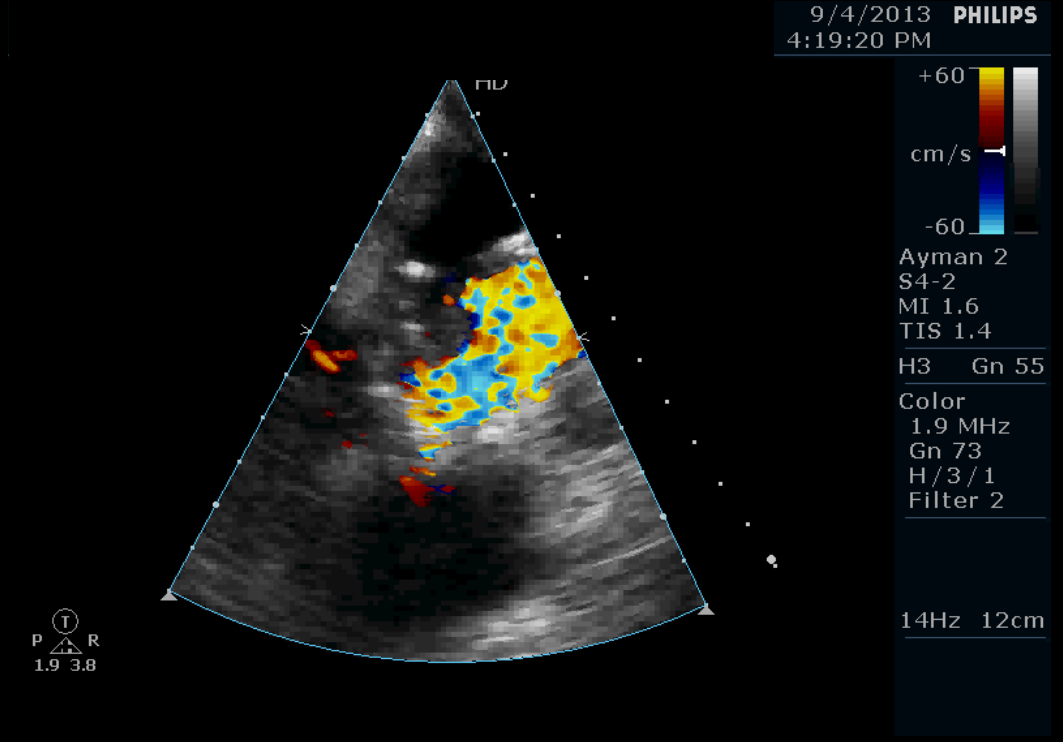
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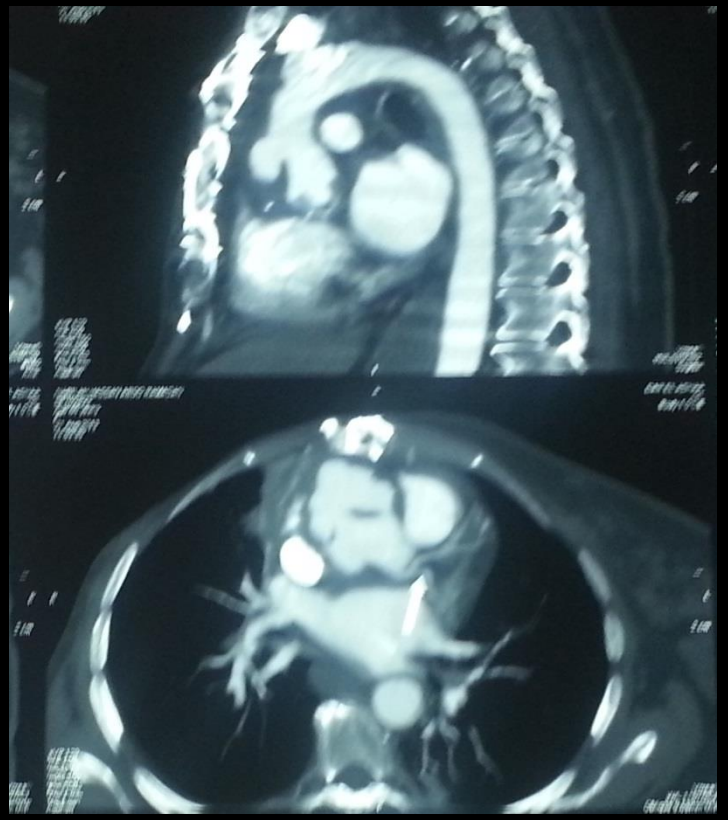

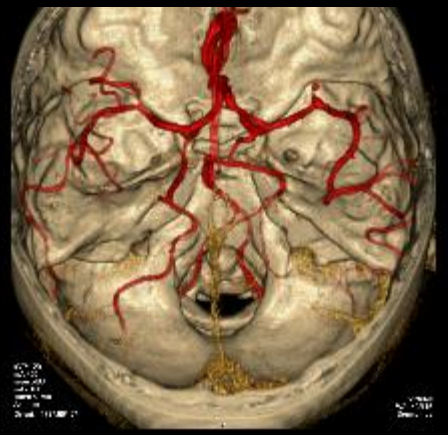

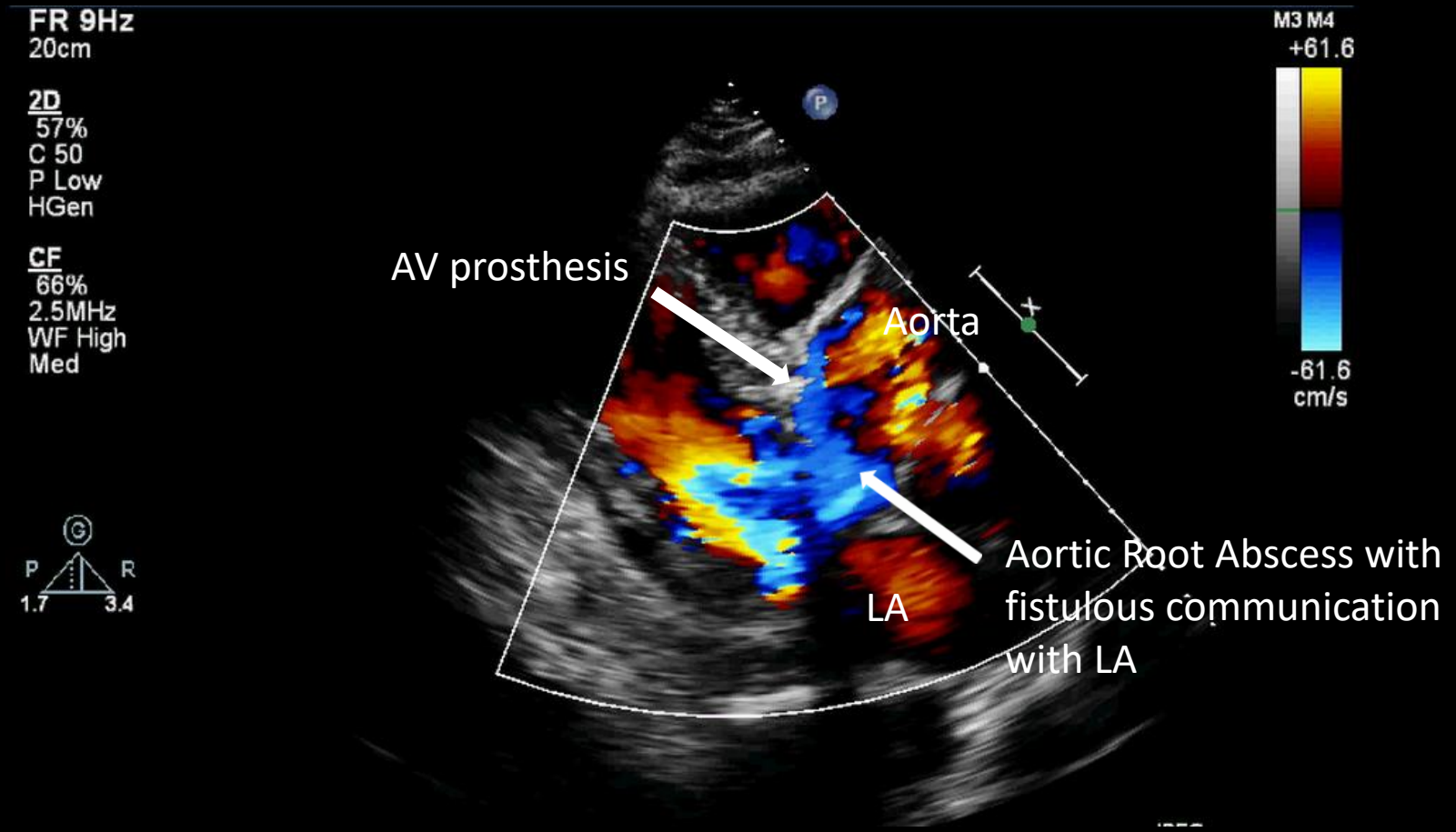
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AV prosthesis
Aorta
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Aortic Root Abscess with fistulous communication with LA

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RESEARCH Open Access

Neutrophil-to-lymphocyte ratio (NLR) and platelet-to-lymphocyte ratio (PLR) as independent predictors of outcome in infective endocarditis (IE)

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Abstract

Background: Early and accurate risk assessment is an important clinical demand in patients with infective endocarditis (IE). The neutrophil-to-lymphocyte ratio (NLR) and platelet-to-lymphocyte ratio (PLR) are independent predictors of prognosis in many infectious and cardiovascular diseases. Very limited studies have been conducted to evaluate the prognostic role of these markers in IE.

Results: We analyzed clinical, laboratory, and echocardiographic data and outcomes throughout the whole period of hospitalization for a total of 142 consecutive patients with definitive IE.
The overall in-hospital mortality was 21%. Major complications defined as central nervous system embolization, fulminant sepsis, acute heart failure, acute renal failure, and major artery embolization occurred in 38 (27%), 34 (24%), 32 (22.5%), 40 (28%), and 90 (63.4%) patients, respectively.
The NLR, total leucocyte count (TLC), neutrophil percentage, creatinine, and C-reactive protein (CRP) level obtained upon admission were significantly higher in the mortality group [$p \leq 0.001$, $p = 0.008$, $p = 0.001$, $p = 0.004$, and $p = 0.036$, respectively].
A higher NLR was significantly associated with fulminant sepsis and major arterial embolization [$p = 0.001$ and $p = 0.028$, respectively].
The receiver operating characteristic (ROC) curve of the NLR for predicting in-hospital mortality showed that an NLR > 8.085 had a 60% sensitivity and an 84.8% specificity for an association with in-hospital mortality [area under the curve = 0.729, 95% confidence interval (CI) 0.616–0.841; $p = 0.001$]. The ROC curve of the NLR for predicting severe sepsis showed that an NLR > 5.035 had a 71.8% sensitivity and a 68.5% specificity for predicting severe sepsis [area under the curve 0.685, 95% CI 0.582–0.733; $p = 0.001$].
The PLR showed no significant association with in-hospital mortality or in-hospital complications.

Conclusion: A higher NLR, TLC, neutrophil percentage, creatinine level, and CRP level upon admission were associated with increased in-hospital mortality and morbidity in IE patients. Furthermore, a lower lymphocyte count/percentage and platelet count were strong indicators of in-hospital mortality among IE patients. Calculation of the NLR directly from a CBC upon admission may assist in early risk stratification of patients with IE.

Keywords: Infective endocarditis (IE), Neutrophil-to-lymphocyte ratio (NLR), Platelet-to-lymphocyte ratio (PLR)

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- ***Most Recent Approach***

  Planned structural intervention as a treatment option in endocarditis patients

Conclusion

- IE highly specialized centre is the state of art in treating endocarditis
- Such Centres would lead to cumulative experience
- Can be reflected to better outcome for a disease of multiple complexities and unfortunately poor outcome
- It is a disease of multidisciplinary approach
- IE incidence is growing , and probably will continue to grow

- Infection is getting more virulent with increasing incidence of fungal infection, MRSA and MDR Gm –ve

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What Do We Need in Egypt?

- Increase the awareness of the IE in order to diagnose and refer patients to IE centres early enough
- To establish satellite centres for management of IE
- To keep a good channel of communication between IE centres and different treating facilities
- Train more cardiologist and physicians on how to diagnose and manage IE patients

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Dealing With The Iceberg

Many cases & Complication being Undiagnosed or Missed

Thank you