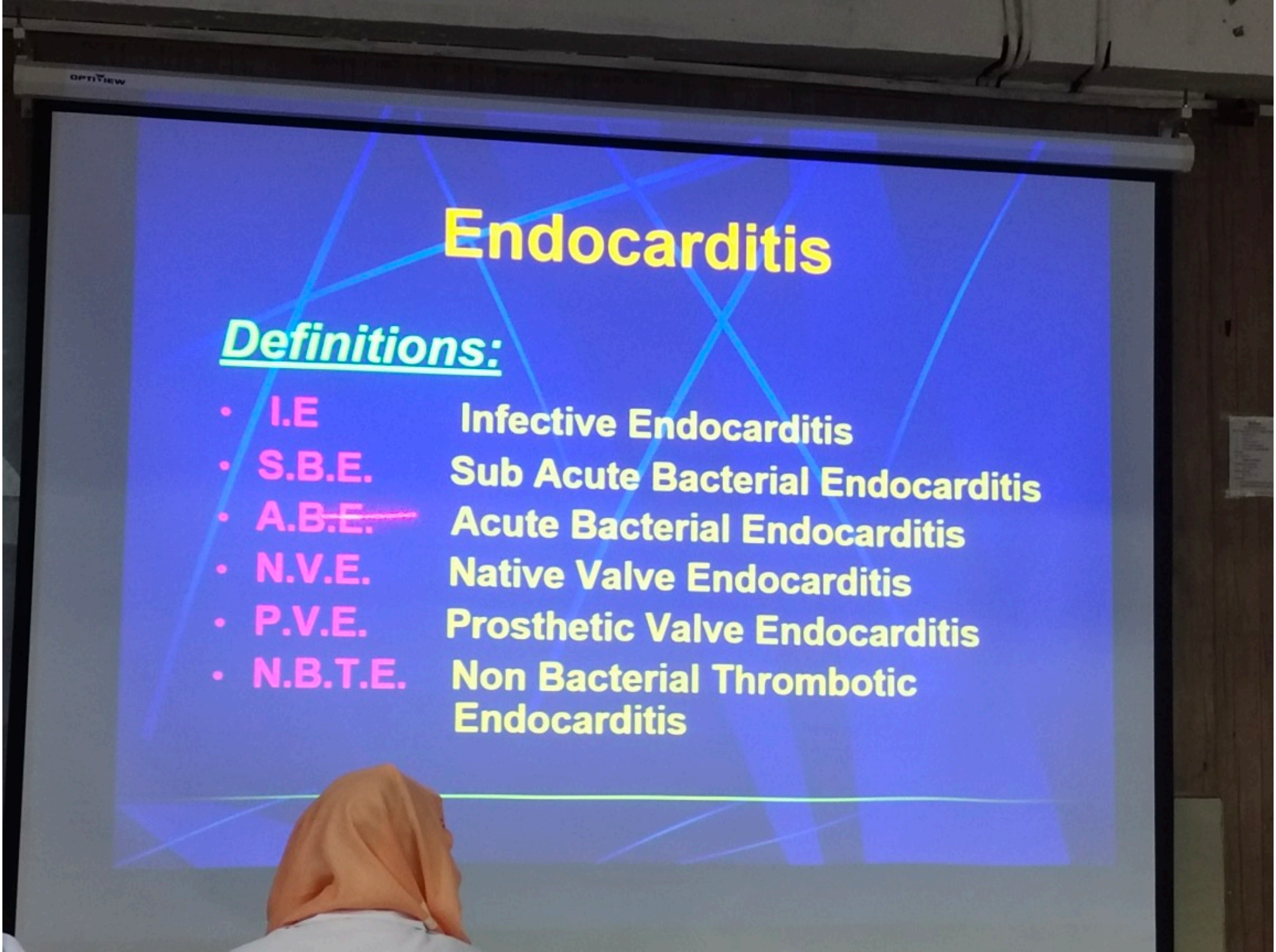
Endocarditis
Definitions:
I.E Infective Endocarditis
S.B.E. Sub Acute Bacterial Endocarditis
A.B.E. Acute Bacterial Endocarditis
N.V.E. Native Valve Endocarditis
P.V.E. Prosthetic Valve Endocarditis
N.B.T.E. Non Bacterial Thrombotic Endocarditis

Endocarditis

Epidemiology

- The Evolution
- The Susceptible Host
- Preexisting Heart Disease
- Endocarditis in Parenteral Drug Abusers
- Endocarditis in Children
- Endocarditis in Gynaecology & Obstetric Patients
- Nosocomial Endocarditis
- Haemodialysis and Endocarditis
- Infective Endarteritis

Epidemiology

The evolution of endocarditis

Infective endocarditis today is a different disease from that seen in the preantibiotic era , when its salient clinical features were exhaustively described. Since 1961, treatises on the " changing face " of "modern endocarditis " have identified the following trends :

- The median age of patients has increased.
- The ratio of males to females has risen.
- The proportion of acute cases has risen.
- Fewer patients develop the classical physical signs of advanced SBE such as osler's nodes, finger clubbing ,or roth's spots.
- The proportion of cases due to streptococci has fallen slightly with increased incidence of staphylococci.
- The proportion of cases caused by gram-negative bacilli, fungi ,and miscellaneous unusual microbes has increased.
- Increased number of Prosthetic valves.
- Increased incidence of HIV, infective endocarditis

Incidence of Transient Bacteremia After Various Dental, Surgical ,or Diagnostic Procedures

	Percentage
Extraction of one or more teeth	82
Periodontal surgery	88
Brushing teeth	40
Tonsillectomy	38
Esophageal dilatation	45
Catheter removal after urological surgery	50
Prostatectomy (sterile urine)	11
Prostatectomy (infected urine)	57
Normal delivery	4--11

Incidence of Transient Bacteremia After Various Dental, Surgical ,or Diagnostic Procedures

Diagnostic procedures;	Percentage
Bronchoscopy	15
Barium studies	10
Liver biopsy	10
Upper GI Endoscopy	4
Sigmoidoscopy	0-5
Colonoscopy	5

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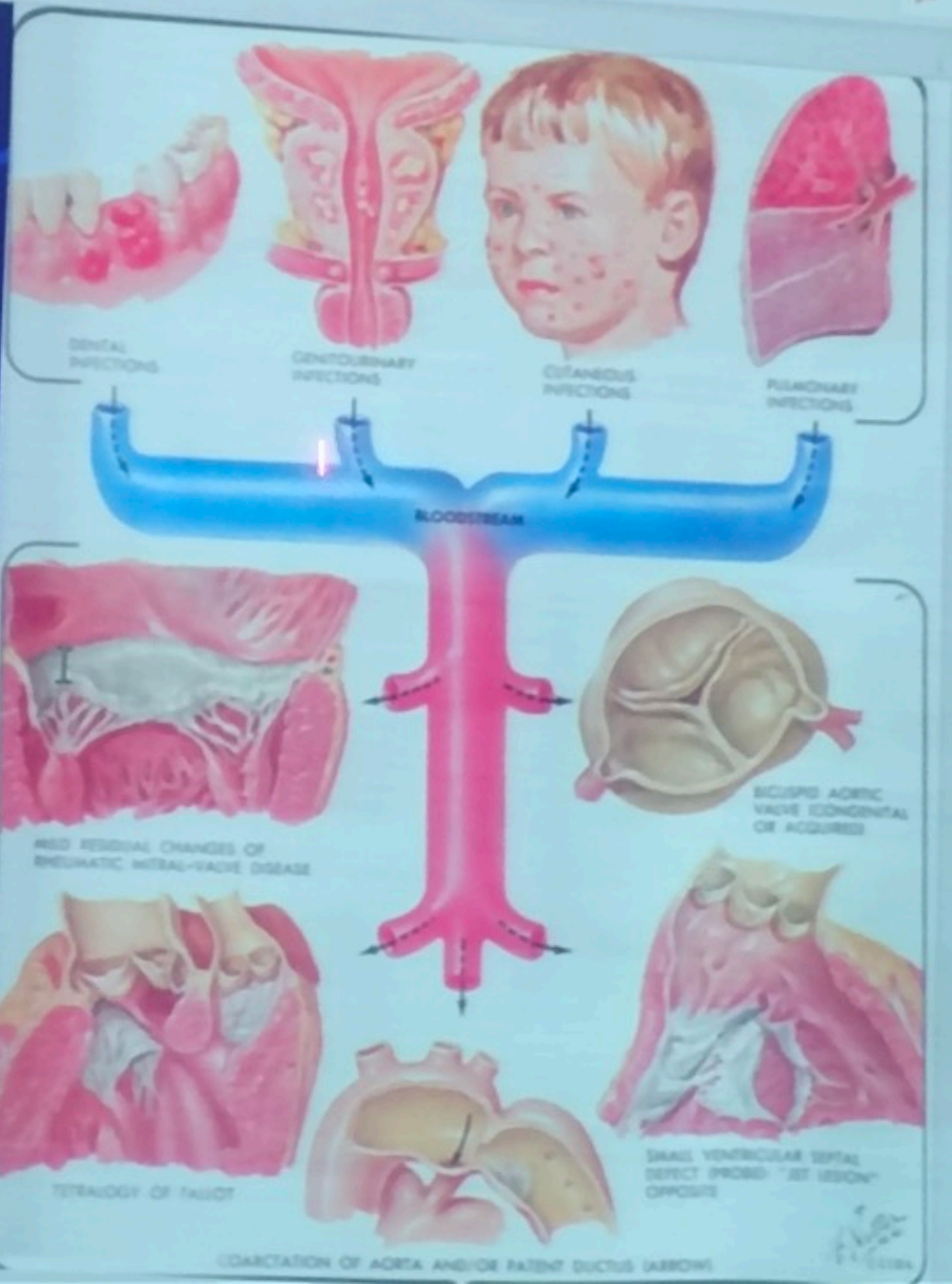
Common Portals Of Bacterial Entry In Bacterial Endocarditis



Frequency of Various Organisms Causing Infective Endocarditis

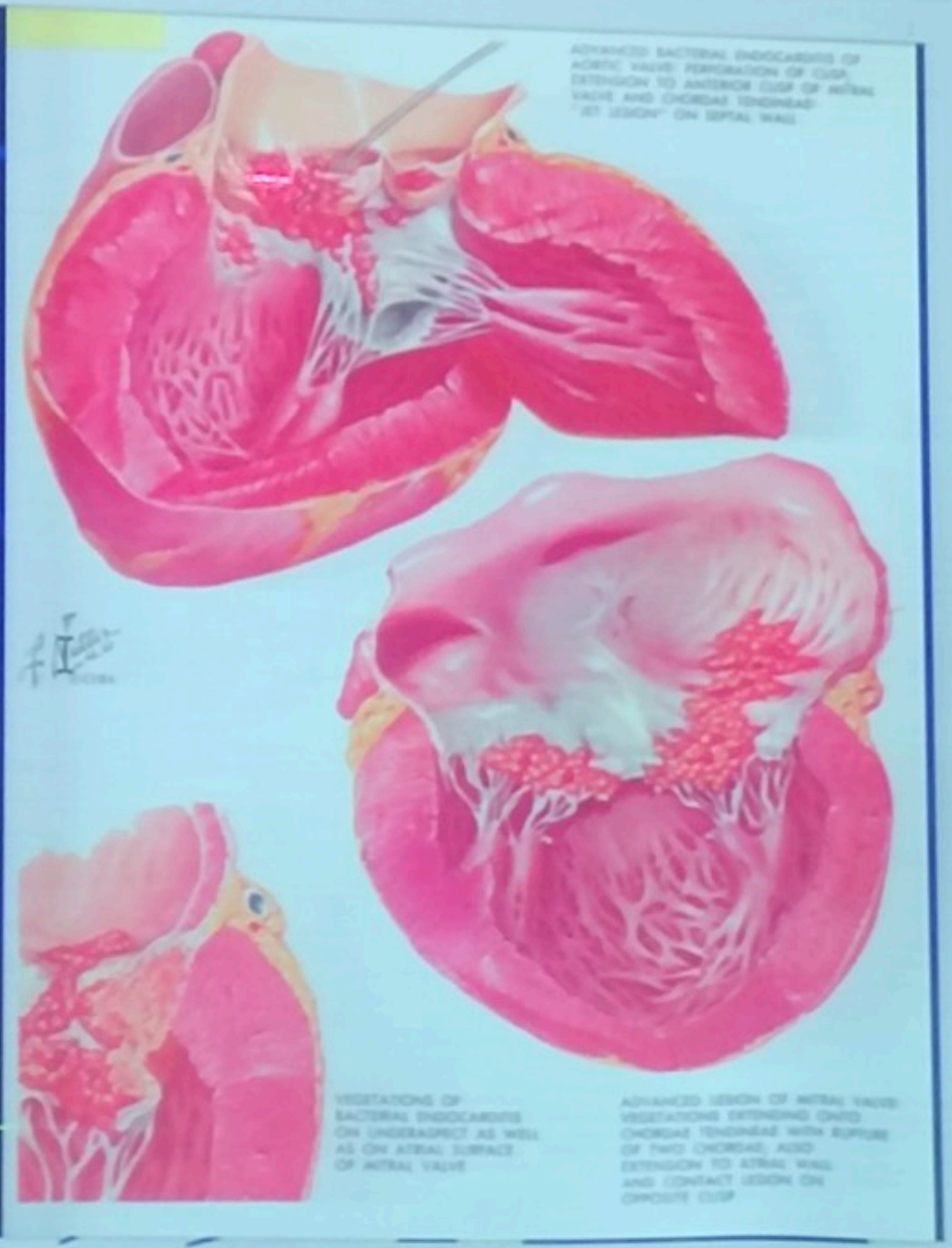
Organism	NVE %	Iv drug abuses %	Early PVE %	Late PVE %
Streptococci	65	15	5	35
Strep Viridans	35	5	<5	25
Strep Bovis (Group D)	15	<5	<5	<5
Strep Faecalis(GroupD)	10	8	<5	<5
Other Streptococci	<5	<5	<5	<5
Staphylococci	25	50	50	30
Coagulase-positive	23	50	20	10
Coagulase-negative	<5	<5	30	20
Gram-negative aerobic Bacilli	<5	5	20	10

Frequency of Various Organisms Causing Infective Endocarditis

Organism	NVE %	Iv drug abuses %	Early PVE %	Late PVE %
Fungi	<5	5	10	5
Miscellaneous bacteria	<5	5	5	5
Diphtheroids, Propiono bacteria	<1	<5	5	<5
Other anaerobes	<1	<1	<1	<1
Rickettsiae	<1	<1	<1	<1
Chlamydiae	<1	<1	<1	<1
Polymicrobial infection	<1	5	5	5
Culture-negative endocarditis	5-10	5	<5	<5

These are representative figures collected from the literature ; Wide local variations in frequency are to be expected ,NVE (native valve endocarditis) ; PVE(prosthetic valve endocarditis).

Vegetations In Bacteial Endocarditis

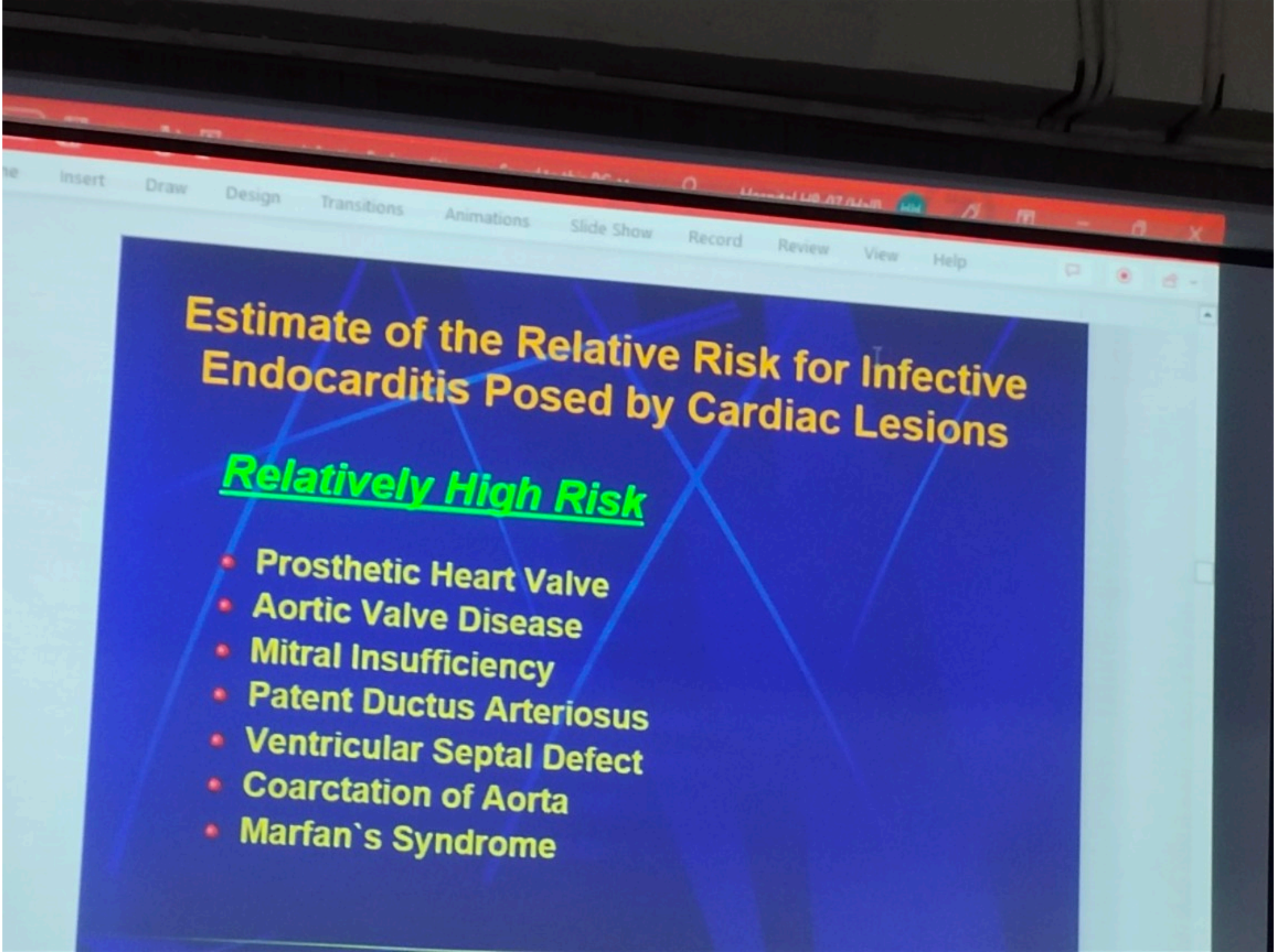


Approximate Frequency of Anatomic Location of Vegetations in SBE, ABE ,and Endocarditis Associated With IV Drug Abuse

Anatomical Site	SBE %	ABE %	ENDOCARDITIS IN IV DRUG ABUSERS, %
Left Sided Valves:	85	65	40
Aortic	15-26	18-25	25-30
Mitral	38-45	30-35	15-20
Aortic and Mitral	23-30	15-20	13-20
Right-sided Valves:	5	20	50
Tricuspid	1-5	15	45-55
Pulmonary	1	Rare	2
Tricuspid and Pulmonary	Rare	Rare	3
Left and Right Sided Sites	Rare	5-10	5-10
Other Sites (Patent Ductus Arteriosus), VSD, Coarctation , Jet Lesions	10	5	5

Approximate Frequency of the Major Preexisting Cardiac Lesions in Patients With Infective Endocarditis in the United States

Type of Heart Disease	Children Under 2 Years %	Children 2-15 Years %	Adults 15-50 Years %	Adults 50 Years %	Adults Who Are Iv Drug Abusers %
No Known Heart Disease	50-70	10-15	10-20	10	50-60
Congenital Heart Disease	30-50	70-80	25-35	15-25	10
Rheumatic Heart Disease	Rare	10	10-15	10-15	10
Degenerative Heart Disease	0	0	Rare	10-20	Rare
Previous Cardiac Surgery	5	10-15	10-20	10-20	10-20
In previous Endocarditis	rare	5	5-15	5-10	10-20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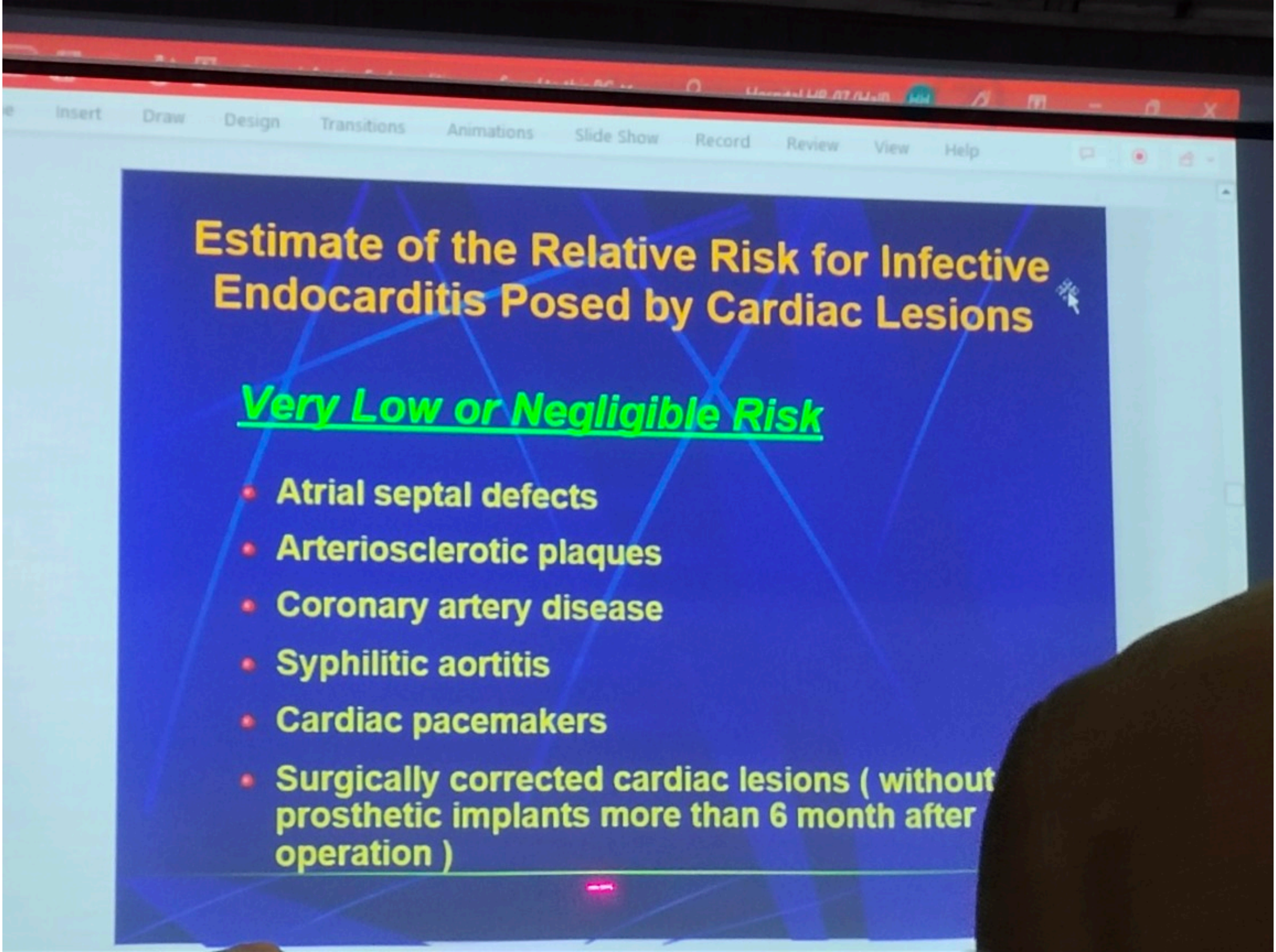
Estimate of the Relative Risk for Infective Endocarditis Posed by Cardiac Lesions
Relatively High Risk
Prosthetic Heart Valve
Aortic Valve Disease
Mitral Insufficiency
Patent Ductus Arteriosus
Ventricular Septal Defect
Coarctation of Aorta
Marfan`s Syndrome

Estimate of the Relative Risk for Infective Endocarditis Posed by Cardiac Lesions

Intermediate Risk

- Mitral valve prolapse
- Pure mitral stenosis
- Tricuspid valve disease
- Pulmonary valve disease
- Previous infective endocarditis
- Asymetrical septal hypotrophy
- Calcific aortic sclerosis
- Hyperalimentation or pressure-monitoring lines that reach the right atrium.
- ~~Non valvular intracardiac prosthetic implants~~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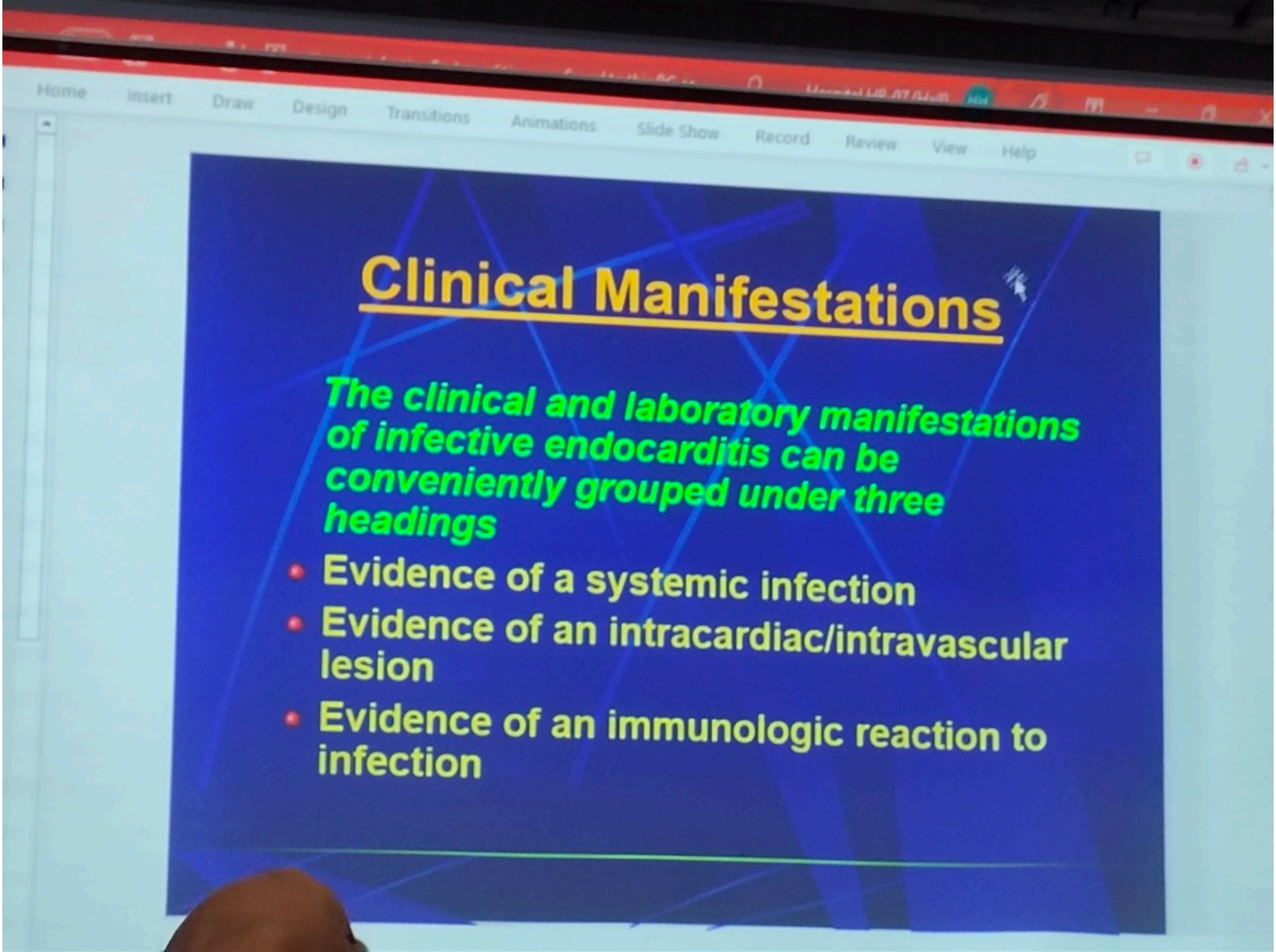
Estimate of the Relative Risk for Infective Endocarditis Posed by Cardiac Lesions
Very Low or Negligible Risk
Atrial septal defects
Arteriosclerotic plaques
Coronary artery disease
Syphilitic aortitis
Cardiac pacemakers
Surgically corrected cardiac lesions (without prosthetic implants more than 6 month after operation)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Clinical Manifestations
The clinical and laboratory manifestations of infective endocarditis can be conveniently grouped under three headings
Evidence of a systemic infection
Evidence of an intracardiac/intravascular lesion
Evidence of an immunologic reaction to infection

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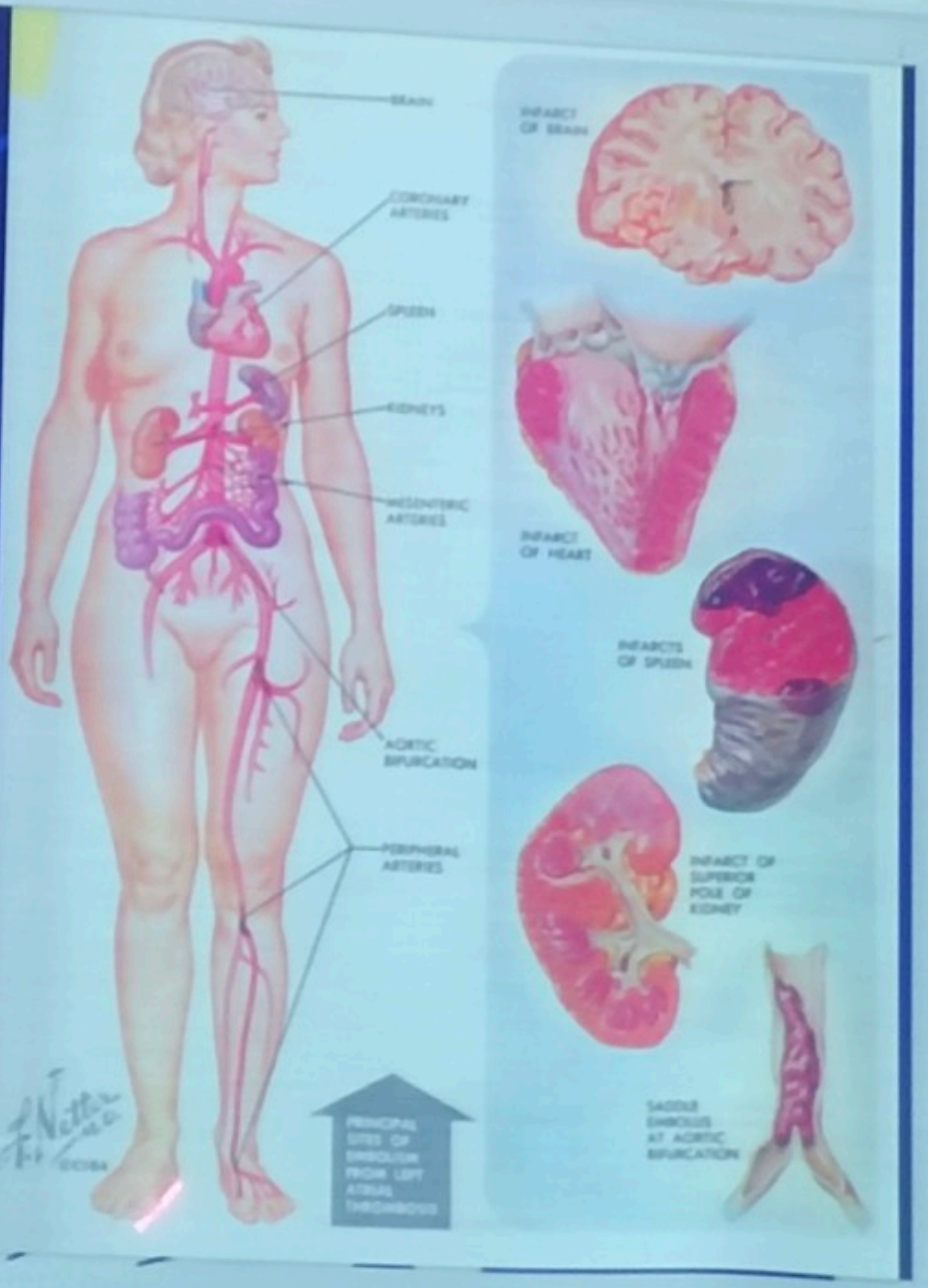
Princpal Sites Of Embolism From Left Atrial Thrombosis



Summary of the Major Manifestations of Infective Endocarditis

	HISTORY	EXAMINATION	INVESTIGATION
Manifestation of Systemic Infection	Fever ,Chills, Rigors, Sweats, Malaise, Weakness ,Lethargy,delirium ,Headache, Anorexia ,weight Loss, Backache, Arthralgia Myalgia ,	Fever Pallor Weight loss Asthenia Splenomegaly	Anemia Leukocytosis (variable) Raised ESR Blood culture+ve Abnormal CSF

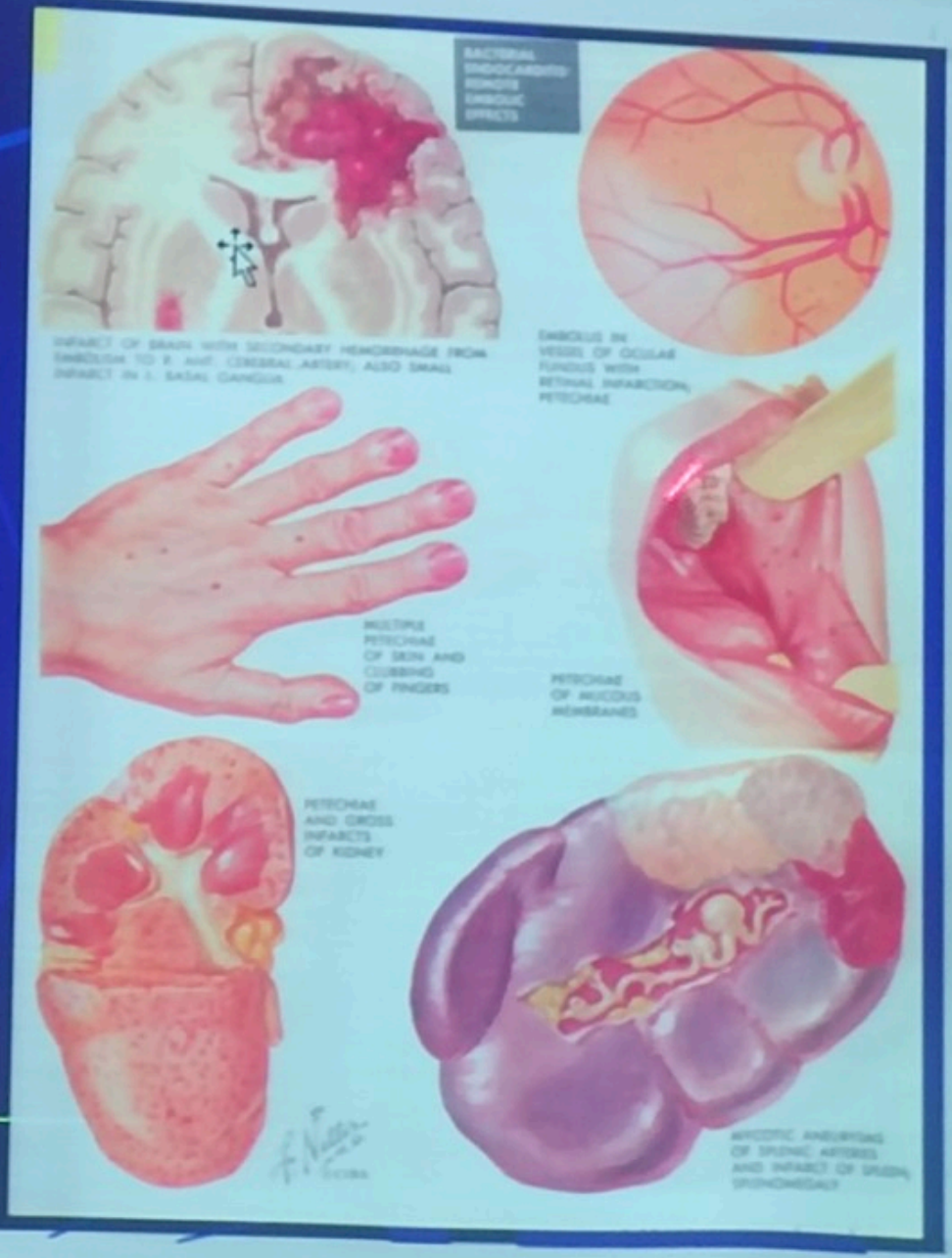
Summary of the Major Manifestations of Infective Endocarditis

	History	Examination	Investigation
Manifestation of Intravascular Lesion	Dysponea, Chest Pain, Focal Weakness, Stroke, Abdominal Pain, Cold and Painful Extremities	Murmurs Sign of Cardiac Failure, Skin - Petechiae, Eye Mucosae Roth Spots, Osler`s Nodes, Janeway Lesions, Splinter Hemorrhages, Stroke, Mycotic Aneurysm, Ischemia or Infarction of Viscera or Extremities.	Blood in Urine, Chest X-rays, Echocardiography, Liver-spleen Scan, Lung Scan, Brain Scan, Histology and Culture of Emboli.

Summary of the Major Manifestations of Infective Endocrditis

	History	Examination	Investigation
Manifestation of Immunologic Reactions	Arthralgia, Myalgia, Tenosynovitis	Arthritis Signs of Uremia Vascular Phenomena Finger Clubbing	Proteinuria, Hematuria, Casts,uremia, Acidosis Polyclonal Increase in Gamma Globulins, Rheumatoid Factor, Decreased Complement, and Immune Complexes in Serum Antistaphylococcal Teichoic Acid Antibodies.

Bacterial Endocarditis Remote Embolic Effects



Major criteria

Positive Blood Culture for Infective Endocarditis

Typical microorganism for infective endocarditis from two separate blood cultures: viridans streptococci,* *Strep. bovis*, HACEK group, or community-acquired *Staph. aureus* or enterococci, in the absence of a primary focus, *or*

Persistently positive blood culture, defined as recovery of a microorganism consistent with infective endocarditis from:

1. Blood cultures drawn more than 12 h apart *or*
2. All of three or a majority of four or more separate blood cultures, with first and last drawn at least 1 h apart

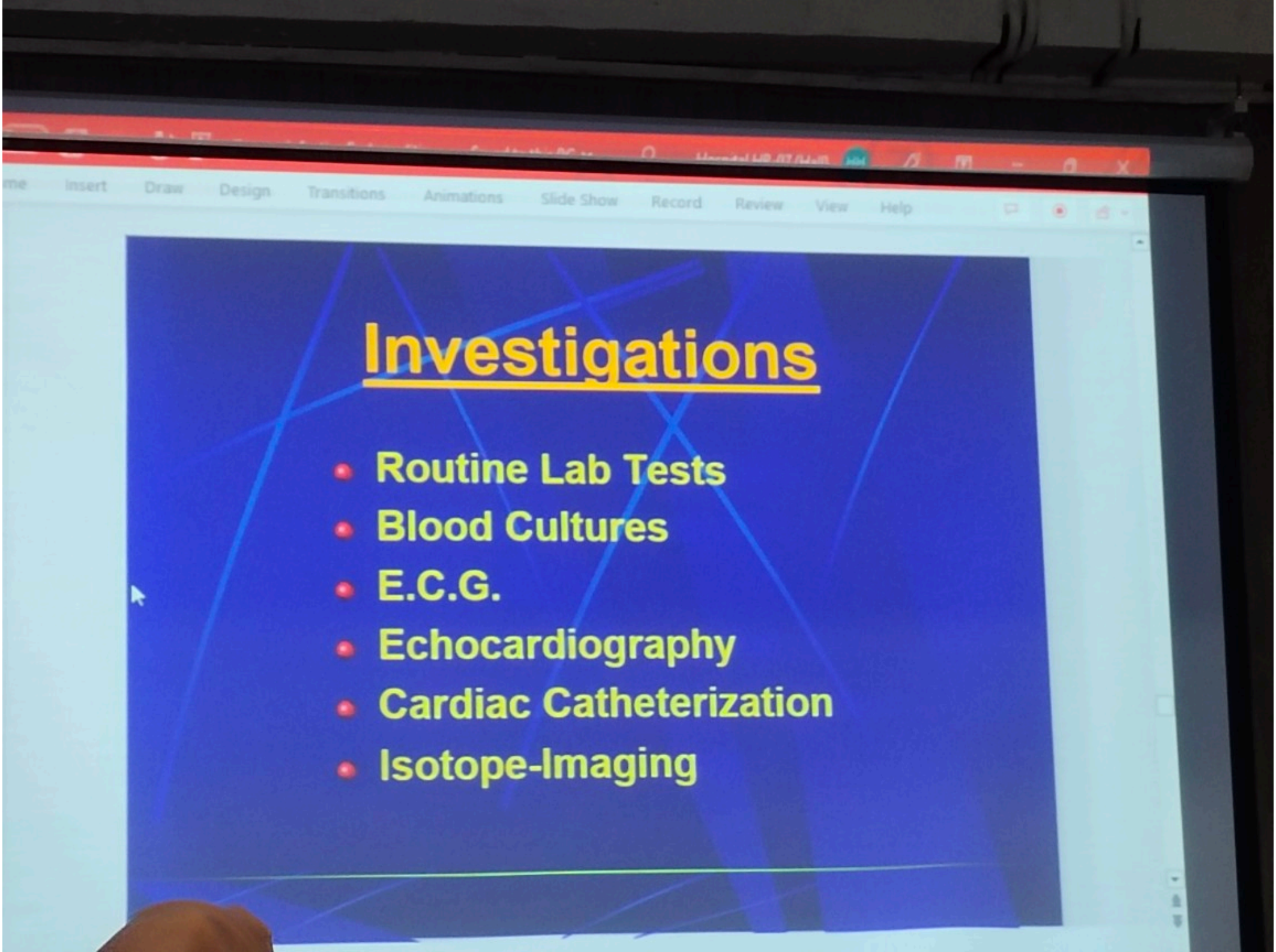
Evidence of Endocardial Involvement

Positive echocardiogram for infective endocarditis

1. Oscillating intracardiac mass, on valve or supporting structures, or in the path of regurgitant jet or on implanted material, in the absence of an alternative anatomic explanation, *or*
2. Abscess, *or*
3. New partial dehiscence of prosthetic valve, *or* New valvular regurgitation (increase or change in preexisting murmur not sufficient)

Minor criteria

- Predisposition: predisposing heart condition *or* intravenous drug use
- Fever: ≥38.0°C (100.4°F)
- Vascular phenomena: major arterial emboli, septic pulmonary infarcts, mycotic aneurysm, intracranial hemorrhage, conjunctival hemorrhages, Janeway lesions
- Immunologic phenomena: glomerulonephritis, Osler's nodes, Roth's spots, rheumatoid factor
- Microbiologic evidence: positive blood culture but not meeting major criterion as previously defined[b] *or* serologic evidence of active infection with organism consistent with infective endocarditis[c]
- Echocardiogram: consistent with infective endocarditis but not meeting major criterion as previously defined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Blood Cultures
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Echocardiography
Cardiac Catheterization
Isotope-Imaging

Treatment

- General Principles
- Antimicrobial Therapy
- Choice of Antibiotics
- Empirical Therapy
- Duration of Therapy
- Anticoagulants & Endocarditis
- Role of Surgery
- Management of Complications
- Prophylaxis

Treatment Regimens for Infective Endocarditis Caused by Gram-positive Cocci

Organism	Regimen	Duration week	Comments
Staph Aureus	1. Naficillin 2 g iv every 4 h or	4 or longer	Standard regimen
	2. Naficillin as above plus gentamycin 1.0 mg/kg iv every 8 hr for the first 3-5 days only ,or	4 or longer	For patients with severe disseminated staphylooccal disease, synergy may be advantaeous during early stages of treatment
	3. Cefazolin 2g iv every 8 hr , or	4 or longer	For patients allergic to pencillins
	4. Vancomycin 15 mg/kg iv every 12hr	4 or longer	For patients allergic to pencillin and cephalosporins for mathicillin resistant strains

Treatment Regimens for Infective Endocarditis Caused by Gram-positive Cocci

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Treatment Regimens for Infective Endocarditis Caused by Gram-positive Cocci

Organism	Regimen	Duration week	Comments
Group A streptococci strep pneumonae	1. Pencillin G 2 million units Iv every 6 hr ,or	2-4	These organisms are usually highly sensitive to pencillin; 2 weeks should be adequate for many patients.
	2. Cefazolin 1 g Iv every 8 hr	2-4	

Treatment Regmins for Infective Endocarditis Caused by Gram-positive Cocci

ORGANISM	REGIMEN	DURATION WEEKS	COMMENTS
Alphahemolytic (viridans) streptococci, strep bovis	1. PENCILLIN G 4 million units iv 6 h plus gentamicin 1.0 mg/kg every 12 h iv or	2	Standard regimen , for patients less than 65 years old without renal failure, eight-nerve defects or, serious complications
	2. Pencillin G 4 million units iv every 6 h plus gentamicin 1.0 mg/kg every 12 h iv (first 2 weeks only) or	4	For patients with complicated disease e.g. CNS involvement, shock, moderatly pencillin resistant streptococci , failed previous treatment
	3. Pencillin G 4 million units iv every 6 h	4	For patients more than 65 years old with renal failure or eighth-nerve defects
	4. Ceftriaxone 2g iv once daily or	4	For patiens allergic to penicillin
	5. Vancomycin 10mg/kg iv every 12 h	4	For patients allergic to pencillin and cephalosporins

Treatment Regimens for Infective Endocarditis Caused by Gram-positive Cocci

Organism	Regimens	Duration Weeks	Comments
Strep fecalis and other penicillin resistant streptococci	1. Ampicillin 2g Iv every 4 h + gentamycin 1.0 mg/kg Iv every 8 h or	4-6	4weeks should be adequate for most cases with symptoms present for less than 3 months.
	2. Vancomycin 15 mg/kg Iv every 12 hr Iv plus gentamycin 1.0 mg/kg Iv (not to exceed 80 mg) every 8 hr	4-6	For patients allergic to pencillin 4 weeks should be adequate for most cases. Serum levels should be monitored.

Endocarditis

- Natural History and Prognosis
- Recurrent Endocarditis

Suggested Regimens For Prophylaxis Of Infective Endocarditis

Standard Regimen

- For dental procedures and oral or upper respiratory tract surgery
- Amoxillin 3.0 G orally 1H procedure before 1.5 g 6 hr later

Special Regimens

- Parenteral regimen for high risk patients also for gastronintestinal (GI) or genitourinary (GU) tract procedures parenteral regimen for pencillin-allergic patients
- Ampicillin 2.0 g or Iv plus gentamicin 1.5 mg/kg Im or Iv 0.5 hr before
- Vancomycin 1.0G Iv slowly over 1 hr , starting 1 hr before procedure add gantamycin 1.5 mg/kg Im or Iv if Gi or Gu tract involved

Suggested Regimens For Prophylaxis Of Infective Endocarditis

Special Regimen

- Oral regimen for pencillin – allergic patients (oral and respiratory tract only)
  - Erthromycin 1.0 g orally 1 hr before then 0.5 g 6 hr later
- Oral regimen for minor GI or GU tract procedures
  - Cefazolin 2.0 g Iv on induction of anesthesia , repeated 8 and 16 hr later
    or
  - Vancomycin 1.0 g Iv slowly over 1h starting on induction of anesthesia, then 0.5 g Iv 8 and 16 hr later.
- Pareneral regimen for cardiac surgery including valve replacement