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diginerve
A Jaypee Initiative

YOUR GUIDE AT EVERY STEP

HIGHLIGHTS

- Winner of the Award for Excellence in Book Production by the Federation of Indian Publishers 2020.
- Contains everything required for practical examination for medical students (both undergraduates and postgraduates).
- Contains case sheet format and diagnosis format for cases in each system.
- Only book to comprehensively include all aspects of practical examination in long cases, short cases, semi-long cases, X-rays, ECGs, spotters, laboratory data interpretation, instruments.
- Only book to include chapters on rheumatology, comprehensive assessment of geriatrics and psychiatric illnesses.
- New sections on history taking and common drugs added.

An Insider's Guide to CLINICAL MEDICINE

As per the Competency Based Medical Education Curriculum (NMC)

Foreword
Chakrapani M

SECOND EDITION

JAYPEE

Contents

Competency Table

Number	COMPETENCY The student should be able to	Core Y/N	Suggested learning methods	Suggested assessment methods	Chapter number	Page number
IM1.10	Elicit document and present an appropriate history that will establish the diagnosis, cause and severity of heart failure including: presenting complaints, precipitating and exacerbating factors, risk factors exercise tolerance, changes in sleep patterns, features suggestive of infective endocarditis	Y	Bedside clinic	Skill assessment	4	97–140
IM1.11	Perform and demonstrate a systematic examination based on the history that will help establish the diagnosis and estimate its severity including: measurement of pulse, blood pressure and respiratory rate, jugular venous forms and pulses, peripheral pulses, conjunctiva and fundus, lung, cardiac examination including palpation and auscultation with identification of heart sounds and murmurs, abdominal distension and splenic palpation	Y	Bedside clinic, DOAP session	Skill assessment	2	9–54
IM1.12	Demonstrate peripheral pulse, volume, character, quality and variation in various causes of heart failure	Y	Bedside clinic, DOAP session	Skill assessment	4	138
IM1.13	Measure the blood pressure accurately, recognize and discuss alterations in blood pressure in valvular heart disease and other causes of heart failure and cardiac tamponade	Y	Bedside clinic, DOAP session	Skill assessment	2	19–25
IM1.14	Demonstrate and measure jugular venous distension	Y	Bedside clinic, DOAP session	Skill assessment	4	23, 103
IM1.15	Identify and describe the timing, pitch quality conduction and significance of precordial murmurs and their variations	Y	Bedside clinic, DOAP session	Skill assessment	4	130
IM1.17	Order and interpret diagnostic testing based on the clinical diagnosis including 12-lead ECG, chest radiograph, blood cultures	Y	Bedside clinic, DOAP session	Skill assessment	4, 11	104, 387–427
IM1.18	Perform and interpret a 12-lead ECG	Y	Bedside clinic, DOAP session	Skill assessment	4, 11	104, 387–427
IM1.20	Determine the severity of valvular heart disease based on the clinical and laboratory and imaging features and determine the level of intervention required including surgery		Small group discussion, Lecture, Bedside clinic	Written/Skill assessment	6	313
IM1.21	Describe and discuss and identify the clinical features of acute and subacute endocarditis, echocardiographic findings, blood culture and sensitivity and therapy	Y	Bedside clinic, Small group discussion, Lecture	Skill assessment	4	113
IM1.23	Describe, prescribe and communicate non-pharmacologic management of heart failure including sodium restriction, physical activity and limitations		Lecture, Small group discussion	Skill assessment	4	101

Number	COMPETENCY The student should be able to	Core Y/N	Suggested learning methods	Suggested assessment methods	Chapter number	Page number
IM1.26	Develop document and present a management plan for patients with heart failure based on type of failure, underlying etiology	Y	Bedside clinic, Skill assessment, Small group discussion	Bedside clinic/Skill assessment/ Written	16	520, 537
IM2.6	Elicit document and present an appropriate history that includes onset evolution, presentation risk factors, family history, comorbid conditions, complications, medication, history of atherosclerosis, IHD and coronary syndromes		Bedside clinic, DOAP session	Skill assessment	4	97–140
IM2.7	Perform, demonstrate and document a physical examination including a vascular and cardiac examination that is appropriate for the clinical presentation	Y	Bedside clinic, DOAP session	Skill assessment	2,11	8–51 and 399
IM2.8	Generate document and present a differential diagnosis based on the clinical presentation and prioritize based on "cannot miss", most likely diagnosis and severity	Y	Bedside clinic, DOAP session	Skill assessment	2, 11	8–51 and 399
IM2.9	Distinguish and differentiate between stable and unstable angina and AMI based on the clinical presentation	Y	Bedside clinic, DOAP session	Skill assessment	4	107
IM2.10	Order, perform and interpret an ECG	Y	Bedside clinic, DOAP session	Skill assessment	4,11	104, 387–427
IM2.11	Order and interpret a chest X-ray and markers of acute myocardial infarction	Y	Bedside clinic, DOAP session	Skill assessment	12	428–441
IM2.12	Choose and interpret a lipid profile and identify the desirable lipid profile in the clinical context	Y	Bedside clinic, DOAP session	Skill assessment	16	545
IM3.4	Elicit document and present an appropriate history including the evolution, risk factors including immune status and occupational risk	Y	Bedside clinic, DOAP session	Skill assessment	3	59–95
IM3.5	Perform, document and demonstrate a physical examination including general examination and appropriate examination of the lungs that establishes the diagnosis, complications and severity of disease	Y	Bedside clinic, DOAP session	Skill assessment	3	59–95
IM3.6	Generate document and present a differential diagnosis based on the clinical features, and prioritize the diagnosis based on the presentation	Y	Bedside clinic, DOAP session	Skill assessment	3	59–95
IM3.7	Order and interpret diagnostic tests based on the clinical presentation including: CBC, chest X-ray PA view, Mantoux, sputum Gram stain, sputum culture and sensitivity, pleural fluid examination and culture, HIV testing and ABG	Y	Bedside clinic, DOAP session	Skill assessment	3	59–95, 428–451
IM3.8	Demonstrate in a mannequin and interpret results of an arterial blood gas examination	Y	Bedside clinic, DOAP session	Skill assessment	2	39
IM3.11	Describe and enumerate the indications for further testing including HRCT, viral cultures, PCR and specialized testing	Y	Bedside clinic, DOAP session	Skill assessment	12	428–451
IM3.13	Select, describe and prescribe based on culture and sensitivity appropriate impaling antimicrobial based on the pharmacology and antimicrobial spectrum	Y	Bedside clinic, DOAP session	Skill assessment/ Written/Viva voce	3	59–95
IM3.14	Perform and interpret a sputum Gram stain and AFB	Y	DOAP session	Skill assessment	13	455
IM3.18	Communicate and counsel patient on family on the diagnosis and therapy of pneumonia	Y	DOAP session	Skill assessment	3	59–95

Number	COMPETENCY The student should be able to	Core Y/N	Suggested learning methods	Suggested assessment methods	Chapter number	Page number
IM4.9	Elicit document and present a medical history that helps delineate the etiology of fever that includes the evolution and pattern of fever, associated symptoms, immune status, comorbidities, risk factors, exposure through occupation, travel and environment and medication use	Y	Bedside clinic, DOAP session	Skill assessment	16	518
IM4.10	Perform a systematic examination that establishes the diagnosis and severity of presentation that includes: general skin mucosal and lymph node examination, chest and abdominal examination (including examination of the liver and spleen)	Y	Bedside clinic, DOAP session	Skill assessment	2	8–57
IM4.11	Generate a differential diagnosis and prioritize based on clinical features that help distinguish between infective, inflammatory, malignant and rheumatologic causes	Y	Bedside clinic, DOAP session	Written/Viva voce	2	29–33
IM4.12	Order and interpret diagnostic tests based on the differential diagnosis including: CBC with differential, peripheral smear, urinary analysis with sediment, chest X-ray, blood and urine cultures, sputum Gram stain and cultures, sputum AFB and cultures, CSF analysis, pleural and body fluid analysis, stool routine and culture and QBC	Y	Bedside clinic, Skill assessment	Skill assessment	2, 16	29–33, 518–519
IM4.15	Perform and interpret a malarial smear	Y	DOAP session	Log book/ Documentation/Skill assessment	15	476
IM4.17	Observe and assist in the performance of a bone marrow aspiration and biopsy in a simulated environment	N	Skills laboratory	Log book/Documentation/ DOAP session	13	458
IM4.20	Interpret a PPD (Mantoux)	Y	DOAP session	Log book/ Documentation	13	457
IM4.23	Prescribe drugs for malaria based on the species identified, prevalence of drug resistance and national programs		Small group discussion	Skill assessment	15	476
IM4.24	Develop an appropriate empiric treatment plan based on the patient's clinical and immune status pending definitive diagnosis	Y	DOAP session	Skill assessment	16	518
IM4.25	Communicate to the patient and family the diagnosis and treatment	Y	DOAP session	Skill assessment	16	518
IM4.26	Counsel the patient on malarial prevention	Y	DOAP session	Skill assessment	15	476–477
IM5.9	Elicit document and present a medical history that helps delineate the etiology of the current presentation and includes clinical presentation, risk factors, drug use, sexual history, vaccination history and family history	Y	Bedside clinic, DOAP session	Skill assessment	5	146
IM5.10	Perform a systematic examination that establishes the diagnosis and severity that includes nutritional status, mental status, jaundice, abdominal distension ascites, features of portosystemic hypertension and hepatic encephalopathy	Y	Bedside clinic, DOAP session	Skill assessment	5	518

Number	COMPETENCY The student should be able to	Core Y/N	Suggested learning methods	Suggested assessment methods	Chapter number	Page number
IM5.14	Outline a diagnostic approach to liver disease based on hyperbilirubinemia, liver function changes and hepatitis serology	Y	Bedside clinic, Small group discussion	Viva voce/ Writte	5	147–151
IM5.15	Assist in the performance and interpret the findings of an ascitic fluid analysis	Y	DOAP session	Documentation in log book	5	147–151
IM5.17	Enumerate the indications, precautions and counsel patients on vaccination for hepatitis		Written, Small group discussion	Written/Viva voce	5	142–162
IM6.7	Elicit document and present a medical history that helps delineate the etiology of the current presentation and includes risk factors for HIV, mode of infection, other sexually transmitted diseases, risks for opportunistic infections and nutritional status	Y	Bedside clinic, DOAP session	Skill assessment	15	500–501
IM6.8	Generate a differential diagnosis and prioritize based on clinical features that suggest a specific etiology for the presenting symptom	Y	Bedside clinic, DOAP session, Small group discussion	Skill assessment	15	500
IM6.15	Demonstrate in a model the correct technique to perform a lumbar puncture		Simulation	Skill assessment	13	459
IM6.20	Communicate diagnosis, treatment plan and subsequent follow-up plan to patients	Y	DOAP session	Skills assessment	15	500–501
IM7.11	Elicit document and present a medical history that will differentiate the etiologies of disease	Y	Bedside clinic, DOAP session	Skill assessment	7	334–337
IM7.12	Perform a systematic examination of all joints, muscle and skin that will establish the diagnosis and severity of disease	Y	Bedside clinic, DOAP session	Skill assessment	7	338–357
IM7.17	Enumerate the indications and interpret plain radiographs of joints	Y	Bedside clinic, Small group discussion	Skill assessment/ Written	7	353
IM7.18	Communicate diagnosis, treatment plan and subsequent follow-up plan to patients	Y	DOAP session	Skill assessment/ Written	7	334–357
IM7.20	Select, prescribe and communicate appropriate medications for relief of joint pain	Y	DOAP session	Skill assessment/ Written	7	334
IM7.22	Select, prescribe and communicate treatment option for systemic rheumatologic conditions	Y	DOAP session	Skill assessment/ Written	7	334–358
IM7.24	Communicate and incorporate patient preferences in the choice of therapy	Y	DOAP session	Skill assessment	7	334–358
IM7.25	Develop and communicate appropriate follow-up and monitoring plans for patients with rheumatologic conditions	Y	DOAP session	Skill assessment	7	334–358
IM7.26	Demonstrate an understanding of the impact of rheumatologic conditions on quality of life, well-being, work and family	Y	DOAP session	Skill assessment	7	334–358
IM8.9	Elicit document and present a medical history that includes: duration and levels, symptoms, comorbidities, lifestyle, risk factors, family history, psychosocial and environmental factors, dietary assessment, previous and concomitant therapy	Y	Bedside clinic, DOAP session	Skill assessment	16	516–517
IM8.10	Perform a systematic examination that includes: an accurate measurement of blood pressure, fundus examination, examination of vasculature and heart	Y	Bedside clinic, DOAP session	Skill assessment	2	19–23
IM8.11	Generate a differential diagnosis and prioritize based on clinical features that suggest a specific etiology	Y	Bedside clinic, DOAP session	Skill assessment	2	19–23

Number	COMPETENCY The student should be able to	Core Y/N	Suggested learning methods	Suggested assessment methods	Chapter number	Page number
IM8.15	Recognise, prioritize and manage hypertensive emergencies	Y	DOAP session	Skill assessment/ Written	16	517
IM8.16	Develop and communicate to the patient lifestyle modification including weight reduction, moderation of alcohol intake, physical activity and sodium intake	Y	DOAP session	Skill assessment	10	381–382
IM8.17	Perform and interpret a 12-lead ECG	Y	DOAP session	Documentation in log book/ Skills station	4 and 11	104, 387–427
IM8.18	Incorporate patient preferences in the management of HTN	Y	DOAP session	Skill assessment	10	381–382
IM9.3	Elicit document and present a medical history that includes symptoms, risk factors including GI bleeding, prior history, medications, menstrual history, and family history	Y	Bedside clinic, DOAP session	Skill assessment	16	522
IM9.4	Perform a systematic examination that includes: general examination for pallor, oral examination, DOAP session of hyper dynamic circulation, lymph node and splenic examination	Y	Bedside clinic, DOAP session	Skill assessment	2, 3, 4, 5, 16	34, 60, 94, 115, 143, 162, 517
IM9.5	Generate a differential diagnosis and prioritize based on clinical features that suggest a specific etiology	Y	Bedside clinic, DOAP session	Skill assessment/ Written	16	517
IM9.6	Describe the appropriate diagnostic work up based on the presumed etiology	Y	Bedside clinic, DOAP session	Skill assessment/ Written	15	506
IM9.15	Communicate the diagnosis and the treatment appropriately to patients	Y	DOAP session	Skill assessment	16	517
IM9.20	Communicate and counsel patients with methods to prevent nutritional anemia	Y	DOAP session	Skill assessment	2	34
IM10.12	Elicit document and present a medical history that will differentiate the aetiologies of disease, distinguish acute and chronic disease, identify predisposing conditions, nephrotoxic drugs and systemic causes	Y	Bedside clinic, DOAP session	Skill assessment	16	523–524
IM10.15	Describe the appropriate diagnostic work up based on the presumed etiology	Y	DOAP session, Small group discussion	Skill assessment/ Written/Viva voce	16	523
IM10.17	Describe and calculate indices of renal function based on available laboratories including fractional excretion of sodium (FENa) and creatinine clearance (CrCl)	Y	DOAP session, Small group discussion	Skill assessment/ Written/Viva voce	16	523
IM10.18	Identify the ECG findings in hyperkalemia	Y	DOAP session, Small group discussion	Skill assessment/ Written/Viva voce	11	401
IM10.20	Describe and discuss the indications to perform arterial blood gas analysis: interpret the data	Y	DOAP session, Bedside clinic	Documentation in logbook	2	39
IM10.21	Describe and discuss the indications for and insert a peripheral intravenous catheter	N	DOAP session	Skill assessment with model	13	461

Number	COMPETENCY The student should be able to	Core Y/N	Suggested learning methods	Suggested assessment methods	Chapter number	Page number
IM11.7	Elicit document and present a medical history that will differentiate the etiologies of diabetes including risk factors, precipitating factors, lifestyle, nutritional history, family history, medication history, comorbidities and target organ disease	Y	Bedside clinic, DOAP session	Skill assessment	10	380
IM11.11	Order and interpret laboratory tests to diagnose diabetes and its complications including: glucoses, glucose tolerance test, glycosylated hemoglobin, urinary microalbumin, ECG, electrolytes, ABG, ketones, renal function tests and lipid profile	Y	Bedside clinic, DOAP session	Skill assessment	10	381
IM11.19	Demonstrate and counsel patients on the correct technique to administer insulin	Y	DOAP session	Skill assessment	13	452
IM12.5	Elicit document and present an appropriate history that will establish the diagnosis cause of thyroid dysfunction and its severity	Y	Bedside clinic	Skill assessment/ Short case	10	383–384
IM12.6	Perform and demonstrate a systematic examination based on the history that will help establish the diagnosis and severity including systemic signs of thyrotoxicosis and hypothyroidism, palpation of the pulse for rate and rhythm abnormalities, neck palpation of the thyroid and lymph nodes and cardiovascular findings	Y	Bed side clinic, DOAP session	Skill assessment	10	383–384
IM12.9	Order and interpret diagnostic testing based on the clinical diagnosis including CBC, thyroid function tests and ECG and radioiodine uptake and scan	Y	Bedside clinic, DOAP session	Skill assessment	11	387–401
IM12.10	Identify atrial fibrillation, pericardial effusion and bradycardia on ECG	Y	Bedside clinic, Laboratory	Skill assessment	11	387–401
IM12.10	Identify atrial fibrillation, pericardial effusion and bradycardia on ECG	Y	Bedside clinic, Laboratory	Skill assessment	16	545
IM14.7	Perform, document and demonstrate a physical examination based on the history that includes general examination, measurement of abdominal obesity, signs of secondary causes and comorbidities	Y	Bedside clinic, Skills laboratory	Skill assessment	2	56
IM15.2	Enumerate, describe and discuss the evaluation and steps involved in stabilizing a patient who presents with acute volume loss and gastrointestinal bleed	Y	Bedside clinic	Skill assessment	5	142–185
IM15.4	Elicit and document and present an appropriate history that identifies the route of bleeding, quantity, grade, volume loss, duration, etiology, comorbid illnesses and risk factors	Y	Bedside clinic, Skills laboratory	Skill assessment	5	142–185
IM15.5	Perform, demonstrate and document a physical examination based on the history that includes general examination, volume assessment and appropriate abdominal examination	Y	Lecture, Small group discussion	Short note/Viva voce	5	142–185
IM15.6	Distinguish between upper and lower gastrointestinal bleeding based on the clinical features	Y	DOAP session	Skill assessment	5	142–185

Number	COMPETENCY The student should be able to	Core Y/N	Suggested learning methods	Suggested assessment methods	Chapter number	Page number
IM15.7	Demonstrate the correct technique to perform an anal and rectal examination in a mannequin or equivalent	Y	Bedside clinic, Skills laboratory	Skill assessment/ Short note/Viva voce	5	142–185
IM15.8	Generate a differential diagnosis based on the presenting symptoms and clinical features and prioritize based on the most likely diagnosis	Y	Bedside clinic, DOAP session, Small group discussion	Skill assessment/ Short note/Viva voce	5	142–185
IM15.9	Choose and interpret diagnostic tests based on the clinical diagnosis including complete blood count, PT and PTT, stool examination, occult blood, liver function tests, *H. pylori* test	Y	Bedside clinic, DOAP session, Small group discussion	Skill assessment/ Short note/Viva voce	5	142–185
IM16.4	Elicit and document and present an appropriate history that includes the natural history, dietary history, travel, sexual history and other concomitant illnesses	Y	Bedside clinic, Skills laboratory	Skill assessment	5, 15, 16	149, 150, 507, 521
IM16.5	Perform, document and demonstrate a physical examination based on the history that includes general examination, including an appropriate abdominal examination	Y	Bedside clinic, Skills laboratory	Skill assessment	5, 15, 16	149, 150, 507, 521
IM16.6	Distinguish between diarrhea and dysentery based on clinical features	Y	Lecture, Small group discussion	Short note/Viva voce		
IM16.7	Generate a differential diagnosis based on the presenting symptoms and clinical features and prioritize based on the most likely diagnosis	Y	Bedside clinic, Skills laboratory	Skill assessment/ short note/Viva voce	5, 15, 16	149, 150, 507, 521
IM16.8	Choose and interpret diagnostic tests based on the clinical diagnosis including complete blood count, and stool examination	Y	Bedside clinic, Skills laboratory , Small group discussion	Skill assessment/ Short note/Viva voce	5, 15, 16	149, 150, 507, 521
IM17.2	Elicit and document and present an appropriate history including aura, precipitating aggravating and relieving factors, associated symptoms that help identify the cause of headaches	Y	Bedside clinic, Small group discussion	Bedside clinic/Skill assessment	6	187
IM17.4	Perform and demonstrate a general neurologic examination and a focused examination for signs of intracranial tension including neck signs of meningitis	Y	Bedside clinic, Small group discussion	Bedside clinic/Skill assessment	6, 13	187, 460
IM17.5	Generate document and present a differential diagnosis based on the clinical features, and prioritize the diagnosis based on the presentation	Y	Bedside clinic, Small group discussion	Bedside clinic/ skill assessment	6	187
IM17.8	Demonstrate in a mannequin or equivalent the correct technique for performing a lumbar puncture	Y	DOAP session	Skill assessment	13	459
IM17.9	Interpret the CSF findings when presented with various parameters of CSF fluid analysis	Y	Small group discussion, Bedside clinic	Skill assessment	16	546
IM18.3	Elicit and document and present an appropriate history including onset, progression, precipitating and aggravating relieving factors, associated symptoms that help identify the cause of the cerebrovascular accident	Y	Bedside clinic	Skill assessment	6	193, 312

Number	COMPETENCY The student should be able to	Core Y/N	Suggested learning methods	Suggested assessment methods	Chapter number	Page number
IM18.5	Perform, demonstrate and document physical examination that includes general and a detailed neurologic examination as appropriate, based on the history	Y	Bedside clinic, DOAP session	Skill assessment	6	186–193
IM18.6	Distinguish the lesion based on upper versus lower motor neuron, side, site and most probable nature of the lesion	Y	Bedside clinic, DOAP session	Skill assessment	6	235
IM18.7	Describe the clinical features and distinguish, based on clinical examination, the various disorders of speech	N	Bedside clinic, DOAP session	Skill assessment	6	290
IM18.10	Choose and interpret the appropriate diagnostic testing in young patients with a cerebrovascular accident (CVA)		Lecture, Small group discussion	Written/Viva voce	6	193, 312
IM18.16	Enumerate the indications describe and observe the multidisciplinary rehabilitation of patients with a CVA		Lecture, Small group discussion	Written/Viva voce	6	193, 312
IM19.3	Elicit and document and present an appropriate history including onset, progression precipitating and aggravating relieving factors, associated symptoms that help identify the cause of the movement disorders	Y	Bedside clinic	Skill assessment	6	303
IM19.4	Perform, demonstrate and document a physical examination that includes a general examination and a detailed neurologic examination using standard movement rating scales	Y	Bedside clinic	Skill assessment	6	303
IM19.5	Generate document and present a differential diagnosis and prioritize based on the history and physical examination	Y	Bedside clinic	Skill assessment	6	303
IM19.6	Make a clinical diagnosis regarding on the anatomical location, nature and cause of the lesion based on the clinical presentation and findings	Y	Bedside clinic	Skill assessment	6	303
IM20.4	Elicit and document and present an appropriate history, the circumstance, time, kind of snake, evolution of symptoms in a patient with snake bite	Y	Bedside clinic, DOAP session	Skill assessment	6	220, 221
IM20.6	Choose and interpret the appropriate diagnostic testing in patients with snake bites		Small group discussion	Written/Viva voce	6	220, 221
IM23.5	Counsel and communicate to patients in a simulated environment with illness on an appropriate balanced diet	Y	DOAP session	Skill assessment	2	51
IM24.2	Perform multidimensional geriatric assessment that includes medical, psycho-social and functional components	Y	Bedside clinic, DOAP session	Skill assessment	8	360–366
IM25.5	Perform a systematic examination that establishes the diagnosis and severity of presentation that includes: general skin, mucosal and lymph node examination, chest and abdominal examination (including examination of the liver and spleen)	Y	Bedside clinic, DOAP session	Skill assessment	2	8–57
IM25.6	Generate a differential diagnosis and prioritize based on clinical features that help distinguish between infective, inflammatory, malignant and rheumatologic causes	Y	Bedside clinic, DOAP session	Written/Viva voce	16	512
IM25.9	Assist in the collection of blood and other specimen cultures	Y	DOAP session	Log book documentation	13	452

Number	COMPETENCY The student should be able to	Core Y/N	Suggested learning methods	Suggested assessment methods	Chapter number	Page number
IM25.11	Develop an appropriate empiric treatment plan based on the patient's clinical and immune status pending definitive diagnosis	Y	DOAP session	Skill assessment	16	511
IM25.12	Communicate to the patient and family the diagnosis and treatment of identified infection	Y	DOAP session	Skill assessment	16	511
IM25.13	Counsel the patient and family on prevention of various infections due to environmental issues	Y	DOAP session	Skill assessment	16	511
IM26.19	Demonstrate ability to work in a team of peers and superiors	Y	Bedside clinic, DOAP session	Skill assessment	1	1–3
IM26.20	Demonstrate ability to communicate to patients in a patient, respectful, non-threatening, non-judgmental and empathetic manner	Y	Bedside clinic, DOAP session	Skill assessment	1	1–7
IM26.21	Demonstrate respect to patient privacy	Y	Bedside clinic, DOAP session	Skill assessment	1	1–7
IM26.22	Demonstrate ability to maintain confidentiality in patient care	Y	Bedside clinic, DOAP session	Skill assessment	1	1–7
IM26.23	Demonstrate a commitment to continued learning		Small group discussion	Skill assessment/ Viva voce	1	1–7
IM26.24	Demonstrate respect in relationship with patients, fellow team members, superiors and other healthcare workers	Y	Bedside clinic, DOAP session	Skill assessment/ Viva voce	1	1–7
IM26.25	Demonstrate responsibility and work ethics while working in the healthcare team	Y	Bedside clinic, DOAP session	Skill assessment/ Viva voce	1	1–7
IM26.26	Demonstrate ability to maintain required documentation in health care (including correct use of medical records)		Small group discussion	Skill assessment/ Viva voce	1	1–7
IM26.27	Demonstrate personal grooming that is adequate and appropriate for healthcare responsibilities		Small group discussion	Skill assessment	1	1–7
IM26.28	Demonstrate adequate knowledge and use of information technology that permits appropriate patient care and continued learning		Small group discussion	Skill assessment/ Viva voce	1	1–7
IM26.29	Communicate diagnostic and therapeutic options to patient and family in a simulated environment	Y	Bedside clinic, DOAP session	Skill assessment/ Viva voce	1	1–7
IM26.30	Communicate care options to patient and family with a terminal illness in a simulated environment	Y	Bedside clinic, DOAP session	Skill assessment/ Viva voce	1	1–7
IM26.31	Demonstrate awareness of limitations and seeks help and consultations appropriately	Y	Bedside clinic, DOAP session	Skill assessment/ Viva voce	1	1–7
IM26.32	Demonstrate appropriate respect to colleagues in the profession		Small group discussion	Skill assessment/ Viva voce	1	1–7
IM26.33	Demonstrate an understanding of the implications and the appropriate procedures and response to be followed in the event of medical errors		Small group discussion	Skill assessment/ Viva voce	1	1–7
IM26.34	Identify conflicts of interest in patient care and professional relationships and describe the correct response to these conflicts		Small group discussion	Skill assessment/ Viva voce	1	1–7

Number	COMPETENCY The student should be able to	Core Y/N	Suggested learning methods	Suggested assessment methods	Chapter number	Page number
IM26.35	Demonstrate empathy in patient encounters	Y	Bedside clinic, DOAP session	Skill assessment/ Viva voce	1	1–7
IM26.36	Demonstrate ability to balance personal and professional priorities		Small group discussion	Skill assessment/ Viva voce	1	1–7
IM26.37	Demonstrate ability to manage time appropriately		Small group discussion	Skill assessment/ Viva voce	1	1–7
IM26.38	Demonstrate ability to form and function in appropriate professional networks		Small group discussion	Skill assessment/ Viva voce	1	1–7
IM26.39	Demonstrate ability to pursue and seek career advancement		Small group discussion	Skill assessment/ Viva voce	1	1–7
IM26.40	Demonstrate ability to follow risk management and medical error reduction practices where appropriate		Small group discussion	Skill assessment/ Viva voce	1	1–7
IM26.41	Demonstrate ability to work in a mentoring relationship with junior colleagues		Small group discussion	Skill assessment/ Viva voce	1	1–7
IM26.42	Demonstrate commitment to learning and scholarship		Small group discussion	Skill assessment/ Viva voce	1	1–7
IM26.49	Administer informed consent and appropriately address patient queries to a patient being enrolled in a research protocol in a simulated environment	Y	Bedside clinic, DOAP session	Written/Viva voce	1	1–7

CHAPTER

4 Cardiovascular System Examination

A. CASE SHEET FORMAT

HISTORY TAKING

Name:

Age:

Sex:

Residence:

Occupation:

Chief complaints (describe in chronological order):

1. _____ × days
2. _____ × days
3. _____ × days

Dyspnea:

- Duration
- Onset
- Grade
- Progression
- Aggravating factors
- Relieving factors
- Orthopnea
- Trepopnea
- Platypnea
- Bendopnea
- Paroxysmal nocturnal dyspnea
- Associated symptoms
  - Wheeze
  - Cough with expectoration

Chest pain:

- Duration
- Onset
- Site
- Type of pain
- Radiation
- Diurnal variation (nocturnal angina)
- Aggravating factors
- Relieving factors
- Associated symptoms
  - Nausea, vomiting, sweating
- Dyspepsia
- Local tenderness
- Angina equivalents.
  - Dyspnea
  - Diaphoresis
  - Discomfort in lower jaw
  - Dyspeptic symptoms
  - Fatigue

Palpitations:

- Duration
- Onset
- Fast or slow
- Regular or irregular
- Precipitating factors
- Associated symptoms
  - Stoke Adams
- Post-palpitation diuresis

Syncope:

- Duration
- Onset
- No of attacks
- Awareness
- Precipitating factors
- Associated symptoms

Pedal edema:

- Duration
- Onset
- Progression
- Aggravating factors
- Relieving factors
- Is it preceded by facial puffiness or followed by facial puffiness?

Other symptoms:

- Hemoptysis
- Cyanosis
- Decreased urine output
- Gastrointestinal symptoms
- Right hypochondrial pain

- Fatigability
- Fever
- Rheumatic fever history
- Infective endocarditis
- Cyanotic spells
- Squatting after exertion

Past history:
- Asthma
- Chronic obstructive airway disease
- Tuberculosis
- History of contact with tuberculosis
- Diabetes mellitus
- Hypertension
- Ischemic heart disease (IHD)
- Seizure disorder
- History of sudden cardiac death.

Family history:
Three generation pedigree chart to be drawn

Personal history:
- Bowel habits
- Bladder habits
- Appetite
- Loss of weight
- Occupational exposure
- Sleep
- Dietary habits and taboo
- Food allergies
- Smoking Index or Pack years
- Alcohol history (if yes mention in grams of alcohol)

Treatment history:
- Drugs using
- Frequency of drug (e.g., drug taken 5 times a week most likely to be digoxin)
- Duration of usage
- Any blood test to be monitored (e.g., INR for warfarin)
- Any intramuscular injections (once in 3 weeks IM injection most likely to be benzathine penicillin for rheumatic heart disease prophylaxis)

Menstrual and obstetric history:
- Gravida, parity, live births, abortions (GPLA)
- Age of menarche
- Menopause at
- Duration

Summarize:

Differential diagnosis:
1.
2.
3.

GENERAL EXAMINATION

Patient

- Conscious
- Coherent
- Cooperative
- Obeying commands

Body Mass Index (BMI)

- Weight (kg)/H^2(meters)
- Grading according to WHO for Southeast Asian countries
- Arm span
- Upper segment: Lower segment ratio

Vitals Examination

- Pulse
  - Rate
  - Rhythm
  - Volume
  - Character
  - Vessel wall thickening
  - Radioradial delay and radiofemoral delay
  - Peripheral pulses
- Blood pressure
  - Right arm
  - Left arm
  - Leg—right and left
  - Postural drop in BP
- Respiratory rate
  - Regular/irregular
  - Abdominothoracic (male) or thoracoabdominal (female)
  - Usage of accessory muscles
- Jugular venous pressure
  - Centimeter (cm) of water (blood) above sternal angle (+ 5 cm from the right atria)
- Jugular venous pulse
  - Waveform
- Pulse oximetry

Physical Examination

- Pallor:
- Icterus:
- Cyanosis:
- Clubbing:
- Lymphadenopathy:
- Edema:

Others

- Signs of infective endocarditis
- Signs of rheumatic fever
- Any dysmorphies/stigmata od congenital heart disease

SYSTEMIC EXAMINATION

Inspection

- Chest shape and symmetry
- Breast abnormalities
- Spine deformity
- Scars
- Precordial prominence

Contd...

B. DIAGNOSIS FORMAT

ACQUIRED/CONGENITAL HEART DISEASE

NOTES

For Acquired Heart Disease

- Acquired heart disease possible etiology (rheumatic/ischemic/cardiomyopathy/degenerative)
- Valvular involvement (MS/MR/AS/AR/others) with severity grading
- With/without evidence of pulmonary artery hypertension (grading)
- Patient in or not in atrial fibrillation (if AF present look for signs of thromboembolism)
- With or without evidence of heart failure (right/left/congestive)
- With or without signs of infective endocarditis
- With or without signs of active rheumatic carditis
- Patient is in NYHA (New York Heart Association) class (I/II/III/IV)

Example: Acquired valvular heart disease, possibly rheumatic etiology, with severe mitral stenosis and moderate mitral regurgitation, with severe pulmonary artery hypertension, patient in atrial fibrillation and congestive cardiac failure, with no signs of infective endocarditis, thromboembolism or active rheumatic carditis. Patient is in NYHA class III.

For Congenital Heart Disease

- Congenital cyanotic/acyanotic heart disease
- Type of defect (shunt/obstructive)
- With/without evidence of pulmonary artery hypertension (grading)
- Patient in or not in atrial fibrillation (if AF present look for signs of thromboembolism)
- With or without evidence of heart failure (right/left/congestive)
- With or without signs of infective endocarditis
- Patient is in NYHA class (I/II/III/IV).

Note: Mention if any features of dysmorphic facies or syndromes.

Example: Congenital acyanotic heart disease, atrial septal defect with pulmonary artery hypertension, with left to right shunt, patient not in atrial fibrillation, no evidence of heart failure or infective endocarditis. Patient in NYHA class II. Patient has features of Holt–Oram syndrome.

C. DISCUSSION ON CARDIAC CYCLE

SYSTOLE AND DIASTOLE

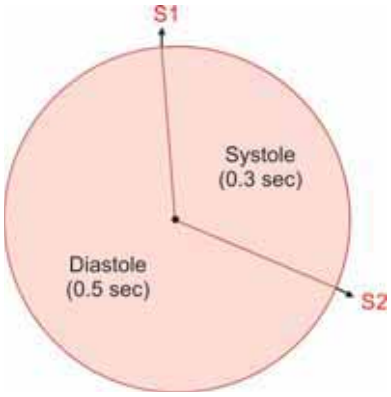

Fig. 4C.1: Systole and diastole.

In **Figure 4C.1**, cardiac cycle is represented as cyclical events beginning from S1 and ending back at S1 in clockwise fashion. Assuming the heart rate of 72 beats/min, each cardiac cycle is of 0.8 seconds duration. 0.3 seconds is ventricular systole and 0.5 seconds is ventricular diastole.

Systole is represented by S1 to S2 in clockwise direction and diastole is represented by S2 to S1 in clockwise direction. And these events continuously repeat.

EVENTS OF CARDIAC CYCLE

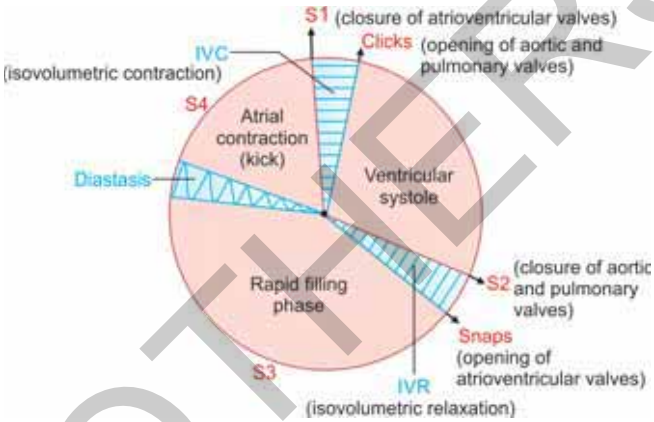

Fig. 4C.2: Major events during cardiac cycle.

Let us describe the cardiac events in clockwise fashion beginning from S1

S1	S1 marks the closure of the atrioventricular valves (mitral and tricuspid valves)
Isovolumetric contraction	Next, the ventricles begin to contract; however, the aortic and pulmonary valves are not yet open. This phase of ventricular contraction where both AV valves and aortic/pulmonary valves are closed is called as **isovolumetric contraction** as depicted in **Figure 4C.2**
Clicks	Opening of aortic and pulmonary valves causes sounds called clicks
Ventricular systole	Immediately after opening of aortic and pulmonary valves, blood in the ventricles is ejected out
S2	Next, the semilunar valves (aortic and pulmonary) close producing heart sound S2
Isovolumetric relaxation	The ventricles begin to relax but the atrioventricular valves are yet to open. This phase where ventricles relax but both atrioventricular valves and aortic/ pulmonary valves are closed is called as **isovolumetric relaxation**
Snaps	Opening of atrioventricular valves causes diastolic sounds called "Snaps"
Rapid filling phase of ventricular diastole—S3	Opening of AV valves is followed by rapid filling of ventricle due to pressure difference
Diastasis	The pressure difference gradually reduces and the flow between the atria and ventricles minimizes. This phase of cardiac cycle where the blood flow between atria and ventricles is minimum is called the **"diastasis"**
Atrial contraction (KICK)—S4	Diastasis is followed by atrial contraction/atrial kick which is responsible for pumping the additional blood from atrium into the ventricles. At the end of atrial contraction, the atrioventricular valves close producing heart sound S1 and cycle repeats

Jugular Venous Pressure Waveform—Timing with Other Cardiac Events

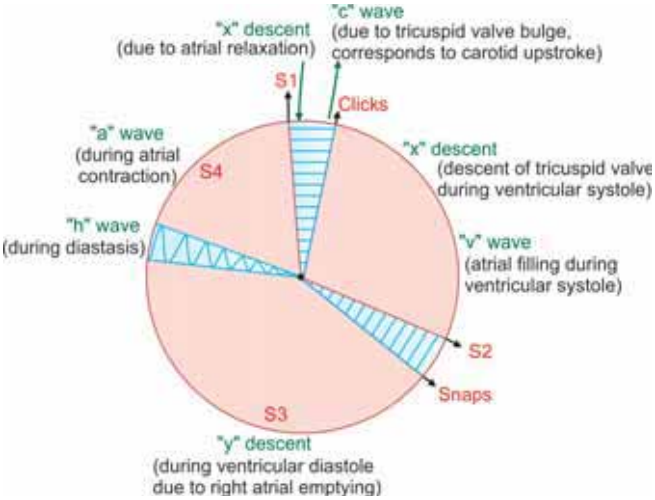

Fig. 4C.3: Timing of JVP with cardiac events.

Now, let us superimpose waves of jugular venous pressure (JVP) onto the cardiac cycle. JVP has the following waves, starting from a, x, c, x', v, y, and h which repeat in a cyclical fashion. Clinically appreciable waves are four, two in systole (i.e., "x" descent and "v" wave) and two in diastole (i.e., "y" descent and "a" wave). The timing of JVP with respect to cardiac cycle has been depicted in **Figure 4C.3**. The waves in JVP include:

"a" wave	■ It coincides with atrial contraction ■ It is seen in diastole and ■ It precedes S1
X wave (initial x descent)	■ It is due to atrial relaxation ■ It is seen in systole ■ It follows S1
C wave	■ It is due to bulge of tricuspid valve into the right atrium ■ It is seen in systole ■ Coincides with carotid upstroke ■ Absent in humans
X' wave (x descent following 'c' wave)	■ It is due to descent in floor of RA with downward pull of TV with continued ventricular contraction ■ It is seen in systole ■ It follows clicks (if audible)
V wave	■ It is due to atrial filling during ventricular systole ■ Seen in late systole extends up to early diastole ■ It precedes S2
Y wave	■ It is due to RA emptying during ventricular diastole ■ Seen in diastole (after IVR phase) ■ It follows opening snap (if audible)
h wave (Hirschfelder wave)	■ It is brief positive wave during the diastasis ■ Seen in diastole just before a-wave ■ Not clinically appreciable ■ Referred as z point by Paul wood

CARDIAC MURMURS—TIMING WITH OTHER CARDIAC EVENTS (FIG. 4C.4)

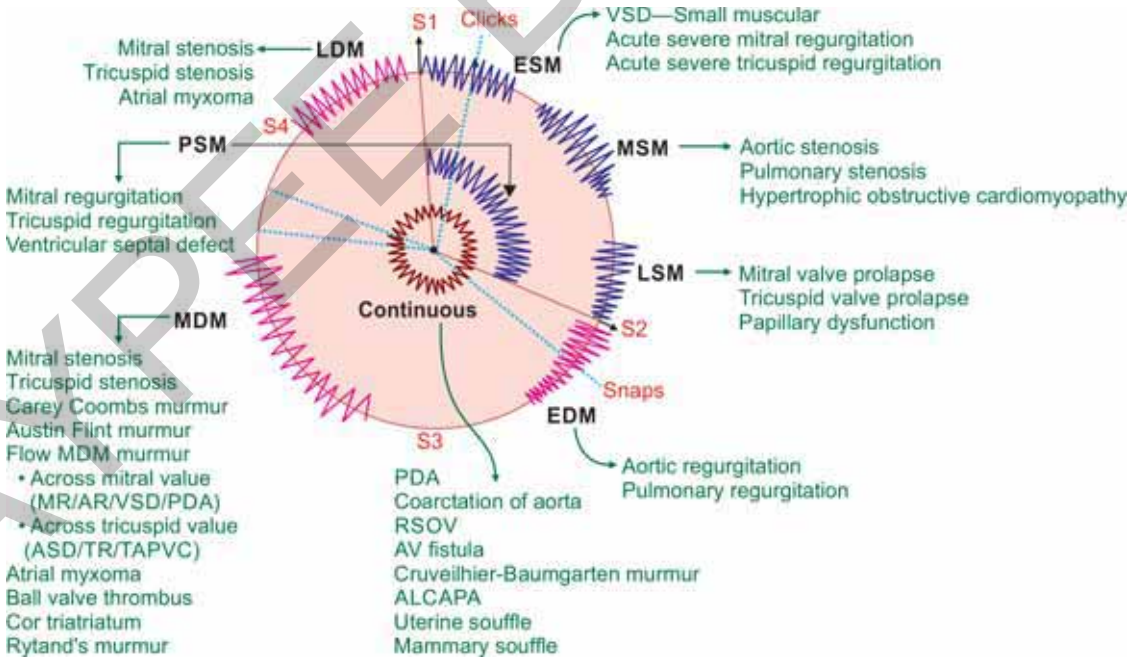

Fig. 4C.4: Timing of cardiac murmurs and pictorial representation on the diagram of cardiac cycle.

To remember murmurs:

Note 1: **ESM/PSM**—due to valve abnormalities of mitral and tricuspid valve (regurgitant lesions); **MSM**—due to valve abnormalities of aortic and pulmonary valve (stenotic lesions); **LSM**—due to prolapse of mitral and tricuspid valve; **EDM**—due to valve abnormalities of aortic and pulmonary valve (regurgitant lesions); **MDM**—due to valve abnormalities of mitral and tricuspid valve; **LDM**—atrial myxomas.

Note 2: **Early murmurs** are regurgitant lesions; **Mid murmurs** are stenotic lesions; **Late murmurs** are prolapse/papillary dysfunction/myxomas

Contd...

D. DISCUSSION ON CARDINAL SYMPTOMS

CHEST PAIN

Chest pain is a common symptom of cardiac disease. It can be due to noncardiac causes such as anxiety or diseases involving the respiratory, musculoskeletal or gastrointestinal systems. It can be acute, ongoing or episodic in nature. Episodic is most common type and classified into typical, atypical and noncardiac chest pain based on the presence or absence of three features:

1. Precipitated by exertion or emotional stress
2. Quality—retrosternal heaviness or squeezing
3. Relieved by rest or with nitrates

Typical—all three criteria are met

Atypical—only two criteria are met

Noncardiac chest pain—meet only one criteria

Causes of Chest Pain (Fig. 4D.1)

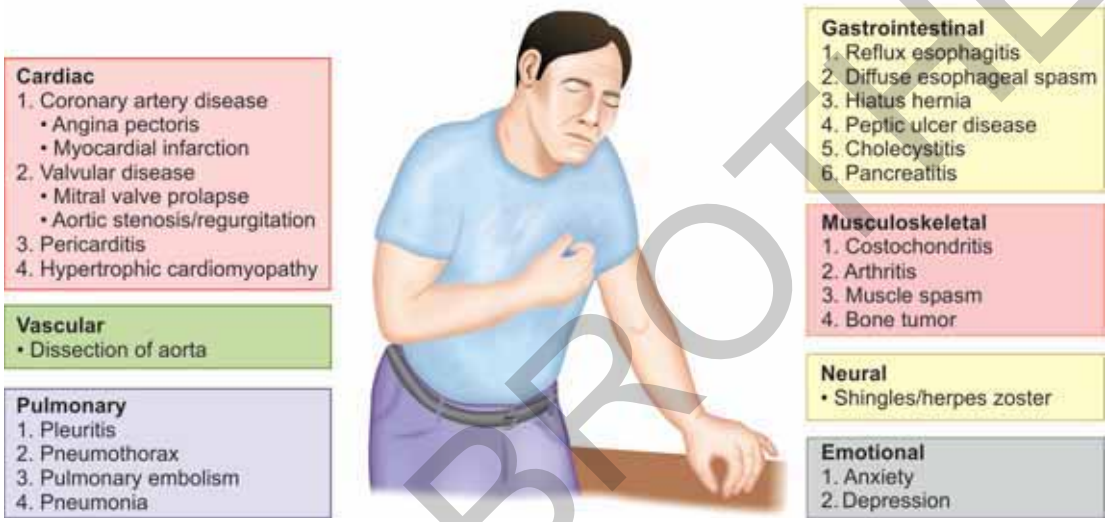

Fig. 4D.1: Causes of chest pain.

Differential Diagnosis of Chest Pain (Table 4D.1)

TABLE 4D.1: Differential diagnosis of chest pain.

Potentially life-threatening causes	*Common non-life-threatening causes*
■ Acute coronary syndromes: Acute myocardial infarction (MI), ST-segment elevation MI, non-ST-segment elevation MI ■ Unstable angina ■ Pulmonary embolism ■ Aortic dissection ■ Myocarditis (most common cause of sudden death in the young) ■ Tension pneumothorax ■ Acute chest syndrome/ crisis in sickle cell anemia ■ Pericarditis ■ Boerhaave's syndrome (perforated esophagus) ■ Gastrointestinal: Perforated peptic ulcer, acute pancreatitis, acute cholecystitis	■ Gastrointestinal ● Biliary colic ● Gastroesophageal reflux disease ● Peptic ulcer disease ■ Pulmonary ● Pneumonia ● Pleuritis ■ Musculoskeletal pain: Costochondritis (Tietze's syndrome), intercostal myalgia/neuralgia, fracture of the ribs (cough, trauma), secondaries in the ribs, Bornholm disease ■ Thoracic radiculopathy: Texidor's twinge (precordial catch syndrome) ■ Emotional: Anxiety ■ Neural: Shingles/herpes zoster

Differential Features of Ischemic Cardiac and Noncardiac Pain (Table 4D.2)

TABLE 4D.2: Differential features of ischemic cardiac and noncardiac pain.

Features	*Ischemic cardiac pain*	*Noncardiac pain*
Site	Central, diffuse	Peripheral, localized
Character of pain	Tight, squeezing, dull, constricting, choking or 'heavy'	Sharp, stabbing, catching
Precipitation/ provocation	Exertion, emotion, cold weather or postprandial	Spontaneous, not related to exertion and reproducible with palpation
Radiation	Jaw/neck/shoulder	Usually no radiation
Relieving factors	Rest (in less than 5 minutes), nitrates **Note:** Patients with UA can have characteristic angina that does not relieve with rest or nitrates completely—s/o ongoing ischemia	Not relieved by rest or by nitrates
Associated features	Breathlessness, diaphoresis, nausea and vomiting (features s/o autonomic system activation)	Depends on the cause

Differentiating Features of the Common Causes of Chest Pain (Table 4D.3)

TABLE 4D.3: Differentiating features of the common causes of chest pain.

Disease	*Description*	*Location*	*Radiation*	*Associations*
Acute coronary syndromes	Crushing, tightening, squeezing, or pressure like	Retrosternal, left anterior chest or epigastric	Right (R) or left (L) shoulder, R or L arm/hand/jaw	Dyspnea, diaphoresis, nausea
Pulmonary embolism	Heaviness, tightness	Whole chest (massive) or focal chest (segmental)	None	Dyspnea, unstable vital signs, feeling of impending doom if massive or just tachycardia, tachypnea if segmental
Aortic dissection	Ripping, tearing	Midline, substernal	Interscapular area of back	Secondary arterial occlusion of aortic branches (e.g., paraplegia-subclavian artery involvement)
Pericarditis/ cardiac tamponade	Sharp, constant or pleuritic	Substernal	None	Fever, dyspnea, pericardial friction rub
Pneumothorax	Sudden, sharp, lancinating, pleuritic	One side of chest	Shoulder, back	Dyspnea
Perforated esophagus	Sudden, sharp, after forceful vomiting	Substernal	Back	Dyspnea, diaphoresis, signs of sepsis

Types of angina	
Angina	Angina is a symptom of myocardial ischemia that is recognized clinically by its character, its location and its relation to provocative stimuli
Stable angina	Angina is typical in character that occurs on exertion or emotion or postprandially or during cold weather lasting for less than 5 minutes and does not have increasing severity. Relieves with rest or sublingual nitrates
Unstable angina	This is a form of acute coronary syndrome. It has at least one of these three features: 1. It occurs at rest (or with minimal exertion), usually lasting more than 10 minutes 2. It is severe and of new onset (i.e., within the prior 4–6 weeks) 3. It occurs with a crescendo pattern (i.e., distinctly more severe, prolonged, or frequent than before)
Variant angina/ prinzmetal angina	Caused due to epicardial coronary artery vasospasm; most common in middle-aged females
Microvascular angina/cardiac syndrome X	Angina-like chest pain in the context of normal epicardial coronary arteries on angiography with microvascular endothelial dysfunction; unresponsive to nitrates
Episodic angina	This syndrome is one in which pains having the characters of effort angina occurring at longer or shorter intervals independent of effort
Nocturnal angina	Seen in severe aortic regurgitation. Proposed mechanisms are: 1. Bradycardia at night prolongs diastole duration. Regurgitation time is prolonged and coronary perfusion is decreased. 2. Increased LVEDP decrease coronary perfusion in chronic AR [coronary perfusion pressure (CPP) = DBP – LVEDP] 3. Dilated left ventricular (LV), increased LV mass, increased demand (demand supply mismatch) 4. Diastolic coronary stealing, Venturi effect of AR jet
Angina decubitus	It is angina that occurs when a person is lying down (not necessarily only at night) without any apparent cause. Occurs because gravity redistributes fluids in the body; difficult to differentiate from nocturnal angina
Angina of stooping	Angina occurring while bending or stooping due to altered hemodynamics in deficient coronary circulation are exaggerated and produce anginal pain
Second wind, or warm up, angina	Describes patients with ischemic heart disease and exertional angina that forces them to stop; after the first bout of angina, they are able to continue with minor, or even without any, further symptoms ischemic preconditioning and collateral recruitment are proposed mechanisms
Linked angina	It is associated with: 1. Gastroesophageal and duodenal disorders and diseases 2. Gallbladder disease 3. Cervical spondylitis

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Refractory angina	Angina that cannot be controlled with optimal medical therapy and where revascularization is not feasible
Status anginosus	It is a clinical term denoting periods of frequently recurring anginal pain at rest, indistinguishable from the pain of cardiac infarction or from its prodromal manifestation, but without the electrocardiographic and laboratory evidences of classical cardiac infarction
Vincent's angina	Fusospirochetal infection of the pharynx and palatine tonsils, causing "ulceromembranous pharyngitis and tonsillitis"
Ludwig's angina	Severe diffuse cellulitis that presents as an acute onset and spreads rapidly, bilaterally affecting the submandibular, sublingual, and submental spaces
Abdominal angina	Postprandial pain that occurs in the mesenteric vascular occlusive disease; most commonly associated with significant CAD
Angina sine dolore	A painless episode of coronary insufficiency. It is associated with diabetes mellitus and also called silent ischemia

Canadian Cardiovascular Society (CSS) functional classification of angina	
Class I	Ordinary activity (e.g., walking, climbing stairs at own pace) does not bring on angina. Angina occurs only with strenuous, rapid, or prolonged exertion at work or during recreation
Class II	Slight limitation of ordinary activity. Symptoms occur when walking or climbing stairs rapidly, walking up a hill, walking up stairs after a meal, in cold weather, in wind, or when under emotional stress, or only a few hours after waking, and climbing more than one flight of ordinary stairs at a normal pace and in normal conditions
Class III	Marked limitation of ordinary activity. Symptoms occur after walking 50–100 yards on the level, or climbing more than one flight of ordinary stairs in normal conditions
Class IV	Inability to carry on any physical activity without discomfort. Angina may be present at rest

Angina Equivalents

These are commonly seen in elderly and diabetics (with autonomic neuropathy) where ischemic angina is absent and they present with:

- Shortness of breath
- Perspiration/diaphoresis
- Syncope
- Gastrointestinal (GI) symptoms—upper abdominal pain, nausea, and vomiting
- Fatigue
- *Confusion*.

PALPITATIONS

Definition

Palpitation is the term used to describe an uncomfortable increased awareness of one's own heartbeat or the sensation of slow, rapid or irregular heart rhythms.

- Palpitations do not always indicate the presence of arrhythmia and conversely, an arrhythmia can occur without palpitations.
- Palpitations are usually noted when the patient is quietly resting.
- Palpitation can be either intermittent or sustained and either regular or irregular.
- A change in the rate, rhythm or force of contraction can produce palpitations.
- Associated with neck pulsations **(frog's sign in SVT)**

Causes of Palpitations (Table 4D.4)

TABLE 4D.4: Causes of palpitations.

Cardiac causes ■ **Cardiac arrhythmias** ● Premature atrial and ventricular contractions ● Supraventricular and ventricular arrhythmias ■ **Structural heart diseases** ● Atrial myxoma, valvular heart disease ● Congenital heart disease, cardiomyopathy ● Mitral valve prolapse, pacemaker	**Drug induced** ■ Alcohol (use or withdrawal) ■ Atropine ■ Amphetamines ■ Caffeine, nicotine ■ Cocaine ■ Beta agonists, theophylline
Psychosomatic disorders ■ Generalized anxiety, major depression, panic disorder	**Endocrine** ■ Hyperthyroidism, hypoglycemia, pheochromocytoma
High output states ■ Anemia, beriberi, fever, pregnancy, thyrotoxicosis	**Miscellaneous and idiopathic** ■ Emotional stress, hyperventilation, premenstrual syndrome, strenuous physical activity

Duration and Frequency of Palpitations

- Duration may be either short-lasting or persistent.
- Note the onset and offset of palpitations.
- Frequency: It may occur daily, weekly, monthly, or yearly.

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E. DISCUSSION ON EXAMINATION

GENERAL EXAMINATION

Vitals

Pulse, blood pressure and jugular venous pressure: Discussed in detail in Chapter 2B.
Anthropometry: Discussed in the Chapter 2D.

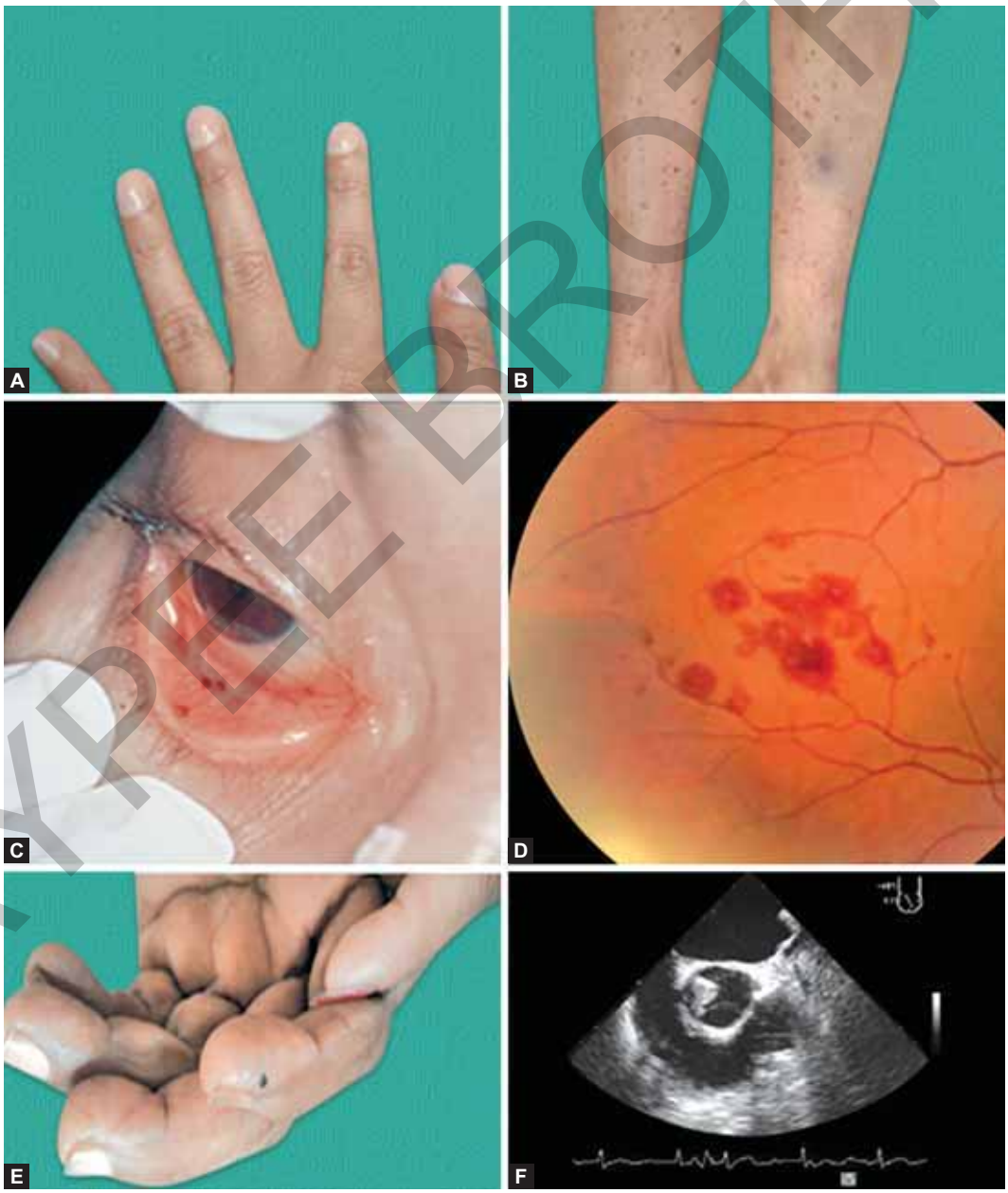
PHYSICAL EXAMINATION

Signs of infective endocarditis (Figs. 4E.1A to F):

- Fever
- Pallor
- Clubbing
- Splinter hemorrhages under nail beds
- Mucosal petechiae
- Janeway lesions
- Osler's nodes
- Roth spots on fundus.

Signs of rheumatic fever:

- Fever
- Arthritis
- Erythema marginatum
- Subcutaneous nodules
- Tachycardia.



Figs. 4E.1A to F: Signs of infective endocarditis: (A) Clubbing; (B) Petechiae; (C) Subconjunctival hemorrhage; (D) Roth spots; (E) Osler's nodes; (F) Echocardiography showing vegetation.

Stigmata of congenital heart disease

Syndrome	Cardiac defects	Other features
Down syndrome (trisomy 21) (CHILD HAS MANY PROBLEM) **(Fig. 4E.2)**	ECD, VSD	■ **C**ataract ■ **H**ypotonia ■ **H**ypothyroidism ■ **I**ncreased gap between 1st and 2nd toe (sandal gap) ■ **L**eukemia ■ **D**uodenal atresia ■ **H**irschsprung's disease ■ **A**lzheimer's disease ■ **S**imian crease ■ **M**ental retardation ■ **M**icrognathia ■ **A**tlantoaxial instability ■ **Ny**stagmus ■ **P**rotruding tongue ■ **P**oor hearing ■ **R**ound face ■ **R**espiratory infections ■ **O**cciput is flat ■ **O**blique palpebral fissure ■ **B**rushfield spots ■ **B**rachycephaly ■ **L**ow nasal bridge ■ **L**anguage problem ■ **E**picanthic fold ■ **E**ar folded ■ **M**ongolian slant ■ **M**yoclonus
Marfan syndrome	Aortic aneurysm, aortic and AML prolapse with MVP and MR	Arachnodactyly with hyperextensibility, subluxation of lens and other joint deformities
William's syndrome	■ Supravalvular AS ■ PA stenosis (peripheral PS most common)	Varying degrees of mental retardation, so-called elfin facies (consisting of some of the following: Upturned nose, flat nasal bridge, long philtrum, flat malar area, wide mouth, full lips, widely spaced teeth, periorbital fullness), hypercalcemia of infancy
Rubella syndrome	PDA and pulmonary stenosis (peripheral PS most common)	**Triad of the syndrome:** Deafness, cataract, and CHDs Others include Intrauterine growth retardation, microcephaly, microphthalmia, hepatitis, neonatal thrombocytopenic purpura
Noonan's syndrome (Turner-like syndrome)	PS (dystrophic pulmonary valve), LVH (or anterior septal hypertrophy)	Similar to Turner's syndrome but may occur in phenotypic male and without chromosomal abnormality
LEOPARD syndrome (multiple lentigines syndrome)	PS, HOCM, long PR interval	Lentiginous skin lesion, ocular hypertelorism, pulmonary stenosis, abnormal genitalia, retarded growth, deafness
Holt-Oram syndrome (cardiac-limb syndrome)	ASD, VSD	Defects or absence of thumb or radius
Ellis–van Creveld syndrome (chondroectodermal dysplasia)	ASD, single atrium	Short stature of prenatal onset, short distal extremities, narrow thorax with short ribs, polydactyly, nail hypoplasia, neonatal teeth
DiGeorge syndrome	Interrupted aortic arch, truncus arteriosus, VSD, PDA, TOF	Hypertelorism, short philtrum, down slanting eyes, hypoplasia or absence of thymus and parathyroid, hypocalcemia, deficient cell-mediated immunity
Cornelia de Lange's (de Lange's) syndrome	VSD	Hirsutism, prenatal growth retardation, microcephaly, anteverted nares, downturned mouth, mental retardation
CHARGE syndrome	TOF, truncus arteriosus, aortic arch anomalies (e.g., vascular ring, interrupted aortic arch)	Coloboma, choanal atresia, growth or mental retardation, genitourinary anomalies, ear anomalies, genital hypoplasia
Ehlers Danlos syndrome	TOF, ASD, great vessel aneurysms	Joint hypermobility, easy bruisability, hernia, kyphoscoliosis

(AS: aortic stenosis; ASD: atrial septal defect; ECD: endocardial cushion defect; HOCM: hypertrophic obstructive cardiomyopathy; LVH: left ventricular hypertrophy; PA: pulmonary artery; PS: pulmonary stenosis; TOF: tetralogy of Fallot; VSD: ventricular septal defect; CHDs: congenital heart diseases; PDA: patent ductus arteriosus)

Features of Down Syndrome (Fig. 4E.2)

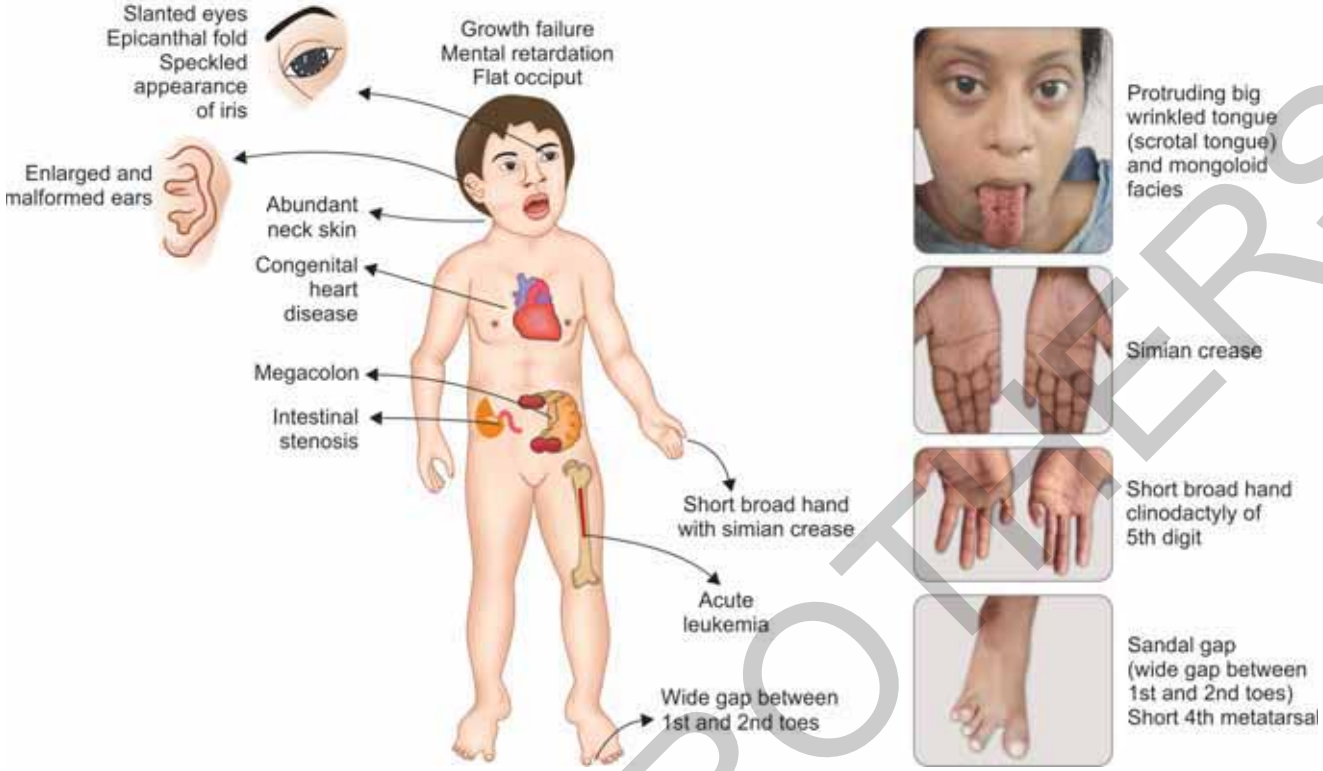


Fig. 4E.2: Features of Down syndrome.

Features of Turner Syndrome (Fig. 4E.3)

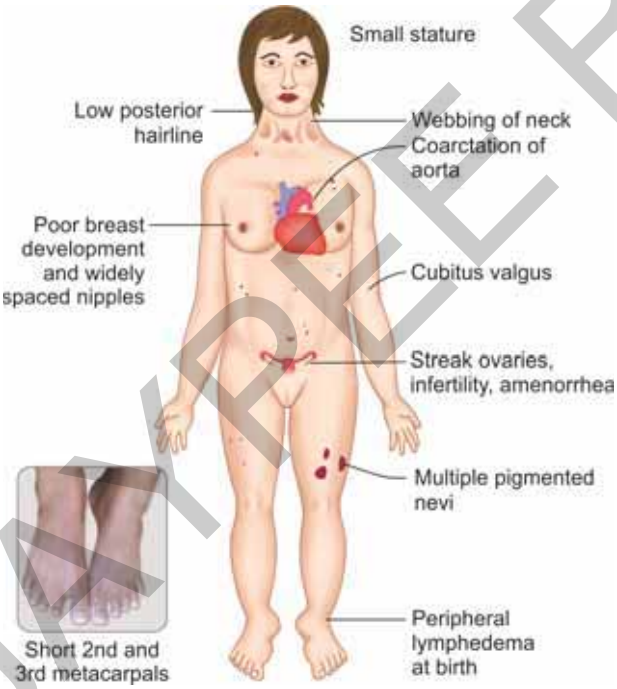


Fig. 4E.3: Features of Turner syndrome.

SYSTEMIC EXAMINATION

All cardiovascular examination must be simultaneously timed with carotid pulse. Findings synchronous with carotid upstroke is systolic and if it is asynchronous, it is diastolic.

Inspection and Palpation of Heart

Palpation of CVS (Fig. 4E.4)

Tips of fingers	For localizing the pulsations
Metacarpal heads	For appreciating the thrills
Heel of hand	For appreciating the heave

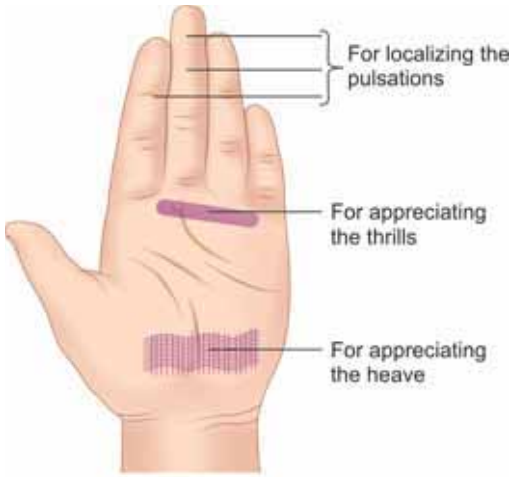


Fig. 4E.4: showing sites of hand for palpation of pulses, thrills and heave.

Chest deformity and associated clinical diseases:

Chest deformity	Associated diseases
Barrel shaped	Chronic obstructive pulmonary disease and cor pulmonale
Broad shield like chest	■ Turner syndrome ■ Noonan syndrome
Pectus carinatum	■ Marfan's syndrome ■ Noonan syndrome
Pectus excavatum	■ Marfan's syndrome ■ Homocystinuria
Straight back syndrome	■ Loss of normal kyphosis ■ Expiratory splitting of S2 ■ Midsystolic murmur ■ Prominent pulmonary artery
Male gynecomastia	Digitalis or spironolactone
Female hypomastia	Mitral valve prolapse (MVP)

Topographical areas of the heart (Fig. 4E.5):

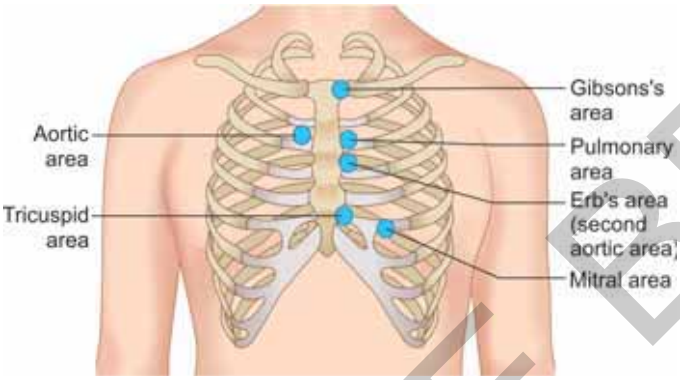


Fig. 4E.5: Illustration of areas of auscultation.

Precordial Bulge

- Patient in supine position, stand at the foot end of the bed and look for precordial bulge
- If present, indicates right ventricular dilatation in childhood
- ***Classically seen only with congenital heart diseases like atrial septal defect (ASD)***
- Costal cartilage fuses by 16 years of age, so cardiac diseases which are acquired beyond 16 years may not have a precordial bulge
- Acquired heart disease that can produce precordial bulge is juvenile mitral stenosis.

Causes of precordial bulge:

Cardiovascular causes	
Ribs involved, e.g., cardiac enlargement of long duration	Ribs not involved, e.g., pericardial effusion
Noncardiovascular causes	
■ Skeletal deformity ■ Bronchogenic carcinoma ■ Mediastinal growth	

Apical Impulse

Definition

It is the **outermost** and **lowermost** point of **definite** cardiac impulse which imparts a perpendicular gentle thrust to a palpating finger in early systole followed by a slight medial retraction in mid to late systole.

Point of maximal impulse: It need not necessarily be the apex beat, since the maximal precordial pulsation may be produced by an enlarged or hypertrophied RV, a dilated aorta or pulmonary artery, or a LV wall motion abnormality.

Method of Examination of Apical Impulse

First observe the **position** of apical impulse, then comment on the **character**.

- Patient should be in supine position
- First palpate the apex with the palm **(Fig. 4E.6)**, then localize it with fingertip **(Fig. 4E.7)**
- Observe the amplitude and duration of the lift of the palpating finger
- If apical impulse is not palpable in supine position, the patient can be put in left lateral position and examination done.

Note: In lateral position—do not comment on position of apical impulse.

Fig. 4E.6: Palpating the apex with palm flat on the chest.

Fig. 4E.7: Localizing the apex with the fingertip.

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SUMMARY OF AUSCULTATION OF HEART SOUNDS

Physical finding	Associated cardiac condition(s)
First heart sound (S1)	
Loud S1	Mitral stenosis, tricuspid stenosis, Lown-Ganong-Levine syndrome, tachycardia
Soft S1	Mitral regurgitation, severe congestive heart failure, calcified mitral valve, left bundle branch block, long PR interval (1st degree atrioventricular block)
Widely split S1	Right bundle branch block, Ebstein's anomaly, right atrial myxoma
Reversed splitting of S1	Severe mitral stenosis, left atrial myxoma, left bundle branch block
Variable intensity S1	Atrial fibrillation
Second heart sound (S2) *Aortic valve closure (A2) and pulmonary closure (P2)*	
Soft/absent A2	Severe aortic stenosis
Loud S2—loud A2	Systemic hypertension
Loud S2—loud P2	Pulmonary hypertension
Reduced splitting of S2	Pulmonary hypertension
Increased splitting of S2—early A2	Mitral regurgitation
Increased splitting of late P2—electrical delay of P2	Right bundle branch block
Increased splitting of late P2—mechanical delay of P2	Pulmonary stenosis, ventricular septal defect, obstruction right ventricle, right ventricular failure, mitral regurgitation (with pulmonary hypertension)
Fixed splitting of S2	Atrial septal defect
Paradoxically split S2—electrical delay of A2	Left bundle branch block, right ventricular pacing, right ventricular ectopic beat (delayed excitation of left ventricular systole)
Paradoxically split S2—mechanical delay of A2	Severe aortic outflow obstruction (aortic stenosis), systolic hypertension, large aorta-to-pulmonary artery shunt, ischemic heart disease, cardiomyopathy, aortic coarctation, patent ductus arteriosus
Single S2 (absence of physiologic splitting)	Tetralogy, truncus arteriosus, tricuspid atresia
Muffled heart sounds	Pericardial effusion
Third heart sound (S3)	
S3 present, 0.14–0.16 seconds after S2	Ventricular septal defect, atrial septal defect, aortic regurgitation, mitral regurgitation, tricuspid regurgitation, patent ductus arteriosus, pregnancy, congestive heart failure, hyperdynamic circulation (fever, anemia, atrioventricular fistula, thiamine deficiency, hyperthyroidism, infection, Paget's disease, pregnancy), physiological <40 years old
Fourth heart sound (S4)	
S4 present, 0.08–0.12 seconds before S1	Hypertension (systemic or pulmonary), hypertrophic cardiomyopathy, acute myocardial infarction, coronary artery disease, congestive heart failure, aortic stenosis, pulmonary stenosis
Early systolic clicks (ejection sounds)	
High frequency systolic ejection clicks, 0.09–0.14 seconds after first heart sound (S1)	Aortic stenosis (bicuspid aortic valve), pulmonary stenosis, pulmonary hypertension, dilated pulmonary artery, left ventricular outflow obstruction
Midsystolic clicks (nonejection sounds)	
Medium-to-high frequency clicks, 0.17–0.27 seconds after S1	Mitral valve prolapse (and associated late systolic murmur), tricuspid valve prolapse, nonmyxomatous mitral valve disease, adhesive pericarditis, atrial myxoma, atrial septal aneurysms, left ventricular aneurysm
Early diastolic opening snap (OS)	
High-frequency sound, 0.04–0.12 seconds after second heart sound (S2)	Mitral stenosis, tricuspid stenosis
Early mid-diastolic tumor plops	
Low frequency sound, 0.04–0.12 seconds after S2	Atrial myxoma
Early mid-diastolic pericardial knocks	
Pericardial knock, 0.06–0.14 seconds after S2	Constrictive pericarditis

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SUMMARY OF HEART MURMURS

Physical finding	Associated cardiac condition(s)
Timing	
Early systolic	Ventricular septal defect, acute mitral regurgitation, acute tricuspid regurgitation
Holosystolic (pansystolic)	Mitral regurgitation, tricuspid regurgitation, ventricular septal defect
Midsystolic (ejection systolic)	Aortic stenosis, pulmonary stenosis, hypertrophic obstructive cardiomyopathy, atrial septal defect, aortic coarctation, pregnancy, mammary soufflé, innocent murmur
Late systolic	Myocardial infarction, ischemia, diffuse myocardial disease, mitral regurgitation from mitral valve prolapse
Early diastolic	Aortic regurgitation, pulmonary regurgitation (± Graham Steell murmur)
Mid-diastolic	Mitral stenosis, tricuspid stenosis, atrial myxoma (right or left), acute severe aortic regurgitation (Austin-Flint murmur), acute rheumatic fever (Carey Coombs murmur)
Presystolic (late diastolic)	Tricuspid stenosis, mitral stenosis, atrial myxoma (right or left), acute severe aortic regurgitation (Austin-Flint murmur)
Continuous	Patent ductus arteriosus, cervical venous hum, mammary soufflé, congenital or acquired arteriovenous shunt (e.g., coronary arteriovenous fistula, ruptured aneurysm of aortic sinus of Valsalva into a right heart chamber, anomalous left coronary artery, intercostal arteriovenous fistula), small atrial septal defect with a high left atrial pressure, proximal coronary artery stenosis, pulmonary artery branch stenosis, bronchial collateral circulation, aortic coarctation
Modulation (shape)	
Diamond (crescendo-decrescendo)	Aortic stenosis, pulmonary stenosis, hypertrophic obstructive cardiomyopathy
Decrescendo	Aortic regurgitation, pulmonary regurgitation
Plateau	Mitral regurgitation, tricuspid regurgitation
Location	
5th intercostal space midclavicular line/ apical	Mitral stenosis/regurgitation, hypertrophic obstructive cardiomyopathy
Right 5th interspace	Tricuspid stenosis/regurgitation
Right 2nd interspace base	Aortic stenosis/regurgitation
Right 1st interspace or higher	Supravalvular aortic stenosis
Right supraclavicular fossa	Cervical venous hum
Left 2nd interspace/upper sternal border	Pulmonic stenosis/regurgitation, patent ductus arteriosus
Left 3rd-4th interspace	Tricuspid regurgitation, hypertrophic obstructive cardiomyopathy
Left and right of sternum, 4th-6th interspace	Ventricular septal defect
Back/interscapular	Patent ductus arteriosus, aortic coarctation
Intensity	
1	Faint, must tune in
2	Easily heard
3	Moderately loud
4	Palpable thrill and loud
5	Very loud
6	Heard with stethoscope off chest
Frequency (pitch)	
High	Mitral regurgitation, acquired pulmonary regurgitation, aortic regurgitation
Low	Mitral stenosis (rumble), tricuspid stenosis, congenital pulmonary regurgitation, acute severe aortic regurgitation
Radiation	
Axillary	Mitral regurgitation (anterior or laterally directed jet)
Back/subscapular	Mitral regurgitation (posteriorly directed jet), patent ductus arteriosus, aortic coarctation
Neck (carotids)	Aortic stenosis, hypertrophic obstructive cardiomyopathy, supravalvular aortic stenosis (louder in right neck)
Quality	
Blowing	Mitral regurgitation
Varying throughout cycle	Pericarditis (pericardial friction rub)

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Findings	MS	MR	AS	AR	TR	ASD	VSD	PDA
Pulse	■ Low volume ■ Irregularly irregular (if associated with AF)	■ High volume, ■ Irregularly irregular (if associated with AF)	■ Low volume, ■ **Pulsus parvus et tardus** ■ Anacrotic pulse ■ Apicocarotid delay—severe AS	■ High volume, **collapsing pulse** ■ **Water hammer pulse** ■ **Pulsus bisferiens**	Normal	■ Normal ■ Irregularly irregular (if associated with AF)	High volume	High volume, collapsing
Blood pressure	■ Low BP ■ Mean of 3 readings to be taken if atrial fibrillation is present	■ Wide pulse pressure ■ Mean of 3 readings to be taken if atrial fibrillation is present	■ Low BP ■ Systolic decapitation ■ **Coanda effect**: Right upper limb BP >left upper limb BP (supravalvular AS)	■ Wide pulse pressure ■ **Hills sign**—lower limb BP >20 mm of upper limb BP	Normal	Normal	Wide pulse pressure	Wide pulse pressure
JVP	■ Raised in heart failure **Prominent a waves**—pulmonary hypertension without atrial fibrillation ■ **Absence of a wave**—atrial fibrillation ■ **Prominent v waves** (c-v waves) and rapid y descent → tricuspid regurgitation	■ Raised in heart failure ■ **Prominent a waves**—pulmonary hypertension without atrial fibrillation ■ **Absence of a wave**—atrial fibrillation ■ **Prominent v waves** (c-v waves) and rapid y descent → tricuspid regurgitation	■ Usually normal ■ Raised in heart failure ■ Rarely prominent a wave—Bernheim effect	■ Usually normal ■ Raised in heart failure	■ Raised with most prominent 'giant' v wave in the jugular venous pulse (a **c-v wave** replaces the normal x descent) ■ **Earlobe pulsations** (Lancisi's sign)	**"M" pattern**—a and v waves have equal height, a wave becomes taller when pulmonary hypertension develops or associated mitral stenosis (MS)	Raised in heart failure	Raised in heart failure
Apex	**Tapping** apex	**Hyperdynamic** Down and out apex	Heaving	**Hyperdynamic** down and out apex	Normal	Normal	Mild displaced down and out	Hyperdynamic down and out apex
Parasternal heave	Present (RVH or left atrial enlargement)	Present (RVH or left atrial enlargement)	No	No		Present	Present	+/–

Findings		MS	MR	AS	AR	TR	ASD	VSD	PDA
Thrills		Diastolic thrill at apex	Systolic thrill at apex in acute or severe MR	Systolic thrill over the aortic and carotid area	Diastolic thrill in aortic/neoaortic area	Systolic thrill in left lower sternal edge	Nil	Left 4–5 ICS parasternal area	Continuous thrill at the upper-left sternal edge
Heart sounds	S1	Loud	Soft	Normal	Soft	Soft	Loud	Soft	Loud
	S2	■ Loud P2 (pulmonary hypertension) ■ Narrow split (pulmonary hypertension)	■ Loud P2 (pulmonary hypertension) Narrow split (pulmonary hypertension)	■ Soft A2 (valvular AS) ■ Loud A2 (bicuspid aortic valve) ■ Paradoxical split (severe AS)	■ Normal Tambour A2 in syphilitic AR	Loud P2 with narrow split (pulmonary hypertension)	■ P2 loud ■ Wide fixed split	P2 loud	■ P2 loud ■ Paradoxical split
	S3	RVS3 (present in failure)	RV/LVS3 (present in failure)	LVS3 in failure	LVS3 in severe AR	RVS3	RVS3	+/–	+/–
	S4	Never	Present in acute MR	Present. Indicates severe AS	+/–	_	RVS4 (Eisenmenger's)	RVS4 (Eisenmenger's)	RVS4 (Eisenmenger's)
	Others	Opening snap	OS in 10%	AEC in bicuspid aortic valve	_	_	PEC (Eisenmenger's)	PEC (Eisenmenger's)	PEC (Eisenmenger's)
Murmurs		■ **MDM** at mitral area ■ **PSM** at tricuspid area ■ **ESM** at pulmonary area ■ **EDM** (Graham Steel) at pulmonary area	■ **PSM** in mitral area radiation to axilla/base ■ **Flow MDM** at mitral area ■ **PSM** at tricuspid area ■ **ESM** at pulmonary area ■ **EDM** (**Graham Steel**) at pulmonary area	■ **ESM** in aortic area conducting to carotid ■ Systolic murmur at mitral area Gallavardin phenomenon	■ **EDM** in aortic/ neoaortic area ■ **Flow ESM** in aortic area ■ **MDM** at mitral area (**Austin Flint**) ■ Diastolic murmur in left axilla (**Cole-Cecil murmur**)	**Blowing PSM:** At the lower-left sternal border that is increased during inspiration and reduced during expiration (**de-Carvallo's sign**).	**ESM** in pulmonary area and MDM in tricuspid area. Once Eisenmenger's—**EDM** in pulmonary area and PSM in tricuspid area	**PSM** heard best at the left sternal edge (3rd, 4th and 5th intercostal space)	Continuous harsh "**machinery-like"/ Gibson's murmur** heard with late systolic accentuation in the first left intercostal space below the clavicle
Other features		Palpable P2 (diastolic shock)	Palpable P2 (diastolic shock)	—	Peripheral signs	Pulsatile liver	Precordial bulge	Aortic insufficiency in approximately 5%	Differential cyanosis and clubbing when Eisenmenger's develops

(AR: aortic regurgitation; AS: aortic stenosis; ASD: atrial septal defect; ESM: ejection–systolic murmur; EDM: early diastolic murmur; MDM: mid-diastolic murmur; MR: mitral regurgitation; MS: mitral stenosis; PS: pulmonary stenosis; PDA: patent ductus arteriosus; PSM: pansystolic murmur; TR: tricuspid regurgitation; VSD: ventricular septal defect)

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