Inspection to the hand; increased pressure will

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Inspection & Palpation of the Apical Impulse on CardiacExaminationByNatalie Hoyte Technique: Setup: The clinician should stand on the patient's right side; the head of the bed may be elevated for patient comfort.

Expose the patient'schest and if necessary, clinician or patient can move the left breast up and tothe left. Clinician will examine the apical impulse (AI) while patient issupine, and again in the left lateral decubitus position (LLDP). Inspection: The apical impulse is typicallyvisible at the left midclavicular line (MCL) in the 5th intercostalspace (ICS) for adults, (4th ICS for children), though the AI is easilyobscured by obesity, large breasts, or muscularity. You may shine tangentiallight on this area to help visualize the pulsation of the AI. The point at whichthe AI is most readily seen or felt should be described as the point of maximal impulse (PMI). Palpation: Palpate apical area of precordium usingthe proximal halves of the four fingers of the right hand. Touch lightly andlet cardiac movements rise to the hand; increased pressure will decrease the pulsatilesensation.

Then isolate AI/PMI using pads of 1 or 2 fingers and record location by ICS and distance from midsternalline. Measure the diameter of theimpulse while patient is in LLDP (diameter typically <1 cm, " dime sized"). 1Characterize the force and duration of the AI as delineated below. Duration should be measured by simultaneously palpating AI while auscultatingat base of heart. 3 History: Palpationof the heart is one of the oldest exam techniques, with records of this exam datingback to 1550 BC in Egypt.

Jean-Nicolas Corvisart, physician of Napoleon, wasthe first to correlate cardiac palpation with postmortem findings of ventricularenlargement in the

early 1800s. Animal experiments in 1830 proved that theapical impulse is caused by ventricular contraction. Much of our current knowledgeof cardiac palpation comes from impulse cardiography and kinetocardiography fromthe 1960s, which precisely timed normal and abnormal precordial movements andcompared with angiography and hemodynamic data.

2 Clinical Question: Canclinicians accurately and reliably assess a patient's cardiac health by palpatingthe apical impulse? Evidence-basedResults: Yes, if theapical impulse is quantitatively measured and graded according to specific guidelines, abnormal findings on physical exam have been shown to correlate with cardiac pathology. 3, 2 Cliniciansshould characterize the AI by duration and force as follows: Duration: (simultaneouspalpation & auscultation required)D1 – apical retractionimmediately after first heart sound (S1) D2 – apical retractionin the first half of systoleD3 – apical retractionin the latter half of systoleD4 – apical retractionwith or after the second heart sound (S2) Force: F1 – impulse barelyvisible and faintly felt, did not lift finger above chest wallF2 – easily seenand felt, lifted a lightly placed finger but not the firmly held fingerF3 – apical excursiondisplaced the firmly held finger a few millimetersF4 – markedly increasedapical excursion produced obvious motion of the chest well, neither fingers norstethoscope could be maintained immobile over apex Classificationof impulse: 3Force 2 = physiologic(normal) Duration 2 = physiologic(normal)Force 3 or 4 = hyperkinetic(abnormal) Duration 3 or 4 = sustained (abnormal) *While the descriptors heaveand lift may refer to sustainedmovements and thrust to hyperkineticmovements, these words are often used imprecisely; it is best to use the terms hyperkinetic and sustained

when describing the AI. 2 Findings: According to a study in which 133subjects of varying age and known cardiac health were examined, 92% of patientswithout heart disease and 91% of those with heart disease that did not affect leftventricular (LV) function (such as mitral stenosis, treated HTN, etc) hadphysiologic impulses, while 90% of those with LV dysfunction had abnormalimpulses. Abnormal impulses and pathophysiologicassociation by impulse classification: Sustainedimpulses – associated withdiastolic hypertension; LV outflow obstruction; asynergic contraction patterns; ventricular aneurysm; LV hypertrophy. Hyperkineticimpulses – most consistentlyfound in those with mitral insufficiency or thyrotoxicosis; also in ventricularseptal defect and aortic regurgitation. Patient positioning: In patients over 30 y/o, the LLDP doubledthe incidence of palpable AI as compared with the supine position. Furthermore, impulse abnormalities that wereundetected in the supine position were revealed in the LLDP. 3Measuring a displaced apical impulse andcardiac enlargement: The midclavicular line (MCL) preciselymeasured as midway between acromioclavicular and sternoclavicular joints isthe most reliable reference point for accurately identifying a displaced AI, which is a traditional sign of cardiomegaly.

The two other landmarks – distancefrom the midsternal line (with ‘ normal’ being 10 cm or less from MSL) or the nippleline – are not useful predictors of an enlarged heart. In supine position, anAI lateral to MCL increases the probability that the heart is enlarged, ejection fraction reduced, and left ventricular end-diastolic volume increased. Diameter of apical impulse: In the LLDP with patient elevated at 45degrees, an AI diameter of 4 cm or

greater increases the probability that thepatient has a dilated heart (increased LV end diastolic volume). Retracting apical impulse: In up to 90% of patients withconstrictive pericarditis, the AI retracts during systole.

2 Reference List: 1.

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