The normal pressure waveform in the right and left atria consists of two positive pressure waves; the A and the V waves and two negative pressure waves; the X and the Y descents. The A wave is caused by atrial systole. The V wave is due to venous filling of the atria during ventricular systole when the mitral and tricuspid valves are closed. The X and the Y descents follow the A and the V waves respectively. The X descent reflects atrial relaxation. The Y descent is due to rapid atrial emptying following opening of the mitral and tricuspid valves. At the bedside, the astute clinician can diagnose several cardiac disorders by carefully examining the atrial pressure waveforms. These disorders include cardiac arrhythmias, mitral regurgitation, tricuspid regurgitation, cardiac tamponade, and right ventricular infarction.

Cardiac arrhythmias disturb the normal sequence of atrial and ventricular contraction and as a result change the normal A and V waves. Arrhythmias such as atrial flutter, re-entrant supraventricular tachycardia, and premature ventricular contractions all can be verified by pressure waveform analysis.

Both mitral and tricuspid regurgitation impose a sudden volume overload on the respective left and right atria during ventricular contraction. This causes an increase in the atrial pressure and an augmentation of the V wave and the Y descent. The V wave increase is most noticeable with acute mitral regurgitation because of the magnitude of the left ventricular systolic pressure and a non-compliant normal sized left atrium.

During pericardial tamponade the atrial pressure is elevated and the Y descent is noticeably absent. This is best observed in the right atrial pressure waveform. These findings resolve after drainage of the pericardial fluid.

Right ventricular infarction causes sudden dilation of the right ventricle. Because the normal pericardium is unyielding, a form of acute pericardial constriction results. This is recognized by elevation of the right atrial pressure, prominent X and Y descents, and often Kussmaul’s sign (an increase in the right atrial pressure on inspiration). These findings in the presence of an acute inferior myocardial infarction are diagnostic of right ventricle infarction.