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Review Article

Collapsing Pulse

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Abstract

Nothing is nor ever will be more significant in medical science, nor more necessary to it, than the observation of the pulse [1]. The characteristic pulse of aortic regurgitation (AR) is so familiar to the observation of everyone that it may perhaps be thought that its mode of origin must be so well known that there can be little room for further discussion on the subject [2]. This review article elaborates the pathogenesis, causes, clinical approach to evaluate collapsing pulse and its sensitivity and specificity .

Keywords: Collapsing Pulse; Water Hammer Pulse; Watson Pulse; Pulsus Celer; Rhazes Pulse; Al Razi Pulse; Cuming Pulse; Vieussens Pulse.

Introduction

Collapsing pulse also known as Watson's water hammer pulse, cannon ball pulse or pulsus celer is described in aortic regurgitation with a rapid upstroke and descent [3]. The water hammer pulse is believed to result from a wide pulse pressure. However, Warnes et al., using intra-arterial radial artery measurements in five patients with severe AR demonstrated that the widened pulse pressure narrows with arm elevation. This fall in pulse pressure was associated with an increased palpated pulse. They attributed these changes to increased arterial compliance. Collapsing pulse (Watson's water hammer pulse) and Corrigan's pulse refer to similar observations. However, the former usually refers to measurement of a pulse on a limb, while the latter refers to measurement of the pulse of the carotid artery. "Watson's water hammer pulse" is named for Thomas Watson, who characterized it in 1844 [4]. Corrigan's pulse" is named for Sir Dominic Corrigan, the Irish physician, who characterized it in 1832 [5].

How to Check for Collapsing Pulse

Hold pulse with fingers of one hand, wrap the fingers of other hand around forearm. Check any pain in arm and shoulder. Lift arm up straight. Collapsing pulse, felt as "water hammer" pulsation in forearm [6].

Pathogenesis

The collapsing or Corrigan or water-hammer pulse and the pistol-shot sound in the groin are time-honored physical signs of marked aortic insufficiency [7]. Collapsing pulse (Water hammer pulse) is a predominant feature in chronic aortic regurgitation and is not seen in acute aortic regurgitation. This will help in identifying the underlying cause e.g. rheumatic etiology, collagen vascular disorders, Marfan's syndrome, syphilis, bicuspid aortic valve or aortic root dilatation and excluding endocarditis, aortic dissection, etc. which are mainly causing acute aortic regurgitation. In chronic aortic regurgitation there is an increase in the left ventricular end-diastolic volume (due to the regurgitation). This leads to hemodynamic compensation in the form of chamber dilatation and eccentric hypertrophy; the latter being

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attained through replication of sarcomeres in series and elongation of the myocytes and myocardial fibers [8].

Causes of collapsing pulse

The causes of collapsing pulse are summarized in Table 1 [9-11].

Table 1: Causes of collapsing pulse [9-11]

S. No.	Etiology	Examples
1.	Hyperkinetic circulatory states	After exercise, Sepsis, Severe anaemia, Fever, Pregnancy, Liver cirrhosis, Thyrotoxicosis , Beriberi, Paget's disease of the bone.
2.	Conditions with aortic run-off	Chronic aortic regurgitation, PDA, Rupture of sinus of vasalva into the right chambers and arterio-venous fistula .
3.	Cyanotic congenital heart disease	Truncus arteriosus with truncal "run-off into PA or truncal insufficiency , pulmonary atresia with broncho- pulmonoray collaterals, Tetralogy of Fallot with broncho - pulmonary collaterals/associated PDA/associated AR or after Blalock Taussig (BT) shunt (systemic artery to pulmonary artery) .

Approach to A Case of Collapsing Pulse

History is an important tool in such cases in two ways. First, prior throat infection with major and minor Duke' criteria plus positive throat culture or high ASO titre may be of help in establishing a rheumatic cause of chronic aortic regurgitation. Second, history of recurrent respiratory tract infections from early infancy and clinical examination may help in diagnosis of ventricular septal defect, truncus arteriosus, patent ductus arteriosus and aorto-pulmonary window with aortic regurgitation and such cases may also require 2-D Echocardiography.

Specificity and Sensitivity of Collapsing Pulse

Babu et al have noted that in the diagnosis of AR, the specificity of collapsing pulse is 16% and sensitivity is 38-95% respectively depending upon the severity of AR. In mild to moderate AR the sensitivity is 85%, in moderately severe to severe AR the sensitivity is 100% and in indeterminate severe AR the sensitivity is 38-95%.

The sensitivity was categorized as indeterminate when the report provided insufficient information about this variable. The overall specificity is only 16% for all degrees of AR [12]. Babu et al also report that the clinical sign carries a negative predictive value of 73% for any degree of AR and 95% for severe AR [13].

Source of Support

None

Conflict of Interest

None

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