REUE | Special Article

Heart auscultation in the 21st century: on the importance of training

Papel de la auscultación cardiaca en el siglo XXI: la importancia de la formación

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Introduction

Before the introduction of the stethoscope, auscultation was performed by physicians who would sometimes place their ear directly on the patient's chest— a method later referred to as "immediate auscultation." Immediate auscultation could be helpful in diagnosing lung diseases but was of limited use in heart disease.

In 1816, the French physician René Laënnec was asked to examine a young overweight woman with symptoms of heart disease.[1] Dr. Laënnec considered immediate auscultation inappropriate due to the patient's age and sex. He therefore used a long rolled sheet of paper to form a funnel, placing one end on the patient's precordium and the other at his ear. Dr. Laënnec was "as surprised as he was satisfied" at how well he could hear the heart sounds.[2] He called his new technique "mediate auscultation" and, after experimenting with different materials, many years later introduced a binaural stethoscope with flexible tubing, a model whose usefulness persists today.[3]

Importance of cardiac auscultation

The invention of the stethoscope—simple and logical as it may seem today—represented a major advance in the diagnosis and management of heart disease. Furthermore, it opened new possibilities for studying the pathophysiology of cardiac diseases, as brilliantly demonstrated by Dr. Laënnec at a very early stage, recognizing the potential of the stethoscope as both a scientific and clinical tool.[4] Consequently, auscultation with the stethoscope quickly became an integral component of the physical examination worldwide.

Several studies have shown that physical examination skills among medical students and physicians today do not reach an acceptable level, particularly regarding cardiac auscultation.[5,6] It has also been demonstrated that skills decline rapidly if they are not practiced regularly.[7]

We may therefore ask: Is cardiac auscultation still a useful diagnostic tool? Absolutely yes. Despite technological advances in medicine, cardiac auscultation remains a fundamental tool in patient evaluation. Although more advanced techniques, such as echocardiography, have gained popularity, auscultation is useful in many clinical settings. It is important to emphasize that cardiac auscultation does not replace echocardiography. However, in the 21st century it continues to be valuable in clinical practice, providing preliminary information that can guide the need for further testing. The combination of auscultation and echocardiography helps clinicians make decisions and provide comprehensive care (Table 1). Nursing professionals also frequently use this instrument.[8]

Cardiac auscultation is a non-invasive, rapid, low-cost technique that remains valuable in the initial diagnosis and monitoring of heart diseases. It can be performed in a clinic, at a patient's home, or in emergency settings. When access to advanced diagnostic equipment is limited, or when a rapid initial assessment is needed, cardiac auscultation is extremely useful. With a stethoscope, trained clinicians can identify abnormalities in heart sounds (murmurs, irregular rhythms, or additional sounds), providing quick and important clues about cardiac function.

Value of cardiac auscultation

In general, cardiac auscultation is the most difficult and the most informative component of the physical examination. Its clinical value is hard to evaluate because it depends largely on the practitioner's auscultatory competence. Significant subjectivity is therefore inevitable.[9]

Several methods have been used to determine the accuracy and clinical usefulness of cardiac auscultation. Studies evaluating its diagnostic value vary in design and are difficult to compare.[10-14] Nevertheless, despite the limitations, several justified considerations can be made:[15]

Table 1. Comparison of cardiac auscultation vs echocardiography

	Cardiac auscultation	Echocardiography
Basic principle	Listening to heart sounds with a stethoscope	Using ultrasound waves to create images of the heart
Accessibility	Widely available and inexpensive	Requires specialized equipment and training
Time	Rapid technique	Requires more time to perform a complete study
Information provided	Initial assessment and detection of abnormalities in heart sounds	Detailed images of cardiac structure
Limitations	Does not provide direct visualization of the heart	May be costly and less accessible in some settings
Patient usefulness	Initial tool for preliminary assessment, detection, and patient follow-up	Complete and detailed evaluation of cardiac anatomy and function

1) Interobserver agreement in cardiac auscultation is moderate to poor.

2) Sensitivity is relatively low—especially for diastolic murmurs and gallops (S3 and S4)—but specificity is high.

3) Although studies differ, there is sufficient evidence that sensitivity and specificity increase with the examiner's experience.

4) Sensitivity correlates positively with the severity of pathological changes, reaching nearly 100% in severe valvular lesions.

Importance of clinical setting and economic considerations

Teaching hospitals must provide adequate training in cardiac auscultation for students and physicians in training. In routine clinical practice, some physicians often lack access to advanced diagnostic facilities and must rely heavily on history-taking, physical examination, and electrocardiography. Technically, it is possible to connect electronic stethoscopes to computer-assisted diagnostic systems or use them in teleconsultations, but such systems are not widely available, are costly, and are not yet suitable for routine use.[16] In any case, optimal use of cardiac auscultation benefits the patient, improves diagnosis, and avoids unnecessary costly tests. Conversely, inadequate auscultation can prevent correct diagnosis and treatment, causing harm and increasing health care costs.[15]

Improving the future of cardiac auscultation

Currently, when used correctly, the stethoscope remains a traditional, easy-to-use tool that provides effective and efficient results.[9-17]

It is undeniable that improving medical student training is a logical starting point to enhance cardiac auscultation skills. Similarly, physicians must recognize that good training would allow them to better diagnose cardiac disease.[18] In 1993, Mangione et al. published a U.S. study focused on cardiac auscultation, showing that all participants believed more time should be devoted to teaching auscultation during medical training.[19]

Several resources exist to improve auscultation skills, including textbooks, educational materials,[18] MP3 audio libraries,[20] and modified electronic stethoscopes.[21] Experience and research indicate that simulation-based training is most effective.[22] Teaching programs should be mandatory when voluntary practice does not achieve an optimal level.[23]

ACCESO A LA WEB

CARDIOBEAT – simulation-based training

A website has recently been developed that allows physicians and medical students to listen to heart sounds online through headphones, recreating an experience similar to listening through a stethoscope during auscultation.

Medical students—future physicians—study heart sound theory but often struggle to recognize pathological sounds in real patients. Addressing this issue, and based on years of clinical and academic experience, a collection of heart sounds from real patients with actual heart diseases was created.[24]

This online tool, CardioBeat–cardiac auscultation assistant,[24] guides users through the auscultation process. Based on real sounds, it allows physicians or students to identify normal and abnormal heart sounds (S1, S2, S3, S4) and murmurs caused by valvular disease. CardioBeat also explains the auscultation areas and where each sound should be detected.[24]

In conclusion, cardiac auscultation requires constant training. It is a cheap, rapid, efficient, and reliable clinical skill—one that every frontline clinician must acquire.

ARTICLE INFORMATION

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