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Research Article

# Ischemic Posteromedial Papillary Muscle Rupture of the Young

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## Abstract

**Introduction**: Transthoracic Doppler echocardiography (TTE) is an essential examination in terms of cardiovascular diseases. Our objective was to describe the indications and to assess their relevance.

**Methods**: A retrospective, descriptive and cross-sectional observational study over a period of 24 months was carried out using data from the ETT register of the Cardiovascular Diseases Service of the Soavinandriana Hospital Center. We included data from patients who underwent an ETT examination. The criteria according to the 2011 American recommendations were used to judge the relevance of the indications.

**Results**: A total of 2163 ETTs were retained. Ninety point eighty percent of the requests came from physicians in the medical setting. Symptoms or conditions potentially related to a suspected cardiac etiology were the most frequent indication (20.66%). The indications were deemed appropriate in 65.28% inappropriate in 23.67% and uncertain in 11.05% of cases. Among the indications, 1.43% were not listed. Sixty-two point sixty-five percent of examinations had pathological results, including 38.04% of hypertensive heart disease. The medical character of the prescriber's service was a factor in the relevance of the indications ($p = 0.0001$ and $OR = 6.94$).

**Conclusion**: There are many indications for TE in adults, most of which were irrelevant. Designing a pre-established form could help standardize requests. To make the examination profitable and before each request, a cardiological opinion would be desirable in order to assess its relevance.

**Keywords**: Adult; Heart Disease; Echocardiography; Indication; Relevance

## Introduction

Non-invasive and non-irradiating Transthoracic Doppler Echocardiography (TTE) using the physical properties of ultrasound [1]. Echocardiography is one of the most commonly performed procedures for the diagnosis, therapeutic orientation and management of a large number of diseases [2,3]. Estimates are of the order of 23 million deaths from cardiovascular disease worldwide in 2030, 85% of which will be in developing countries including Africa [4]. In the management of these serious pathologies, transthoracic Doppler echocardiography remains an essential and essential examination, especially in countries with low technical facilities such as Madagascar. It constitutes an essential axis of the diagnostic reflection, the therapeutic orientation and the follow-up of patients suspected of a cardiovascular pathology [5]. Our objective was to describe the clinical situations motivating the requests for ETT and then to evaluate the relevance of each indication within the Center Hospitalier de Soavinandriana (CENHOSOA) Madagascar.

## Methods

This was a descriptive cross-sectional study based on data from the adult ETT register of the CENHOSOA Cardiovascular Diseases Department from January 1, 2017 to December 31, 2018. We included all patients who underwent an ETT examination during this period. Excluded were patients whose age was less than or equal to 15 years and whose files were incomplete. The echocardiography device used was of the Toshiba APLIO 300 brand. The approval of the Director of the establishment and that of the Head of department was obtained before consulting the register. All information obtained is recorded respecting anonymity. Raw data was recorded by Excel 2016 and then analyzed by Epi Info 7.2 software. The parameters studied included: socio-demographic parameters (age, gender), the profile of the doctors requesting ultrasound examination, the indications for the examination, the relevance of the indications, the results of the ultrasound report. The profile of the requesting physicians was grouped into physicians in private practice and physicians from the hospital environment. These were composed of doctors in the medical field (cardiologists, doctors of other specialties, and interns) and doctors in the surgical field (surgeons, anesthesiologists – resuscitators). ETT indications were classified within the 08 major indication groups according to the ETT indication criteria issued by American study groups ACCF/ASE/AHA/ASNC/HFSA/HRS/SCAI/SCCM/SCCT/SCMR [6]. As for the relevance of the indications, each group comprises the indications themselves numbered from 01 to 98, with their respective level of relevance. The evaluation of the relevance of the indications and clinical situation was rated on a grading scale from 1 to 9 according to this document. The indications were defined as "Appropriate" if the score is between 7 and 9. ETT offers advantages in the management of patients. In this relevance group, the indication is reasonable and acceptable. They were defined as "Uncertain" if the score is between 4 and 6. The indication involves further research of patient information to classify the definitive indication. The procedure may be generally acceptable and may be reasonable for the indication. For scores from 1 to 3, the relevance is rated "Inappropriate". The indication had no benefit in the management of the patient. In this case, the procedure is not acceptable or reasonable for the indication.

## Result

The 2536 ETTs carried out, 2163 ETTs were retained. The age groups selected were dominated by subjects over 60 years old. The sex ratio of 0.94 showed a female predominance. Ninety percent of the patients came from physicians in the medical community. Only 1.11% came from doctors in private practice. Among the 2163 examinations performed, 808 were normal (37.35%) and 1355 (62.65%) were pathological. Physicians working in a surgical setting found many more pathological results according to table 1.

| Origine des patients | Normaux n (%) | Pathologiques n (%) | p | Odds-ratio |
|---|---|---|---|---|
| Milieu libéral | 04 (16,66) | 20 (83,33) | 0,057 | - |
| Milieu chirurgical | 79 (45,14) | 96 (54,86) | 0,033 | 1,41 [1,03-1,93] |
| Milieu médical | 726 (36,96) | 1238 (63,03) | 0,21 | - |

**Table 1:** Distribution of ultrasound reports according to patient origin.

Regarding the grounds for examination, 1.43% of the requests were not listed on the document. The general evaluation of cardiac structures and functions was the most requested group of indications. Table 2 summarizes the ETT indication groups.

| Indication group | Number Proportion (%) | Number Proportion (%) |
|---|---|---|
| Indications not listed | 31 | 1,43 |
| General assessment of cardiac structures and functions | 1368 | 63,25 |
| Cardiovascular assessment in the context of emergency | 72 | 3,33 |
| Evaluation of valve functions | 62 | 2,87 |
| Evaluation of intracardiac or extracardiac structures and cavities | 52 | 2,40 |
| Evaluation of aortic abnormalities | 23 | 1,06 |
| Evaluation of arterial hypertension, heart failure and cardiomyopathies | 554 | 25,61 |
| Adult congenital heart disease | 1 | 0,05 |

**Table 2:** Transthoracic Doppler echocardiography indication groups.

Table 3 identifies the ten most common clinical situations in which TTE is performed. These ten indications brought together 1471 examinations (68%). When evaluating the relevance of each indication according to the document, only 65.28% of the examinations were appropriate indications, 23.67% inappropriate and 11.05% uncertain.

| Number | Indications | Names (%) |
|---|---|---|
| 1: Symptoms or conditions potentially related to a suspected cardiac etiology, including: chest pain, shortness of breath, palpitations, TIA, stroke, or peripheral embolism | | 447(20,66) |
| 68: routine assessment of systemic hypertension with or without signs or symptoms of hypertensive heart disease | | 395(18,26) |
| 91: Initial and Serial Reassessments in a Patient Under Treatment with Cardiotoxic Agents | | 254(11,74) |
| 33: Routine assessment in the setting of mild chest trauma without electrocardiographic changes or elevation of biomarkers | | 147(6,79) |
| 2: Prior tests for heart disease or structural abnormalities, including but not limited to: Chest x-ray, reference images for stress echocardiography, ECG or cardiac biomarkers | | 53(2,45) |
| 52: Initial evaluation of suspected infective endocarditis with positive blood cultures or new murmur | | 49 (2,26) |
| 86: Initial Evaluation of Known or Suspected Cardiomyopathy | | 44 (2,03) |
| 5: Sustained or unsustained atrial fibrillation, Supraventricular tachycardia or Ventricular tachycardia | | 39(1,80) |
| 61: Reassessment of Known Pericardial Effusion to Guide Management | | 30(1,38) |

**Table 3:** The ten most frequent indications.

67: Evaluation initiale pour suspicion de la maladie cardiaque hypertensive 13(0,60).

## Discussion

In our study, to better understand the relevance of TTE indications, we used the American version of 2011. In the literature, this rate varies from 74% to 95% [7-10]. The relevance rate of ETT indications varies depending on the versions of the consensus documents used to judge the relevance of ETT indications. However, the rate found in our study (65.28%) was lower than those of other authors according to Table V and figure 1. These results could be explained by the fact that ETT is the most prescribed examination. by Malagasy doctors due to lack of access to other cardiological explorations (myocardial ischemia tests, cardiac catheterization). Figure 1: Taux d'études appropriées, inappropriées, incertaines et inclassables dans notre étude comparées aux autres études

| Origin doctors | Appropriate indications not (%) | Directions not appropriate not (%) | p | Odds-Ratio |
|---|---|---|---|---|
| Medical world | 1363 (69,3) | 601 (30,7) | 0,0001 | 6,94 [4,95-9,71] |
| Surgical environment | 36 (20,5) | 139 (79,5) | 0,0001 | 0,11 [0,07-0,16] |
| Liberal environment | 13 (54,1) | 11 (45,9) | 0,35 | - |

**Table 4:** Breakdown of requesting physicians according to the relevance of the examinations requested.

| Authors | Criteria used | Percentage of appropriate indications |
|---|---|---|
| Our study | American Study Groups: ACCF/ASE/AHA/ASNC/HFSA/HRS/SCAI/SCCM/SCCT/SCMR in 2011 | 65,28% |
| Anzouan., *et al.* [7] | American Study Groups: ACCF/ASE/AHA/ASNC/HFSA/HRS/SCAI/SCCM/SCCT/SCMR in 2011 | 95,30% |
| Barbosa., *et al.* [8] | U.S. Study Groups: ACCF/ASE/ACEP/ASNC/SCAI/SCCT/SCMR in 2007 | 74,70% |
| Al-Kaisey., *et al.* [9] | American Study Groups: ACCF/ASE/AHA/ASNC/HFSA/HRS/SCAI/SCCM/SCCT/SCMR in 2011 | 77% |
| Ward PR., *et al.* [10] | U.S. Study Groups: ACCF/ASE/ACEP/ASNC/SCAI/SCCT/SCMR in 2007 | 88,70% |

**Table V:** Comparison of the percentage of appropriate information.

dication was indication n°1 (symptoms or conditions potentially linked to a suspected cardiac etiology, in particular: chest pain, shortness of breath, palpitations, TIA, stroke or peripheral embolism ) which accounted for 20.66% of cases. The second most common indication was No. 68 (systematic evaluation of systemic hypertension without symptoms or signs of hypertensive heart disease) in 18.26% of cases. The Ivorian study by Anzouan., *et al.* placed indication no. 1 with indication no. 68 in first place [8]. In

Asia, Punlee., *et al*. also found a result consistent with ours for the first frequent indication [11]. According to Ward PR., *et al.* in the United States, indication no. 1 was also the most frequent indication (384 examinations, i.e. 28%). On the other hand, the second most frequent indication was indication n°2 (Preliminary tests concerning cardiac diseases or structural abnormalities, including but not limited to: Chest x-ray, reference images for stress echocardiography, ECG or cardiac biomarkers) [10]. These results show that the reasons for ETT examination were dominated by the clinical manifestations of cardiovascular pathologies. Moreover, unlike these different studies, the doctors prescribing ETT in our series came from various specialties, which could possibly influence the low rate of relevance of the indications.

## Limit of the Study

The monocentric nature of our study will not allow us to represent the national population, which certainly led to an underestimation of the result, and also the retrospective nature of our study will not allow us to collect ample information on the patients.

## Conclusion

The indications for ETT in adults remain very diverse. The general evaluation of cardiac structures and functions was the most requested group of indications. The relevance rate of ETT indications in our study remains very low (65.28%). The low rate, unlisted indications and uncertain indications for ETT could therefore spend a budget with a significant economic impact in terms of health economics. Thus, despite the place of ETT in the management of several pathologies, before any prescription, each indication must be well assessed with a view to making the examination profitable and not burdening unnecessary health expenses, especially in a country with modest income.

## Conflicts of Interest

None.

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