

# Heart murmurs

## These sounds can whisper clues to disease

BY SAAD AL BUGAMI, MD AND KENNETH GIN, MD, FRCPC

Murmurs are abnormal heart sounds, produced by a turbulent blood flow that is sufficient to create audible noise. When found, they may be an important clue to the diagnosis of undetected valvular heart disease or congenital cardiac defects, and may warrant further investigations. The first imaging is usually an echocardiogram. Certain murmurs might result from harmless flow characteristics that are of no clinical significance, in which case they're referred to as functional or innocent. In some situations, however, additional tests such as chest x-ray, electrocardiogram (ECG) or cardiac catheterization will be necessary to establish a firm diagnosis. Treatment depends on the underlying structural abnormality identified.

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### Reasons for turbulence

- high blood flow through normal or abnormal orifices
- forward flow through a narrowed or irregular orifice into a dilated vessel or chamber
- backward or regurgitant flow through an incompetent valve
- often several of the above

### Grading

- Grade 1 — very soft, heard only by experts; you must tune to hear it
- Grade 2 — soft sound anyone can hear
- Grade 3 — loud, not palpable, no thrill
- Grade 4 — loud sound, palpable, thrill present
- Grade 5 — loud, can be heard with edge of stethoscope
- Grade 6 — loud enough to be heard with stethoscope slightly off the chest

### Considerations

- characteristics of pathologic murmurs
  - ≥ grade 3 systolic murmur
  - diastolic murmur
  - increased intensity when patient is standing
  - in children, any of these findings needs referral to a pediatric cardiologist
- asymptomatic older patients
  - many have systemic hypertension
  - midsystolic murmurs, grade 1 or 2 intensity, related to sclerotic aortic valve leaflets or flow into tortuous noncompliant great vessels
  - murmur of aortic sclerosis can be difficult to distinguish from aortic stenosis
  - absence of left ventricular hypertrophy on ECG may be reassuring, but echocardiography is frequently necessary

### Categories

#### Systolic

- murmur begins with or follows S1 and ends near S2
- most don't signify cardiac disease
- functional murmurs
  - related to physiologic increases in blood flow velocity — e.g. in anemia, thyrotoxicosis, fever and pregnancy
  - exclusively ejection in nature — systolic or mid-systolic
  - usually soft ≤ grade 2
  - never associated with a palpable thrill
  - subject to considerable variation with change in posture
- pathologic
  - no further diagnostic workup necessary
  - loud; ≥ grade 3
  - consider echocardiography, especially with symptoms such as shortness of breath or chest pain, or other abnormal cardiac findings like enlargement of cardiac apex, abnormal heart sounds (S3) or clicks

#### Diastolic

- begins with S2 and ends before subsequent S1
- virtually always represents pathologic conditions
- requires further cardiac evaluations

#### Continuous

- starts in systole and continues without interruption through S2 into all or part of diastole
- generally pathologic
- needs workup, except for venous hum and mammary souffle
- mammary souffle
  - arterial murmur due to increased blood flow into the breast during pregnancy and lactation
  - disappears on firm pressure with stethoscope
- venous hum
  - confluence of flow through internal jugular and subclavian veins as they pour into superior vena cava
  - heard over the neck in pregnancy, severe uremia, anemia and hyperthyroidism
  - can be eliminated by turning the patient's head toward the side of the hum or applying firm pressure with stethoscope

### Children

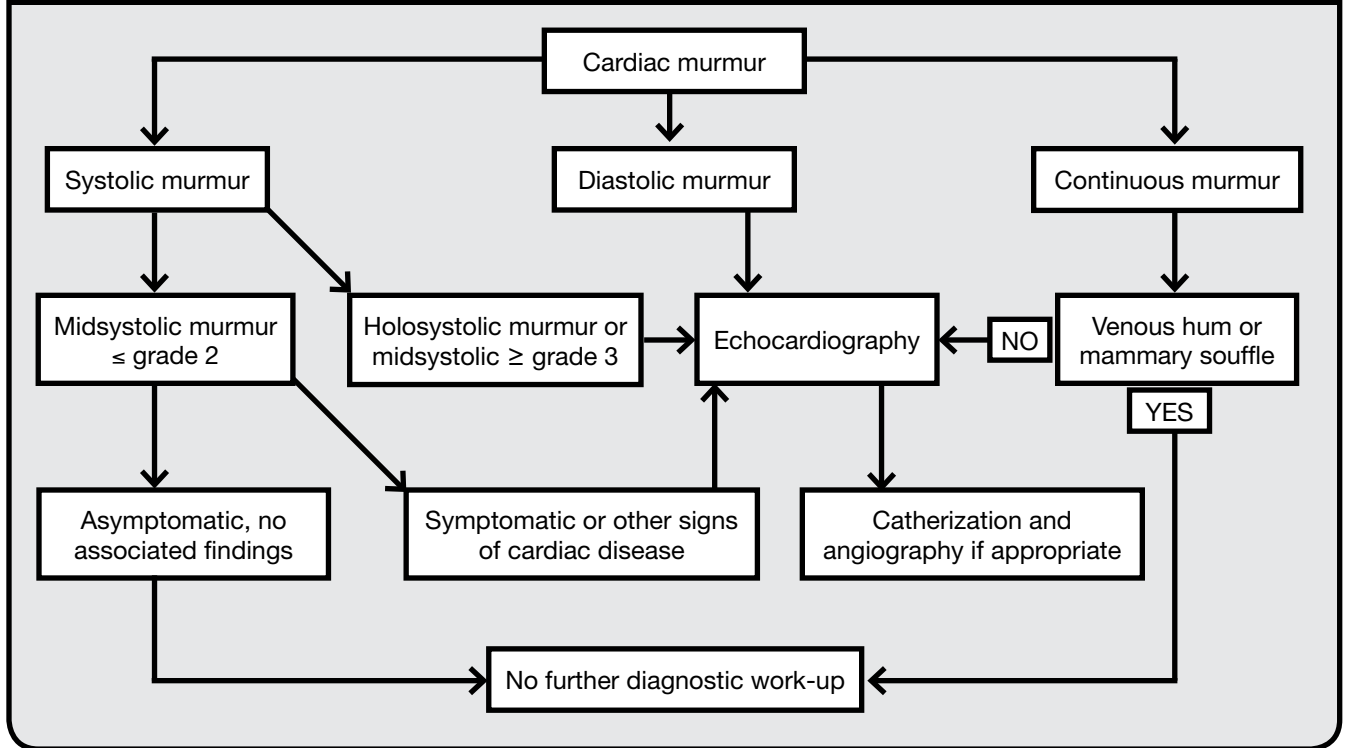
- many normal kids have murmurs, but most don't have heart disease
- history and physical examination identify those at increased risk
- systolic pathology
  - atrial and ventricular septal defects
  - pulmonary or aortic outflow tract abnormalities
  - patent ductus arteriosus
- atrial septal defect — often confused with a functional murmur, but can be differentiated by specific physical findings such as wide fixed second heart sound
- **Indications for referral and investigations**
- symptoms — e.g. chest pain, shortness of breath, dizzy spells, failure to thrive
- family history of Marfan's syndrome or sudden death in young family members
- malformation syndrome, e.g. Down's
- increased precordial activity
- decreased femoral pulses
- abnormal second heart sound
- clicks
- loud (≥ 3) or harsh murmur
- increased intensity of murmur when patient stands

### Antibiotic prophylaxis

- no longer needed for patients with aortic stenosis and mitral valve prolapse
- indicated only for high-risk individuals
- prior to dental procedures
- insufficient evidence for genitourinary procedures
- required in the following conditions
  - prosthetic cardiac valves
  - previous infective endocarditis
  - congenital heart disease
    - non-repaired cyanotic heart disease (CD)
    - CD corrected with prosthetic materials — first 6 months after surgery
    - repaired CD with residual shunts
  - cardiac transplantation with valvulopathy

See flow-chart for diagnostic workup p. 73

## Diagnostic workup



## STIEPROX®

ciclopirox olamine 1.5% shampoo

### THERAPEUTIC CLASSIFICATION

#### TOPICAL ANTIFUNGAL

#### INDICATIONS AND CLINICAL USE

STIEPROX (ciclopirox olamine 1.5%) shampoo is indicated for the topical treatment and prophylaxis of dandruff or the treatment of seborrheic dermatitis in which the yeast *Malassezia furfur* is involved.

**Geriatrics:** No data is available.

**Pediatrics:** No data is available.

#### CONTRAINDICATIONS

Patients who are hypersensitive to this drug or to any ingredient in the formulation or component of the container. For a complete listing, see the Dosage Forms, Composition and Packaging section of the Product Monograph.

#### WARNINGS AND PRECAUTIONS

##### General

STIEPROX (ciclopirox olamine 1.5%) shampoo is for external use only. Avoid contact with eyes. In case of contact with the eyes, rinse thoroughly with copious amounts of water. If irritation persists, a physician should be consulted.

##### Skin

If a reaction suggesting hypersensitivity or chemical irritation should occur with the use of STIEPROX shampoo, treatment should be applied less often or should be discontinued and appropriate therapy instituted.

##### Special Populations

**Pregnant Women:** The safety of STIEPROX shampoo during pregnancy has not been established. There is evidence that ciclopirox olamine crosses the placental barrier. Reproductive studies in mice, rats, rabbits and monkeys, at doses of ciclopirox olamine 10 times that of a topical human dose, have revealed no significant evidence of impaired fertility or harm to the fetus. STIEPROX should only be used during pregnancy if the potential benefits to the mother justify the potential risks to the fetus.

No pregnant women were enrolled during clinical trials with STIEPROX.

**Nursing Women:** It is unknown if ciclopirox olamine is excreted in human milk. Because many drugs are excreted in human milk precaution should be exercised.

**Pediatrics:** The safety and effectiveness of STIEPROX has not been established in children.

**Geriatrics:** The safety and effectiveness of STIEPROX has not been established in a geriatric population.

#### ADVERSE REACTIONS

##### Adverse Drug Reaction Overview

STIEPROX (ciclopirox olamine 1.5%) shampoo is well tolerated with a low incidence of adverse reactions.

##### Clinical Trial Adverse Drug Reactions

Because clinical trials are conducted under very specific conditions, the adverse reaction rates observed in the clinical trials may not reflect the rates observed in practice and should not be compared to the rates in the clinical trials of another drug. Adverse Drug Reaction information from clinical trials is useful for identifying drug-related adverse events and for approximating rates.

Table 1 provides the list of the Common Adverse Drug Reactions (>1%) observed with STIEPROX (ciclopirox olamine 1.5%) shampoo during controlled clinical trials.

Table 1—Common adverse drug reactions to STIEPROX or its vehicle

	STIEPROX n=216	Placebo n=238
Administration site conditions		
Scalp pruritus	4 (2%)	4 (2%)

#### LESS COMMON CLINICAL TRIAL ADVERSE DRUG REACTIONS (<1%)

**Administration site conditions:** Uncommon: erythema, erosion of scalp. **Eye disorders:** Uncommon: stinging, watering, infection. **Nervous system disorders:** Uncommon: headache. **Abnormal Hematologic and Clinical Chemistry Findings:** Hematologic and clinical chemistry parameters were not evaluated during clinical trials with STIEPROX.

#### DRUG INTERACTIONS

##### Overview

No drug interactions have been reported with ciclopirox olamine. The possibility of interaction with alcohol has not been evaluated.

##### Drug-Food Interactions

Interactions with food have not been established.

##### Drug-Herb Interactions

Interactions with herbal products have not been established.

##### Drug-Laboratory Interactions

Interactions with laboratory tests have not been established.

#### DOSAGE AND ADMINISTRATION

##### Dosing Considerations

Situations that may affect the dosing of STIEPROX have not been established.

##### Recommended Dose and Dosage Adjustment

**Dandruff:** Use 2 or 3 times a week or as often as necessary.

**Seborrheic dermatitis:** Use 3 times a week or as often as necessary.

##### Missed Dose

Any missed application of the shampoo should be done the next day.

##### Administration

The hair should be wet and sufficient STIEPROX (ciclopirox olamine 1.5%) shampoo should be applied to produce an abundant lather. The affected areas (scalp and/or its edges) should be vigorously massaged with the fingertips for two to three minutes. The hair should then be thoroughly rinsed and the procedure repeated.

##### Special Populations and Conditions

STIEPROX was not tested in special populations.

#### DOSAGE FORMS, COMPOSITION AND PACKAGING

STIEPROX contains ciclopirox olamine USP 1.5% in a mild aqueous shampoo base. STIEPROX contains the following excipients: purified water, sodium lauryl ether sulphate, cocamidopropyl betaine, disodium hydrogen phosphate, citric acid monohydrate, coconut diethanolamide, hexylene glycol, oleyl alcohol, polysorbate 80, polyquaternium 10, fragrance, and sodium hydroxide. STIEPROX shampoo is packaged into 100 mL bottles.

##### Product Monograph available upon request.

**References:** 1. Shuttleworth D, et al. Comparative clinical efficacy of shampoos containing ciclopirox olamine (1.5%) or ketoconazole (2%; Nizoral®) for the control of dandruff/seborrheic dermatitis. *J Dermatol Treat* 1998;9:157-62. 2. STIEPROX Product Monograph. Siefel Canada Inc., 2006.

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Research in Dermatology™

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SCI/D/06-03/STPX/1020/PL-E