



The Mashadi-Narasimhan-Said Classification for Cor Triatriatum Sinister: Applicable to All

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We read with great interest the article by Kim et al. [1] describing a single-center surgical experience with cor triatriatum sinister (CTS), a rare congenital cardiac anomaly. In the study, 32 patients were treated surgically over a 27-year span. All patients were classified using the modified Lucas classification for CTS, which is a system that has been adopted by the Society of Thoracic Surgeons as part of the Congenital Heart Surgery Nomenclature and Database Project [2]. In the 32-patient cohort, the authors could not classify 2 patients. The first patient had a fenestration through the membrane with an atrial-level communication above the membrane between the accessory chamber (AC) and right atrium (RA), a communication below the membrane between the left atrium proper and RA, and partial anomalous pulmonary venous connection (PAPVC) of the right lower pulmonary vein (PV) to the RA. The second patient had a fenestration through the membrane, but with an atrial-level communication between the AC and RA, as well as PAPVC of the right upper and middle PVs to the RA. These 2 patients do not fit any of the categories of the Lucas classification. The authors also described 1 of their patients who had a functional single ventricle secondary to hypoplastic left heart syndrome. Single-ventricle physiology is likewise not referred to in the Lucas classification.

As we know, the main focus of the Lucas classification is describing the different patterns for drainage and/or connection of the PVs by including 3 main groups (I–III), with

each branching into an A and B subset. However, the Lucas classification has several deficiencies that we have drawn attention to recently [3]. It does not account for single-ventricle physiology, and it does not accurately describe the anatomy of the CTS membrane. These variations in atrial-level communication and the presence of single-ventricle physiology have been well documented in the literature in association with CTS [4,5]. The Lucas classification is an incomplete anatomic and non-physiologic classification that does not account for the degree of obstructiveness of the CTS membrane, which may result in different hemodynamics and clinical presentations for patients who have the same subtype under the Lucas classification.

We recently published a simple yet comprehensive classification for CTS based on our recent review of long-term outcomes in 16 children [3]. The newly proposed Mashadi-Narasimhan-Said (MNS) classification is more practical and inclusive of all CTS categories (Table 1). The MNS classification divides CTS patients into those with isolated CTS (I) (no other congenital heart defects), besides atrial-level communications, and those with complex CTS (II) (associated with other anomalies). It then accounts for physiology, the degree of obstructiveness of the membrane, and the patterns of drainage/connection of the PVs, as well as the atrial-level communication and its location, thus covering all subtypes of CTS.

Our classification can be straightforwardly applicable to



Table 1. The newly proposed Mashadi-Narasimhan-Said classification for cor triatriatum sinister

Category	Description
I	Isolated CTS: CTS with no other congenital heart defects <ul style="list-style-type: none"> • Non-obstructive vs. obstructive • Atrial level communication: <ul style="list-style-type: none"> • Present: AC-to-RA (AC-RA); LA-to-RA (LA-RA); combined • No communication • Normal pulmonary venous anatomy
II	Complex CTS: CTS associated with other anomalies (other than ASD) <ul style="list-style-type: none"> A. Single-ventricle circulation: <ul style="list-style-type: none"> • Non-obstructive vs. obstructive • Atrial level communication: <ul style="list-style-type: none"> • Present: AC-to-RA (AC-RA); LA-to-RA (LA-RA); combined • No communication • Pulmonary venous drainage/connection: <ul style="list-style-type: none"> • Normal • Anomalous: partial (PAPVC); total (TAPVC) B. Two-ventricle circulation: <ul style="list-style-type: none"> • Non-obstructive vs. obstructive • Atrial level communication: <ul style="list-style-type: none"> • Present: AC-to-RA (AC-RA); LA-to-RA (LA-RA); combined • No communication • Pulmonary venous drainage/connection: <ul style="list-style-type: none"> • Normal • Anomalous: partial (PAPVC); total (TAPVC)

CTS, cor triatriatum sinister; AC, accessory chamber; AC-RA, accessory chamber to right atrium; ASD, atrial septal defect; CTS, cor triatriatum sinister; LA, left atrium; LA-RA, left atrium to right atrium; PAPVC, partial anomalous pulmonary venous connection; RA, right atrium; TAPVC, total anomalous pulmonary venous connection.

all patients in the series by Kim et al. [1]. The 2 patients who were not classified under the Lucas classification in their series can be easily included in the MNS classification as types IIB (complex, 2-ventricle circulation), non-obstructive (N/O), combined (atrial-level communication), and PAPVC for the first patient, while the second patient would be IIB: N/O, AC-to-RA, and PAPVC. Although the single-ventricle patient was classified using the Lucas classification in the study, the MNS classification would be a better approach for this patient, who would be included in subgroup IIA.

In conclusion, the MNS classification may represent a simple, yet more inclusive classification for patients with CTS. It accounts for the deficiencies that are encountered in other classification systems and we hope it will be used in the future to better categorize this rare anomaly.

Article information

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Conflict of interest

The author Sameh M. Said is a consultant to Artivion, Abbott, and Stryker. Except for that, no potential conflict of interest relevant to this article was reported.

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