Commentary: Worldwide, the management of transposition may be more baffling than we knew

Jonathan M. Chen, MD

From the Division of Cardiothoracic Surgery, Children's Hospital of Philadelphia, Philadelphia, Pa.

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Address for reprints: Jonathan M. Chen, MD, Cardiothoracic Surgery, Children's Hospital of Philadelphia, 3401 Civic Center Blvd, Suite 12NW10, Philadelphia, PA 19104 (E-mail: chenj14@email.chop.edu).

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The evolution from the atrial switch to the arterial switch operation may be the single example in congenital heart surgery most frequently cited to demonstrate surgical advancement from palliative to restorative. Although the concept of the arterial switch as “definitively corrective” may be debatable, irrefutably, during the past several decades, iterative improvements in technique have nearly eliminated the contributing morbidity of some of its most significant previous challenges (eg, coronary anomalies, associated lesions). Indeed, the persisting major risk factors for poor outcome are those less “modifiable” factors, of which late diagnosis after left ventricular “untraining” remains formidable, most notably in developing countries worldwide.

Globally, for those patients beyond the threshold to enjoy benefit from a rapid 2-stage arterial switch, the atrial switch (Senning or Mustard) still maintains prominence as an effective operative strategy. Because of this, as demonstrated by Hosny and colleagues¹ in this issue of the *Journal*, the atrial switch still deserves continued focus and refinement in an effort to mitigate its well-known late complications (arrhythmia, baffle obstruction, exercise intolerance). From 2013 to 2018, the Aswan group managed 634 patients with transposition, 504 of whom underwent a 1-stage arterial switch and 101 who underwent the Mustard procedure. Their technical modifications aim to maximize the alliterative triumvirate of the systemic venous baffle—namely, its capacitance, conduit, and contractile (“kick”) functions. I encourage readers to review the linked videos describing these technical advances, as eloquently narrated by Dr Yacoub.¹

Whereas previous reports have focused largely on tailoring the perfect Mustard pantaloons to prevent stenosis, the revisions described by Hosny and colleagues¹ seek to “normalize” the mitral inflow, which they demonstrate by magnetic resonance imaging and have previously also shown by 3- and 4-dimensional modeling.²⁻⁵ In addition, these modest alterations of the baffle suture line are hoped to preserve sinus node function and ideally limit later issues of arrhythmia.⁶ What remains to be demonstrated,

Is Mustard the new black?

Central Message

Improvements to the Mustard procedure remain relevant, because atrial switch operations are still performed broadly worldwide for patients with late diagnosis of transposition of the great arteries.

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however, is whether the aggregate advantages of these technical modifications are offset by comparable issues of abnormal systemic *right* ventricular filling or—likely more daunting—the unrelenting march of systemic right ventricular decompensation with time.^{7,8} Indeed, also not yet verified with this technique is a correlated improvement in exercise capacity or hemodynamic response to exercise, which may in fact together represent the holy grail for the atrial switch if we accept at baseline our inability to halt the inexorable failure of the systemic right ventricle.⁹⁻¹¹

Trainees today are taught reflexively to answer on board examinations that the atrial switch belongs in the graveyard of abandoned eponymous procedures—atriopulmonary Fontan, Baffles, Brock. The contribution of Hosny and colleagues,¹ however, reminds us that the Mustard procedure cannot become a lost art. Indeed, whereas implementation of obstetrical screening guidelines boast a prenatal diagnosis of transposition approaching 80% in North America, the findings worldwide are far more sobering.¹²⁻¹⁴ We must acknowledge that for many developing countries, baffling as it seems, the atrial switch has never left the front page of *Vogue*.¹⁵ Until earlier diagnosis (and balloon atrial septostomy) is more broadly available worldwide, the tireless pursuit of perfection in the atrial switch will continue to represent a professional mandate.

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