

# Intraoperative Three-Dimensional Mapping of Supraventricular Tachycardia in a Young Fontan Patient



James C. Perry, MD, Matthew R. Williams, MD, Suzanne Shepard, RN, Andras Bratincsak, MD, PhD, Cynthia Murphy, RN, Raghav Murthy, MD, Mohammad Ebrahim, MD, and John J. Lamberti, MD

Pediatric Cardiology and Cardiovascular Surgery, Rady Children's Hospital, University of California San Diego, San Diego, California; Kapi'olani Medical Specialists, Hawai'i Pacific Health, Honolulu, Hawaii

**Preoperative tachycardia is uncommon before an initial Fontan procedure. Catheter intervention can risk complications in small patients. A patient with fetal tachycardia and double inlet left ventricle underwent Norwood and bidirectional Glenn procedures. She had persistent tachycardia. A three-dimensional electroanatomic mapping system was modified for the operative procedure; it was used to identify the arrhythmia substrate and cryoablate an atrioventricular nodal tachycardia. Mapping added 20 minutes to the operation. She is arrhythmia-free and off medication after 4 months. This three-dimensional system was successfully adapted for an intraoperative SVT ablation in this small patient, and it may be useful in other settings.**

(Ann Thorac Surg 2017;103:e453-6)

© 2017 by The Society of Thoracic Surgeons

**P**reoperative supraventricular tachycardia (SVT) substrates are uncommon in congenital heart disease (CHD) before an initial Fontan procedure. Accessory pathway SVT mechanisms are associated with CHD (e.g., Ebstein malformation) [1], whereas atrioventricular nodal reentry [2] and reentrant SVT involving twin atrioventricular (AV) node physiologies are rare [3]. Transcatheter ablation provides definitive therapy of SVT in young patients and adults with CHD [4, 5], but patient size constraints must be considered with small patients. We report the use of a three-dimensional (3D) mapping system in an intraoperative, open-chest setting for SVT mechanism determination and therapeutic guidance in a small patient with CHD.

The patient's diagnoses included double inlet left ventricle, L-transposed great arteries, and ventricular septal defect. She had fetal SVT that persisted postnatally. There was no preexcitation. She underwent Norwood procedure with Blalock-Taussig shunt and atrial septectomy at 5 days and had postoperative SVT, treated with

intravenous amiodarone and then esmolol. She needed flecainide for recurrent SVTs, inferred by electrocardiography to be perhaps nodal. There was no clear evidence of variable QRS morphology indicating potential twin AV node physiology.

She had gastrostomy tube, right bidirectional Glenn shunt, shunt takedown, and pulmonary arterioplasty at 3.5 months. At the time of the Fontan procedure, she was 4 years old, weighing 13.6 kg. She had recurrent SVT during a trial off flecainide (Fig 1). A preoperative electrophysiology study was deferred because of her size and the potential nodal substrate. Given the double inlet left ventricle diagnosis, a node-node mechanism was possible. Intraoperative 3D electroanatomic mapping was planned.

The CARTO 3D electroanatomic mapping system (Biosense Webster, Diamond Bar, CA) was brought to the operating suite. The locator pad was removed from its housing and secured under the table foam, above the metal table component (Fig 2A). Location patches were placed, avoiding the sterile field with an extension on the table so that pad and patches were well positioned (Fig 2B). The front upper body patches on the shoulders remained in the locator field even after prepping, draping, and sternotomy.

The anterior, right lateral, and posterior aspects of the heart were dissected. A ventricular temporary wire was placed, and a connection fashioned for a BARD EP Lab-System (Boston Scientific), stimulator and the CARTO system.

A hand-held Navistar 4-mm tip catheter (Biosense Webster, Diamond Bar, CA) created an epicardial map of sinus rhythm, identified sinus node location, and provided a mapping template (Fig 3A). Ventricular pacing and extrastimuli mapped the epicardial retrograde atrial activation. This was compatible with posterior AV nodal activation (Fig 3B) without evidence of an anterior node. A purse-string puncture of the lateral right atrium allowed introduction of the mapping catheter into the atria. Ventricular pacing and endocardial mapping was again compatible with a posterior AV node location (Fig 3C). A premature ventricular contraction protocol showed single atrial exit and ventriculoatrial decrement without accessory pathway properties. Given these findings and no evidence of twin AV nodes, a diagnosis of posterior AV node reentry was made. The total intraoperative mapping and pacing protocols took 20 minutes of operating room time.

The patient was placed on cardiopulmonary bypass, and a lateral atriotomy performed. A cryoablation lesion line was created under direct visualization, guided by the retrograde conduction map, from the posterior tricuspid annulus isthmus to coronary sinus os and laterally to the inferior vena caval orifice. The atrium was closed, and an extracardiac fenestrated Fontan procedure was completed. After rewarming off bypass, there was sinus rhythm with intact AV conduction and normal PR interval. An atrial and ventricular extrastimulus pacing protocol after rewarming showed no inducible SVT. The patient was discharged on postoperative day 10 without

Accepted for publication Oct 27, 2016.

Address correspondence to Dr Perry, Cardiology Division, 3020 Children's Way, MC 5004, San Diego, CA 92123; email: [jperry@rchsd.org](mailto:jperry@rchsd.org).

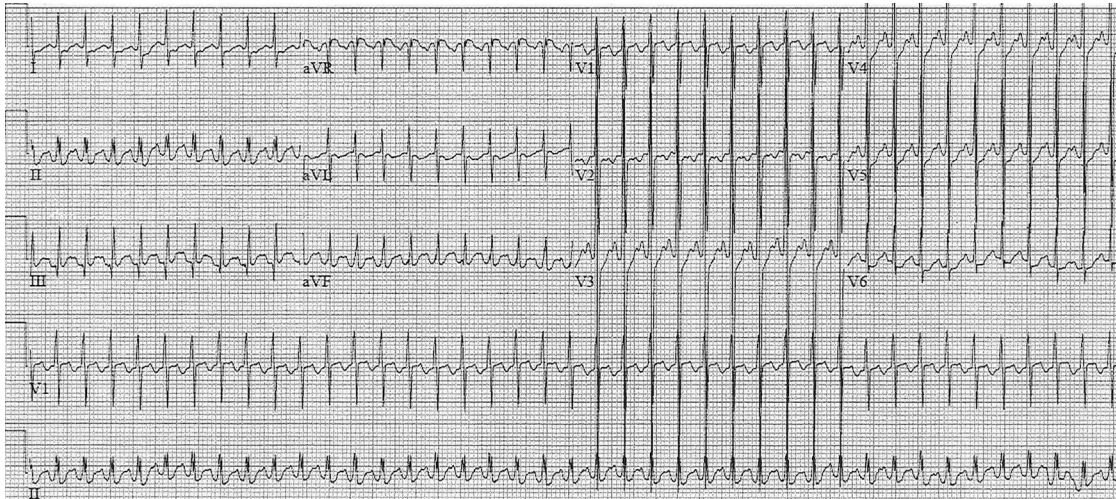


Fig 1. Preoperative supraventricular tachycardia in this patient.

antiarrhythmic medications. She remains arrhythmia-free after 4 months.

### Comment

Ablation techniques are commonplace for older patients with CHD, taking advantage of the strengths of both transcatheter and intraoperative surgical strategies. Surgical approaches are often used during Fontan revision surgeries [6]. In younger, smaller CHD patients, interventional electrophysiologic catheter approaches are prohibited by small patient size, catheter size, and a higher

complication risk. Elective procedures are generally reserved for those weighing more than 15–20 kg and older than 4–5 years. With primary Fontan surgeries performed on such young patients, these factors are important for the complex CHD patient with preoperative tachyarrhythmia.

Intraoperative techniques for SVT ablation were commonplace in the 1980s [7]. These surgical ablation procedures were innovative, but essentially have fallen by the wayside, and surgical arrhythmia experience, outside of Maze procedures [6], is currently limited.

This case report shows that intraoperative mapping is feasible and efficacious using a 3D electroanatomic catheter laboratory-based system for some patients with

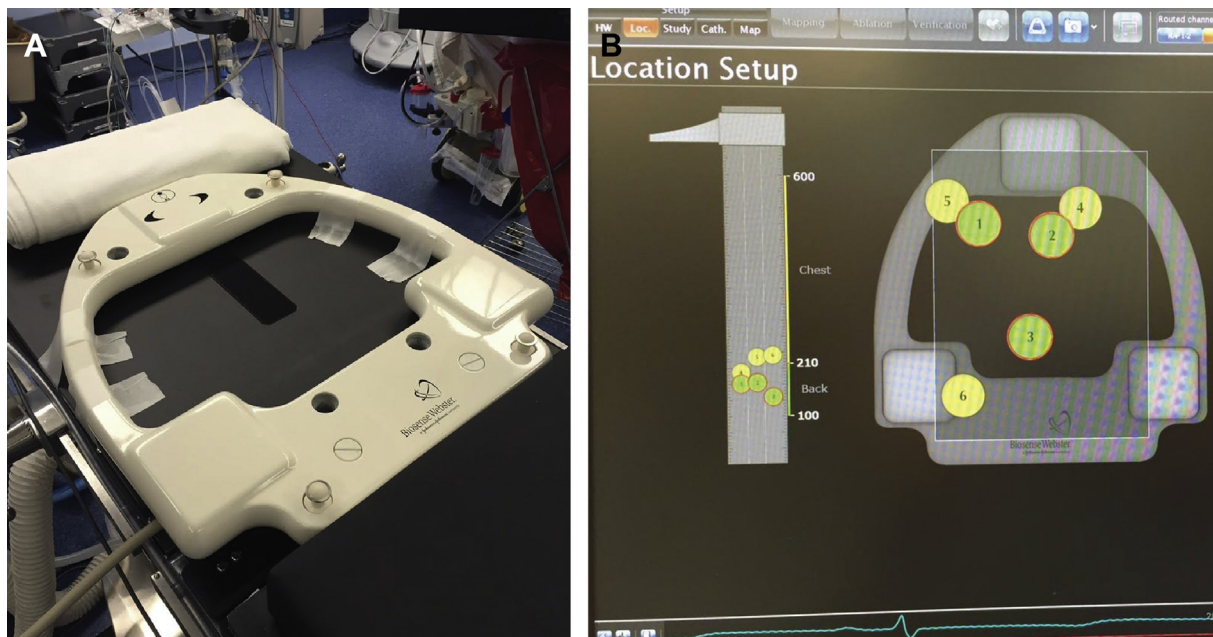


Fig 2. (A) Positioning of the locator pad above the operative table, in position beneath the top table cushion. (B) Adequate patch positioning.

Download English Version:

<https://daneshyari.com/en/article/5596995>

Download Persian Version:

<https://daneshyari.com/article/5596995>

[Daneshyari.com](https://daneshyari.com)