Title: Surgical Atrioventricular (AV) Block and the Single Ventricle Patient: Risks, Results and Resolutions

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Purpose:
Surgical AV block is associated with comorbidity and cost. At our center we observed an increased incidence of surgical AV block in patients undergoing left ventricle rehabilitation (LVR) for hypoplastic left heart syndrome (2/9 patients) and sought to further investigate the incidence of surgical AV block in both the LVR and single ventricle cohorts.

Methods:
A retrospective review of our surgical database was carried out for 2010-2014. All patients (0-25 years old) with a discharge diagnosis of "AV block" were identified and their records reviewed. Patients with surgical AV block prior to 2010 or congenital AV block were excluded. Incidence was compared between two ventricle, single ventricle and LVR groups (LVR= Norwood + surgical procedure defined to grow the LV). Incidence was calculated as number of surgical AV block cases divided by total number of open heart surgical cases without previously diagnosed AV block. Statistical analysis: two tailed Fisher's Exact Test.

Results:
A total of 15 patients (age 7 days-18 years old) developed surgical AV block, representing an overall incidence of 1.32% (15/1136 cases). Incidence in single ventricle cases showed a statistically significant difference compared to the two ventricle cases (p=0.0122). There was no statistical difference in incidence between the single ventricle cases (excluding those defined as LVR) and the LVR cases (p=0.2307). 22% of LVR patients (2/9) had surgical AV block (3/9 patients would have achieved statistical significance at P<0.05 when compared to single ventricle patients).

2010-2014 Surgical AV Block Data for Open Heart Cases

	Cases with AV block	Cases without AV Block	Total	Incidence	P Value
Two Ventricle Anatomy	8	915	923	0.87%	n/a
Single Ventricle Anatomy	7	206	213	3.29%	0.0122*
-*Single Ventricle Excluding LVR*	5	180	185	2.7%	0.0505
-*LVR*	2	26	28	7.14%	0.0325*

Table 1. All comparisons to two ventricle anatomy; (*) denotes significance (P<0.05). Single ventricle anatomy is further subgrouped into LVR and those with single ventricle anatomy excluding LVR.

Conclusion:
We have demonstrated a statistically significant increase in incidence of surgical AV block in single ventricle cases when compared to the two ventricle group. Surgical AV block in 22% of LVR patients, while not statistically significant, is clinically important and as future patients proceed down the LVR path statistics may reach significance. Previous studies have failed to define modifiable risk factors for prevention or peri-operative treatment outside of pacemaker placement. Target areas for risk reduction in these populations may include examining the role of post-operative steroids and the use of intraoperative cardiac mapping.