

Cost and Outcome Comparison Between Neonates Undergoing Balloon Atrial Septostomy at Bedside versus Cardiac Catheterization Laboratory

“Background”

Balloon Atrial Septostomy (BAS) is an effective and low-risk procedure typically performed at the patient bedside or in the catheterization laboratory. Location is typically based on physician or institutional preference, with safety concerns cited when the cath lab is preferred. A comparison of safety and outcomes of BAS in the two locations has not been studied, nor the economic impact of this choice.

“Methods”

The medical records of neonates with d-transposition of the great arteries who underwent BAS were reviewed between 10/1/2000 to 12/31/2013.

Medical and procedural records, echocardiograms and catheterization data were reviewed. Descriptive statistics including means, standard deviations, ranges and medians for continuous variables and counts and percentages for categorical variables were calculated on various patient characteristics for each procedural approach. The two locations were compared using t-tests for most continuous variables and Fisher's exact tests for all categorical variables. Since age at procedure, age at surgery, and days between procedure and surgery were skewed, Wilcoxon rank sums tests were used to compare the two locations on these characteristics. An analysis of covariance (ANCOVA) model was used to compare the two locations on the change in SaO₂ levels after adjusting for the pre-procedure level.

“Results”

In the 88 subjects who underwent the procedure, 53 (60.2%) were done bedside and 35 (39.8%) were done in the cath lab. Table 1 shows the comparison of the two locations on various patient characteristics. The subjects in the cath lab were significantly roughly 4 days older on average than those at bedside (cath lab mean: 6.3 (SD=13.2); bedside mean: 2.1 (9.0); $p=0.0035$). There was no significant differences in gender (0.6524), weight (0.9975) or gestational age ($p=0.7064$). Significantly more bedside subjects had a prenatal diagnosis than those performed in the cath lab (42% vs. 14%; $p=0.0123$). All subjects in the cath lab while no subjects at bedside had anesthesia ($p<0.0001$). Nearly all of the bedside placements had an echo during the procedure compared to less than a third for the cath lab placements (98% vs. 31%; $p<0.0001$). There were no significant differences between the placement locations in ventilator use ($p=0.5163$), use of inotropes ($p=0.3616$), need for a 2nd cath for CA ($p=0.2359$), or procedural complications ($p=0.5135$). The percent of echo and surgery findings that matched were similar in the procedure locations (bedside: 58%; cath lab: 43%; $p=0.1922$). The age at surgery ($p=0.1585$) and the number of days from the procedure until surgery ($p=0.3450$) were also not significantly different between the two placement locations. The pre-procedure SaO₂ levels were similar between the placement locations ($p=0.4660$). The bedside location had significantly higher post-procedure SaO₂ levels ($p=0.0277$); however, the change between the pre and post-levels was not significantly different between the two groups ($p=0.3996$). However, after adjusting for the pre-procedure level, there is a significant difference between the two locations (bedside mean: 20.7 (SE=0.9); cath lab mean: 17.0 (SE=1.4); $p=0.0271$).

“Conclusions”

Bedside septostomy for d-transposition of the great arteries is as safe as in the catheterization laboratory. With equivalent outcomes, the singular advantage of catheterization is the addition of coronary artery imaging to identify anomalies, although anomalies are commonly identified by ultrasound. However, laboratory based septostomies generate a significant increase in healthcare costs, even without the inclusion of angiography, and offer no improvement in outcome or safety. Therefore, balloon atrial septostomy should be performed at the patient bedside primarily, unless significant concern of a coronary anomaly necessitates coronary angiography.