See Article page 1838.

Commentary: Experience and fundamentals. Or, “Whoa, that’s a small baby”

David M. Overman, MD

“Big and fast always beats fast”

—Barry Switzer, former head coach
Oklahoma Sooners and Dallas Cowboys

Barry Switzer is 1 of only 3 head football coaches to have won both a National Collegiate Athletic Association Championship and the Super Bowl (the others are Switzer’s former teammate Jimmy Johnson and Pete Carroll). Although his aphorism regarding football and physicality may seem remote to an article about undersized babies with congenital heart disease, its central principle is not. Successful people have an ability to distill seemingly complex issues down to fundamentals, to sift the wheat from the chaff, to cut out the noise. Of course there are exceptions to any rule (which is why the less clear minded get confused), but those who succeed in whatever their pursuit have the ability to recognize, distill, and practice the fundamental principles of their discipline.

The analysis by Steurer and colleagues¹ of outcomes based on birth weight *z* scores in more than 25,000 newborns undergoing cardiac surgery in the Society of Thoracic Surgeons Congenital Heart Surgery Database is novel and important, even while it is intuitive and connected to a seemingly basic idea. That idea is this: If you are bigger when you are born (or more precisely, not smaller than you are supposed to be), you have better odds of having a good outcome (or more precisely, avoiding a bad one). Birth

David M. Overman, MD

CENTRAL MESSAGE

Intrauterine growth retardation has a pronounced influence on perinatal mortality and morbidity that is independent of gestational age. This observation has important implications across many domains.

weight *z* score was independently associated with death across all gestational ages less than term, and its effect was most pronounced in the early term (37–38 weeks’ gestation) population. This, as the authors note, may reflect the penetrance of growth restriction’s pathophysiology in this gestational age group, which is blunted—or masked—by more pronounced effects of prematurity in the earlier gestational age cohort. The literature is mixed as to whether prematurity and growth restriction have a competing or synergistic influence on mortality risk, but suffice to say, neither is desirable.

The obstetrical community has known about the independent effect of intrauterine growth retardation for some time now. In 2004, a study by Thorp and colleagues² examining outcomes in nearly 30,000 premature infants demonstrated a rather astounding influence on mortality of growth restriction at each gestational age. Risk of death was increased 50% for the overall cohort (4% to 6%), and more than 250% (18% to 52%) at 26 weeks’ gestation. The mechanisms underlying growth restriction’s influence on fetal and perinatal health are myriad, and involve derangements of nutritional, immune, cardiopulmonary, and cerebral function with major downstream consequences.

The recognition of the independent and powerful role of growth restriction in the prognosis of a newborn infant with

From the Division of Cardiovascular Surgery, Children’s Minnesota, Mayo Clinic-Children’s Minnesota Cardiovascular Collaborative, and Division of Cardiac Surgery, The Children’s Heart Clinic, Minneapolis, Minn.

Disclosures: The author reported no conflicts of interest.

The *Journal* policy requires editors and reviewers to disclose conflicts of interest and to decline handling or reviewing manuscripts for which they may have a conflict of interest. The editors and reviewers of this article have no conflicts of interest.

Received for publication Feb 15, 2021; revisions received Feb 15, 2021; accepted for publication Feb 17, 2021; available ahead of print Feb 22, 2021.

Address for reprints: David M. Overman, MD, Division of Cardiovascular Surgery, Children’s Minnesota, Mayo Clinic-Children’s Minnesota Cardiovascular Collaborative, Division of Cardiac Surgery, The Children’s Heart Clinic, 2530 Chicago Ave S, Suite 500, Minneapolis, MN 55404 (E-mail: doverman@chc-pa.org).

J Thorac Cardiovasc Surg 2021;162:1848–9

0022-5223/\$36.00

Copyright © 2021 by The American Association for Thoracic Surgery

<https://doi.org/10.1016/j.jtcvs.2021.02.058>

congenital heart disease is important across several domains: prenatal counseling, assessment of programmatic variation in outcomes, and risk modeling to name a few. Therapeutic decision making and its fit with growth-restricted patients is another vast and largely uncharted area for future investigations.³

In its purest form, athletics (as in many other disciplines) teaches lessons about character, pain and loss, joy and fulfillment—lessons about life. The somewhat glib but nonetheless spot-on observation of a master at his discipline

applies some 30 years later to the field of neonatal cardiac surgery: You're a lot better off if you're bigger.

References

1. Steurer MA, Peyvandi S, Costello JM, Moon-Grady AJ, Habib RH, Hill KD, et al. Association between z score for birth weight and post-operative outcomes in neonates and infants with congenital heart disease. *J Thorac Cardiovasc Surg.* 2021;162:1838-47.e4.
2. Thorp JA, Clark R, Garite TJ. Intrauterine growth restriction increases morbidity and mortality among premature neonates. *Am J Obstet Gynecol.* 2004;191:481-7.
3. Collela M, Frerot A, Batista-Novais AR, Baud O. Neonatal and long-term consequences of fetal growth restriction. *Curr Pediatr Rev.* 2018;14:212-8.

See Article page 1838.

Commentary: The growing problem in congenital heart surgery

Garick D. Hill, MD, MS

In this issue of the *Journal*, Steurer and colleagues¹ carefully separate the risk of absolute weight and that of being born small for gestational age in patients undergoing congenital heart surgery. Their work adds to a growing body of evidence on the adverse effects of low birth weight z-score on surgical outcomes. The strength of this study is the large and nationally representative patient population from the Society of Thoracic Surgeons Congenital Heart Surgery Database, allowing a robust evaluation of the risk of even mild growth restriction. The finding that patients with a birth weight z-score between -1 and -0.5 have 38% increased mortality compared with those with just a slightly improved birth weight z-score between 0 and $+0.5$ is of major impact. For perspective, in a 39-week gestation male, this

From the Division of Cardiology, Department of Pediatrics, Cincinnati Children's Hospital Medical Center, Cincinnati, Ohio.

Disclosures: The author reported no conflicts of interest.

The *Journal* policy requires editors and reviewers to disclose conflicts of interest and to decline handling or reviewing manuscripts for which they may have a conflict of interest. The editors and reviewers of this article have no conflicts of interest.

Received for publication Jan 27, 2021; revisions received Jan 27, 2021; accepted for publication Jan 27, 2021; available ahead of print Feb 4, 2021.

Address for reprints: Garick D. Hill, MD, MS, Division of Cardiology, Department of Pediatrics, Cincinnati Children's Hospital Medical Center, 3333 Burnet Ave, Cincinnati, OH 45229 (E-mail: Garick.Hill@cchmc.org).

J Thorac Cardiovasc Surg 2021;162:1849-50

0022-5223/\$36.00

Copyright © 2021 by The American Association for Thoracic Surgery

<https://doi.org/10.1016/j.jtcvs.2021.01.120>

Garick D. Hill, MD, MS

CENTRAL MESSAGE

Although weight is an important determinant of outcomes after congenital heart surgery, the ability to grow, even prenatally, is equally important. Strategies to address this increased risk are untested.

approximates a birth weight of 2.9-3.15 kg versus 3.35-3.6 kg. This is of particular importance, given that the average patient undergoing the Norwood procedure is in this higher-risk group.^{2,3} Nearly as striking from this study is the additive effect of early term delivery, particularly for infants born at 37-38 weeks of gestation.¹ Most diagnoses of congenital heart disease necessitating neonatal intervention are now made prenatally,⁴ and delivery dates are often scheduled. Although recent publications demonstrating the detrimental effects of even slightly early delivery⁵ have attempted to push back elective timing, 75% of the patients in this study were born at ≤ 39 weeks.