



Manchula Navaratnam

Clinical Professor, Anesthesiology, Perioperative and Pain Medicine

CLINICAL OFFICE (PRIMARY)

- **LPCH Cardiac Anesthesia**

725 Welch Rd Rm H3580

MC 5640

Palo Alto, CA 94304

Tel (650) 723-5728 **Fax** (650) 497-8001

Bio

BIO

Dr. Manchula Navaratnam is a Clinical Professor of Anesthesiology, Perioperative, and Pain Medicine at Stanford University, specializing in Pediatric Cardiac Anesthesia. With over 16 years of expertise in the perioperative care of pediatric patients with complex cardiac conditions, Dr. Navaratnam serves as the anesthesiology lead for pediatric cardiac transplantation, ventricular assist devices, single ventricle physiology and perioperative hemostasis management.

Dr. Navaratnam's research includes pivotal work on left ventricular outflow tract velocity time integral (LVOT VTI) as a measure of ventricular function, now widely utilized at Stanford Children's Hospital. Dr. Navaratnam has led multidisciplinary clinical studies to improve care for single ventricle physiology patients, developed standardized pathways for perioperative hemostasis management, and recently contributed to an FDA-funded multicenter trial investigating pulse oximetry accuracy in congenital heart disease patients with darker skin tones.

As a dedicated mentor and educator, Dr. Navaratnam founded and directs the Pediatric Cardiac Anesthesia Learning (PCAL) workshop for fellows nationwide and leads Stanford's undergraduate course, "Mending a Broken Heart." Dr. Navaratnam's mentorship has supported numerous trainees and collaborators, resulting in award-winning presentations and impactful research contributions. Dr. Navaratnam is an associate editor for Pediatric Anesthesia, an active peer reviewer for leading journals, a coach and board member for the Congenital Cardiac Anesthesia Society, and an active contributor to national committees and task forces advancing faculty development and the field of pediatric cardiac anesthesia.

Dr. Navaratnam's mission is providing exceptional and compassionate patient care while training the next generation of leaders in the field.

CLINICAL FOCUS

- Pediatric Anesthesia
- Pediatric cardiac anesthesia
- Pediatric Anesthesiology

ACADEMIC APPOINTMENTS

- Clinical Professor, Anesthesiology, Perioperative and Pain Medicine
- Member, Cardiovascular Institute

PROFESSIONAL EDUCATION

- Board Certification: Anesthesia, The Royal College of Anaesthetists (2003)
- Residency: South East Scotland School of Anaesthesia (2007) Scotland
- Fellowship: Westmead Children's Hospital (2006) Australia
- Residency: South East Scotland School of Anaesthesia (2001) Scotland
- Residency: South Manchester NHS Trust (1999) UK
- Residency: Trafford General Hospital (1999) UK
- Residency: St John's Hospital at Howden (1998) UK
- Internship: South Manchester NHS Trust (1997) UK
- Medical Education: Edinburgh University (1997) UK

Research & Scholarship

CLINICAL TRIALS

- Effects of Different Tidal Volume Ventilation Strategies on Fontan Flow and Hemodynamics, Not Recruiting
- The Hemodynamic Effects of Vasopressin in Patients With Fontan Physiology, Not Recruiting

Teaching

COURSES

2025-26

- Mending a broken heart: The Anatomy, Physiology and Psychology of congenital heart disease: ANES 74Q (Win)

2024-25

- Mending a broken heart: The Anatomy, Physiology and Psychology of congenital heart disease: ANES 74Q (Win)

2023-24

- Mending a broken heart: The Anatomy, Physiology and Psychology of congenital heart disease: ANES 74Q (Win)

2022-23

- Mending a broken heart: The Anatomy, Physiology and Psychology of congenital heart disease: ANES 74Q (Win)

Publications

PUBLICATIONS

- **Heart Transplantation and Ventricular Assist Device in Duchenne Muscular Dystrophy: A New Era.** *Pediatric transplantation*
Rosenthal, D. N., Amodeo, A., Butterfield, R. J., Butts, R., Chrzanowski, S., Cripe, L., Day, J., Davies, R., Duong, T., Evers, P., Gambetta, K., Harris, R., Hayes, et al
2026; 30 (1): e70253
- **Pharmacologic Management of Segmental Pulmonary Hypertension in Children After Unifocalization and Pulmonary Artery Reconstruction: Initial Experience.** *Pulmonary circulation*
Cameron, J. E., McElhinney, D. B., Liu, E., Hopper, R. K., Asija, R., Navaratnam, M., Hanley, F. L., Feinstein, J. A.
2025; 15 (3): e70134
- **Hemodynamic Effects of Altering Tidal Volume During Positive Pressure Ventilation in the Fontan Circulation: A Randomized Crossover Trial.** *Paediatric anaesthesia*
Navaratnam, M., Schmidt, A. R., Kaplinski, M., De Souza, E., Beattie, M. J., Rowe, E. V., Punn, R., Ramamoorthy, C.
2025

- **Comparison of the Point-Of-Care Coagulation Device Quantra With the TEG-5000 for Congenital Cardiac Surgery-A Pilot Study.** *Paediatric anaesthesia*
Ochocinski, D., Navaratnam, M., Babb, A., De Souza, E., Kamra, K., Sleasman, J. R., Margetson, T. D., Bhamidipati, J. K., Ramamoorthy, C., Schmidt, A. R.
2025
- **Decisions Using Intra-Operative Gross Assessment of Fontan-Associated Liver Disease: Implications for Heart-Only Transplantation** *PEDIATRIC TRANSPLANTATION*
Rivera, D., Zhang, K., Ebel, N., Bensen, R., Martin, E., Ma, M., Esquivel, C. O., Navaratnam, M., Hollander, S. A., Rosenthal, D. N., Chen, S.
2025; 29 (1)
- **Decisions Using Intra-Operative Gross Assessment of Fontan-Associated Liver Disease: Implications for Heart-Only Transplantation.** *Pediatric transplantation*
Torpoco Rivera, D. M., Zhang, K. Y., Ebel, N., Bensen, R., Martin, E., Ma, M., Esquivel, C. O., Navaratnam, M., Hollander, S. A., Rosenthal, D. N., Chen, S.
2025; 29 (1): e70036
- **Perioperative Management of Pediatric Combined Heart and Liver Transplantation: A 17 year single center experience.** *Paediatric anaesthesia*
Navaratnam, M., Li, E. X., Chen, S., Margetson, T., Wolke, O., Ma, M., Ebel, N. H., Bonham, C. A., Ramamoorthy, C.
2024
- **Error traps in patients with congenital heart disease undergoing noncardiac surgery.** *Paediatric anaesthesia*
Albertz, M., Ing, R. J., Schwartz, L., Navaratnam, M.
2024
- **Intraoperative and Postoperative Hemodynamic Predictors of Acute Kidney Injury in Pediatric Heart Transplant Recipients.** *Journal of pediatric intensive care*
Hollander, S. A., Chung, S., Reddy, S., Zook, N., Yang, J., Vella, T., Navaratnam, M., Price, E., Sutherland, S. M., Algaze, C. A.
2024; 13 (1): 37-45
- **Acute Hemodynamics in the Fontan Circulation: Open-Label Study of Vasopressin.** *Pediatric critical care medicine : a journal of the Society of Critical Care Medicine and the World Federation of Pediatric Intensive and Critical Care Societies*
Adamson, G. T., Yu, J., Ramamoorthy, C., Peng, L. F., Taylor, A., Lennig, M., Schmidt, A. R., Feinstein, J. A., Navaratnam, M.
2023
- **Coming Soon to an OR Near You: a Child with a Ventricular Assist Device** *CURRENT ANESTHESIOLOGY REPORTS*
Kleiman, Z., Navaratnam, M.
2023
- **In Response.** *Anesthesia and analgesia*
Navaratnam, M., Boothroyd, D., Zhang, S., Williams, G. D.
2023; 136 (6): e40-e41
- **Multidisciplinary Stroke Pathway for Children Supported with Ventricular Assist Devices.** *ASAIO journal (American Society for Artificial Internal Organs : 1992)*
Lee, S., Ryan, K. R., Murray, J., Chen, S., Grant, G. A., Wilkins, S., Yarlagadda, V. V., Wintermark, M., Dodd, R., Rosenthal, D., Teuteburg, J., Navaratnam, M., Lee, et al
2023
- **Activated 4-Factor Prothrombin Complex Concentrate as a Hemostatic Adjunct for Neonatal Cardiac Surgery: A Propensity Score-Matched Cohort Study.** *Anesthesia and analgesia*
Navaratnam, M., Mendoza, J. M., Zhang, S., Boothroyd, D., Maeda, K., Kamra, K., Williams, G. D.
2022
- **ISHLT consensus statement: Perioperative management of patients with pulmonary hypertension and right heart failure undergoing surgery.** *The Journal of heart and lung transplantation : the official publication of the International Society for Heart Transplantation*
McGlothlin, D. P., Granton, J., Klepetko, W., Beghetti, M., Rosenzweig, E. B., Corris, P. A., Horn, E., Kanwar, M. K., McRae, K., Roman, A., Tedford, R., Badagliacca, R., Bartolome, et al
2022; 41 (9): 1135-1194

- **Intraoperative epicardial echocardiography or transoesophageal echocardiography in CHD: how much does it matter?** *Cardiology in the young*
Stauffer, K. J., Brabender, J., Reddy, C. D., Selamet Tierney, E. S., Lopez, L., Maeda, K., Navaratnam, M., Punn, R.
2022: 1-8
- **Impact of a clinical pathway on acute kidney injury in patients undergoing heart transplant.** *Pediatric transplantation*
Algaze, C. A., Margetson, T. D., Sutherland, S. M., Kwiatkowski, D. M., Maeda, K., Navaratnam, M., Samreth, S. P., Price, E. P., Zook, N. B., Yang, J. K., Hollander, S. A.
2021: e14166
- **Intraoperative and Postoperative Hemodynamic Predictors of Acute Kidney Injury in Pediatric Heart Transplant Recipients** *JOURNAL OF PEDIATRIC INTENSIVE CARE*
Hollander, S. A., Chung, S., Reddy, S., Zook, N., Yang, J., Vella, T., Navaratnam, M., Price, E., Sutherland, S. M., Algaze, C. A.
2021
- **Neurosurgical intervention in children with ventricular assist devices: A single center case series review.** *Paediatric anaesthesia*
Yu, J., Murray, J., Ramamoorthy, C., Chen, S., Lee, S., Ryan, K., Maeda, K., Navaratnam, M.
2021
- **Impact of Modified Anesthesia Management for Pediatric Patients With Williams Syndrome.** *Journal of cardiothoracic and vascular anesthesia*
Schmidt, A. R., Collins, R. T., Adusumelli, Y., Ramamoorthy, C., Weng, Y., MacMillen, K. L., Navaratnam, M.
2021
- **Adverse Events Associated with Cardiac Catheterization in Children Supported with Ventricular Assist Devices.** *ASAIO journal (American Society for Artificial Internal Organs : 1992)*
Power, A., Navaratnam, M., Murray, J. M., Peng, L. F., Rosenthal, D. N., Dykes, J. C., Yarlagadda, V. V., Maeda, K., Almond, C. S., Chen, S.
2021
- **Comparison of combined heart–liver vs heart-only transplantation in pediatric and young adult Fontan recipients.** *The Journal of heart and lung transplantation : the official publication of the International Society for Heart Transplantation*
Sganga, D., Hollander, S. A., Vaikunth, S., Haeffele, C., Bensen, R., Navaratnam, M., McDonald, N., Profita, E., Maeda, K., Concepcion, W., Bernstein, D., Chen, S.
2020
- **Management of a Pediatric Patient With a Left Ventricular Assist Device and Symptomatic Acquired von Willebrand Syndrome Presenting for Orthotopic Heart Transplant.** *Seminars in cardiothoracic and vascular anesthesia*
Flannery, K. M., Kamra, K., Maeda, K., Shuttleworth, P., Almond, C., Navaratnam, M.
2020: 1089253220949386
- **Pectoral Nerve Blocks Decrease Postoperative Pain and Opioid Use After Pacemaker or Implantable Cardioverter-Defibrillator Placement in Children.** *Heart rhythm*
Yang, J. K., Char, D. S., Motonaga, K. S., Navaratnam, M., Dubin, A. M., Trela, A., Hanisch, D. G., McFadyen, G., Chubb, H., Goodyer, W., Ceresnak, S. R.
2020
- **Evolution of Single Ventricular Assist Device Support for the Failing Bi-directional Glenn Patient.** *The Annals of thoracic surgery*
Maeda, K., Nasirov, T., Yarlagadda, V., Hollander, S. A., Navaratnam, M., Rosenthal, D. N., Dykes, J. C., Kaufman, B. D., Almond, C. S., Reinhartz, O., Murray, J., Chen, S.
2020
- **The use of prothrombin complex concentrate as a warfarin reversal agent in pediatric patients undergoing orthotopic heart transplantation.** *Paediatric anaesthesia*
Sisti, D., Williams, G. D., Ding, V., Long, J., Maeda, K., Chen, S., Navaratnam, M.
2020
- **Bridge to Transplant with Ventricular Assist Device Support in Pediatric Patients with Single Ventricle Heart Disease** *ASAIO JOURNAL*
Chen, S., Rosenthal, D. N., Murray, J., Dykes, J. C., Almond, C. S., Yarlagadda, V. V., Wright, G., Navaratnam, M., Reinhartz, O., Maeda, K.
2020; 66 (2): 205–11
- **Peri-operative right ventricular dysfunction—the anesthesiologist’s view.** *Cardiovasc Diagnosis Therapies*
Navaratnam, M., DiNardo, J. A.

2020; 10 (5): 1725-1734

- **Pediatric ventricular assist devices: Bridge to a new era of perioperative care** *PEDIATRIC ANESTHESIA*
Navaratnam, M., Maeda, K., Hollander, S. A.
2019; 29 (5): 506–18
- **Preoperative Laboratory Studies for Pediatric Cardiac Surgery Patients: A Multi-Institutional Perspective** *ANESTHESIA AND ANALGESIA*
Jones, S. E., Jooste, E. H., Gottlieb, E. A., Schwartz, J., Goswami, D., Gautam, N. K., Benkowitz, C., Downey, L. A., Guzzetta, N. A., Zabala, L., Latham, G. J., Faraoni, D., Navaratnam, et al
2019; 128 (5): 1051–54
- **Preoperative Laboratory Studies for Pediatric Cardiac Surgery Patients: A Multi-Institutional Perspective.** *Anesthesia and analgesia*
Jones, S. E., Jooste, E. H., Gottlieb, E. A., Schwartz, J., Goswami, D., Gautam, N. K., Benkowitz, C., Downey, L. A., Guzzetta, N. A., Zabala, L., Latham, G. J., Faraoni, D., Navaratnam, et al
2019
- **Bridge to Transplant with Ventricular Assist Device Support in Pediatric Patients with Single Ventricle Heart Disease.** *ASAIO journal (American Society for Artificial Internal Organs : 1992)*
Chen, S., Rosenthal, D. N., Murray, J., Dykes, J. C., Almond, C. S., Yarlagadda, V. V., Wright, G., Navaratnam, M., Reinhartz, O., Maeda, K.
2019
- **Pediatric ventricular assist devices: Bridge to a new era of peri-operative care.** *Paediatric anaesthesia*
Navaratnam, M., Maeda, K., Hollander, S. A.
2019
- **Epoprostenol Therapy for a Pediatric Patient With Subacute Heparin-Induced Thrombocytopenia and a Ventricular Assist Device Undergoing Heart Transplant: A Case Report** *A & A PRACTICE*
Navaratnam, M., Williams, G. D., Shuttleworth, P., Almond, C., Maeda, K.
2018; 11 (12): 329–31
- **Bilateral automatized intermittent bolus erector spinae plane analgesic blocks for sternotomy in a cardiac patient who underwent cardiopulmonary bypass: A new era of Cardiac Regional Anesthesia.** *Journal of clinical anesthesia*
Tsui, B. C., Navaratnam, M. n., Boltz, G. n., Maeda, K. n., Caruso, T. J.
2018; 48: 9–10
- **LVOT-VTI is a Useful Indicator of Low Ventricular Function in Young Patients.** *Pediatric cardiology*
Navaratnam, M., Punn, R., Ramamoorthy, C., Tacy, T. A.
2017
- **Perioperative management of pediatric en-bloc combined heart-liver transplants: a case series review.** *Paediatric anaesthesia*
Navaratnam, M., Ng, A., Williams, G. D., Maeda, K., Mendoza, J. M., Concepcion, W., Hollander, S. A., Ramamoorthy, C.
2016; 26 (10): 976-986
- **Surgical Reconstruction of Tracheal Stenosis in Conjunction With Congenital Heart Defects** *Basic Science Forum of the 58th Annual Meeting of the Southern-Thoracic-Surgical-Association*
Mainwaring, R. D., Shillingford, M., Davies, R., Koltai, P., Navaratnam, M., Reddy, V. M., Hanley, F. L.
ELSEVIER SCIENCE INC.2012: 1266–73
- **Pediatric pacemakers and ICDs: how to optimize perioperative care** *PEDIATRIC ANESTHESIA*
Navaratnam, M., Dubin, A.
2011; 21 (5): 512-521
- **Myocardial ischemia is more important than the effects of cardiopulmonary bypass on myocardial water handling and postoperative dysfunction: a pediatric animal model.** *The Journal of thoracic and cardiovascular surgery*
Egan, J. R., Butler, T. L., Cole, A. D., Aharonyan, A., Baines, D., Street, N., Navaratnam, M., Biecker, O., Zazulak, C., Au, C. G., Tan, Y. M., North, K. N., Winlaw, et al
2008; 136 (5): 1265-73, 1273.e1-2