

# Anesthesia Concerns in Child with Takayasu Arteritis for Catheterization Laboratory Intervention

Kalpana Irpachi<sup>1</sup> Sandeep Sharan<sup>1</sup> Ameya Karanjkar<sup>1</sup> Poonam Malhotra Kapoor<sup>1</sup>

<sup>1</sup>Department of Cardiac Anaesthesia, CT Center, All India Institute of Medical Sciences, New Delhi

**Address for correspondence** Kalpana Irpachi, MBBS, MD, DM, Department of Cardiac Anaesthesia, CT Center, All India Institute of Medical Sciences, New Delhi, India (e-mail: drkalpna80@rediffmail.com).

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## Abstract

### Keywords

- ▶ anesthesia concerns
- ▶ catheterization laboratory intervention
- ▶ Takayasu's arteritis

Takayasu's arteritis (pulse less disease) is a nonspecific chronic progressive panend-arteritis affecting the large- and medium-sized arteries, involving the aorta and its main branches. Anesthesia for patients with Takayasu's arteritis complicated by severe uncontrolled hypertension, end-organ dysfunction, stenosis of major blood vessels, and difficulties encountered in monitoring arterial blood pressure. We describe the anesthetic concerns of a child with Takayasu's arteritis and severe hypertension refractory to medical treatment, presented with bilateral renal artery stenosis requiring urgent bilateral percutaneous renal angioplasty.

## Introduction

Takayasu's arteritis (TA) (also called the pulseless disease) is a nonspecific chronic progressive panendarteritis affecting the large- and medium-sized arteries, involving the aorta and its main branches. Anesthesia for patients with TA is complicated by severe uncontrolled hypertension, end-organ dysfunction, stenosis of major blood vessels, and difficulties encountered in monitoring arterial blood pressure. We describe the anesthetic concerns of a child with TA and severe hypertension refractory to medical treatment, presented with bilateral renal artery stenosis requiring urgent bilateral percutaneous renal angioplasty.

## Anesthesia Concerns

TA is characterized by a focal stenosis process involving the aorta and the proximal segment of its major branches. In 1908, TA was first reported by Takayasu, a Japanese ophthalmologist; it then has subsequently been reported throughout the world.<sup>1</sup>

TA presents either incidentally or more frequently for correction of other vascular occlusive disease, often presenting as upper extremity claudication and minimal to no palpable arterial pulsations in the arms as evident in our patient.<sup>2</sup>

We encountered a 6-year-old boy weighing 13 kg who presented with breathlessness, hypertension refractory to

medical treatment, and bilateral subclavian and bilateral renal artery stenosis; he was subsequently found to have TA with severe eccentric mitral regurgitation due to mitral valve prolapse with pulmonary artery hypertension (PAH) requiring urgent bilateral percutaneous renal angioplasty (PTRA). Most of these procedures are generally performed under general anesthesia or local anesthesia in older children. There are certain advantages and disadvantages of both general as well as regional anesthesia. Administering general anesthesia is challenging in TA as it needs special attention for major vascular procedures.<sup>3</sup> The influence of changing head position on cerebral function should be evaluated because hyperextension of head during laryngoscopy may further compromise blood flow through carotid artery as a result of the vascular inflammatory process associated with this disease. Gaba et al<sup>4</sup> suggested blind insertion of Intubating Laryngeal Mask Airway (ILMA) can be done with neck in the neutral position without any significant variation in degree of flexion or extension of the cervical spine during intubation.

Since the patient had pulmonary edema, he could not lie down supine, despite anticongestive therapy. The patient was planned for PTRA, under standard monitoring (SpO<sub>2</sub>, noninvasive blood pressure, ECG, and temperature); the patient was sedated with bolus dose of fentanyl 2 µg/kg and ketamine 2 mg/kg. The patient was maintained with 50% mixture of air and oxygen, and continuous titrated infusion was initiated with a combination of fentanyl



2 µg/mL (2–3 µg/kg/min), ketamine (10–15 µg/kg/min), and midazolam (1–2 µg/kg/min), respectively, at 12 mL/h for sedation and pain control.

Musculoskeletal changes associated with TA make regional anesthesia technically more difficult. But the major advantage of regional anesthesia in such patients is that it allows monitoring of brain perfusion through the patient's level of consciousness, which is lost in general anesthesia.

In two studies, PTRAs were performed under general anesthesia in children younger than 7 years and in older children, the procedure was performed under local anesthesia.<sup>5,6</sup>

Two retrospective reviews of data for all children with renovascular hypertension who underwent PTRAs, both at a single center between 1984 and 2003 and another between 1997 and 2009 were performed. All procedures were performed under general anesthesia.<sup>7,8</sup> In 2010, Gumus et al<sup>9</sup> reported PTRAs in a 5-year-old child under continuous sedation as we performed successfully under monitored anesthesia care with continuous sedation in our patient. Certainly, if general anesthesia or intravenous sedation is used, neurologic monitoring is recommended if the patient has a history of syncope and carotid artery stenosis. The use of a computerized electroencephalography monitor during anesthesia allows continuous assessment of the adequacy of cerebral flow as we did the same in our patient.

Anesthetizing a patient with TA is a challenge as it is complicated by the four most important complications of TA—retinopathy, secondary uncontrolled hypertension, aortic regurgitation, and aneurysm formation, each graded as mild, moderate, or severe defined by Ishikawa.<sup>10</sup> Cannulation of an artery for direct measurement of blood pressure carries an added risk for patients as the intimal changes in the vessels indicate the possibility of aneurysm formation. The main concern in conduct of anesthesia in patients with TA is the maintenance of blood pressure during the perioperative period.

A sodium nitroprusside infusion was continued at a rate of 2 µg/kg/min during the procedure as well as in the postprocedure period for control of blood pressure. The therapeutic intervention period was uneventful. Arterial blood gas analyses were within normal limits.

Wang et al<sup>11</sup> discussed the possible reasons for failure to resuscitate the patient. Failure of resuscitation may be due to poor myocardial performance and low cerebrovascular perfusion pressure. Anesthetic-induced decreased blood pressure caused by decreased cardiac output or systemic vascular resistance must be recognized promptly and treated by either adjusting the concentration of anesthetic drugs or expanding the intravascular fluid volume, or both. Post procedure, the child was monitored in the high dependency unit and had an unremarkable stay.

## Conclusion

We recommend the meticulous preoperative planning of child presenting with TA before taking up for catheterization laboratory intervention, including need for preoperative optimization of the patient, perioperative monitoring of the cardiovascular system, and maintenance of cerebral and other organ perfusion and normal acid–base status. The choice of the anesthesia technique should be tailored to the presentation of patients. Monitored anesthesia care using sedation for major vascular procedures and adequate preloading can be safely performed in a child presenting with TA. The goal should be maintenance of mean arterial pressure close to preoperative value to achieve favorable outcome. The role of anesthesiologist has become more challenging in this changing environment. Good coordination between anesthesiologist, cardiologist and cardiothoracic surgeon reduces the morbidity and mortality.

## Conflict of Interest

None.

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