

# Perioperative Management of Transposition of the Great Arteries: Our Experience with 22 Newborns

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## Abstract

**Background:** Transposition of the great arteries (TGA) is a critical congenital heart defect requiring timely surgical intervention.

**Methods:** This study presents our perioperative management protocol and outcomes in 22 newborns who underwent arterial switch operation (ASO) at Mother Teresa University Hospital Center in Tirana from June 2019 to June 2024. Key aspects include preoperative stabilization, surgical techniques, and postoperative care.

**Results:** All patients successfully underwent ASO, with one requiring reoperation for bleeding. Postoperative complications included low cardiac output syndrome (14%), transient arrhythmias (9%), and mild pulmonary

hypertension (18%). One patient (4.5%) died due to refractory LCOS and sepsis. The median ICU stay was 5 days, and the median hospital stay was 10 days.

**Conclusion:** These findings highlight the importance of structured, multidisciplinary collaboration in optimizing outcomes for newborns with TGA, though further studies with larger samples are needed to refine management strategies.

**Keywords:** Prenatal diagnosis, Transposition of the Great Arteries, Congenital Heart Disease, Cardiac Anesthesia

## INTRODUCTION

Transposition of the great arteries (TGA) is a cyanotic congenital heart defect characterized by ventriculoarterial discordance, where the aorta arises from the right ventricle and the pulmonary artery from the left ventricle. Without prompt intervention, it leads to severe hypoxemia, which can be life-threatening in neonates. Surgical correction via an arterial switch operation (ASO) is the definitive treatment, typically performed within the first two weeks of life (1).

This study aims to describe the perioperative management strategies employed at the Mother Teresa University Hospital Center, including preoperative stabilization, surgical techniques, and postoperative care, along with outcomes in 22 newborns diagnosed with TGA between June 2019 and June 2024, representing all TGA cases referred at our center during this period.

## PATIENTS AND METHODS

This study is a retrospective observational analysis conducted at Mother Teresa University Hospital in Tirana, Albania, a tertiary care center specializing in neonatal and pediatric cardiac surgery. The study includes all cases of transposition of the great arteries (TGA) referred to our center over a five-year period (June 2019 to June 2024).

Neonates with associated complex congenital anomalies requiring additional procedures were excluded from the study. The 22 cases represent the total TGA population treated at our hospital during this period. Referrals to our center were

primarily from neonatal and pediatric units nationwide, with some cases transferred from regional hospitals for specialized care.

Data were collected retrospectively from patient medical records and operative logs. Key parameters included:

1. Demographic Data: Age, weight, and gender of the patients.
2. Preoperative Variables: Use of prostaglandin E1, need for balloon atrial septostomy (BAS), and results of echocardiographic assessments.
3. Intraoperative Variables: Cardiopulmonary bypass (CPB) time, aortic cross-clamp time, and details of the surgical technique.
4. Postoperative Outcomes: Duration of mechanical ventilation, length of stay in the ICU and hospital, and incidence of complications such as low cardiac output syndrome (LCOS), arrhythmias, and pulmonary hypertension.

The median age at surgery was 7 days (range: 3–14 days), and the median weight was 3.1 kg (range: 2.5–4.2 kg), (Figure 1). TGA was confirmed in all patients via echocardiography, supported by clinical evaluations.

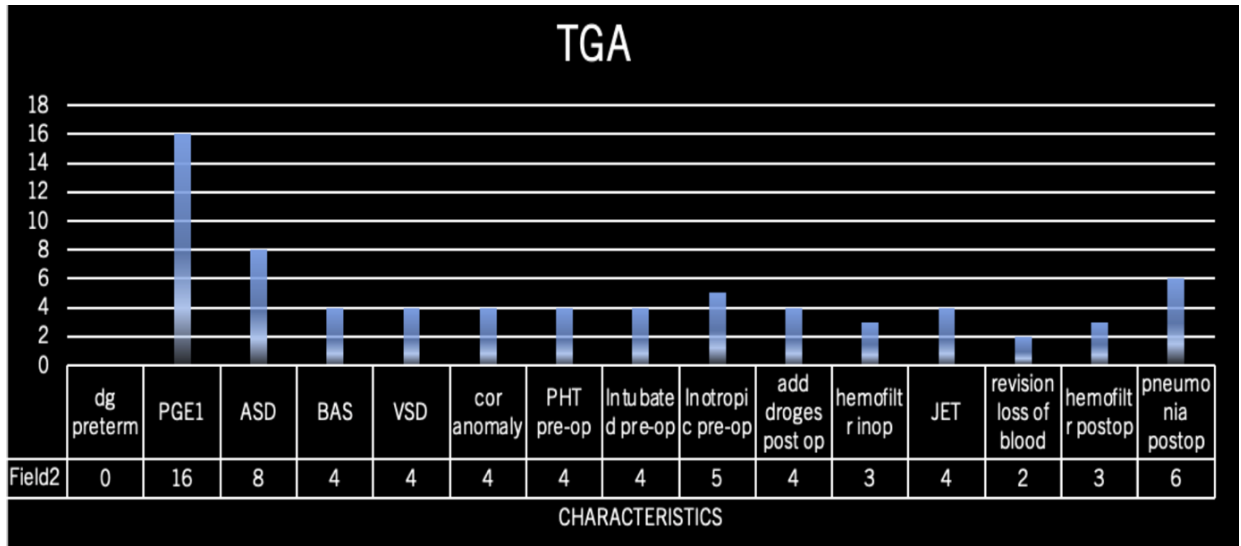
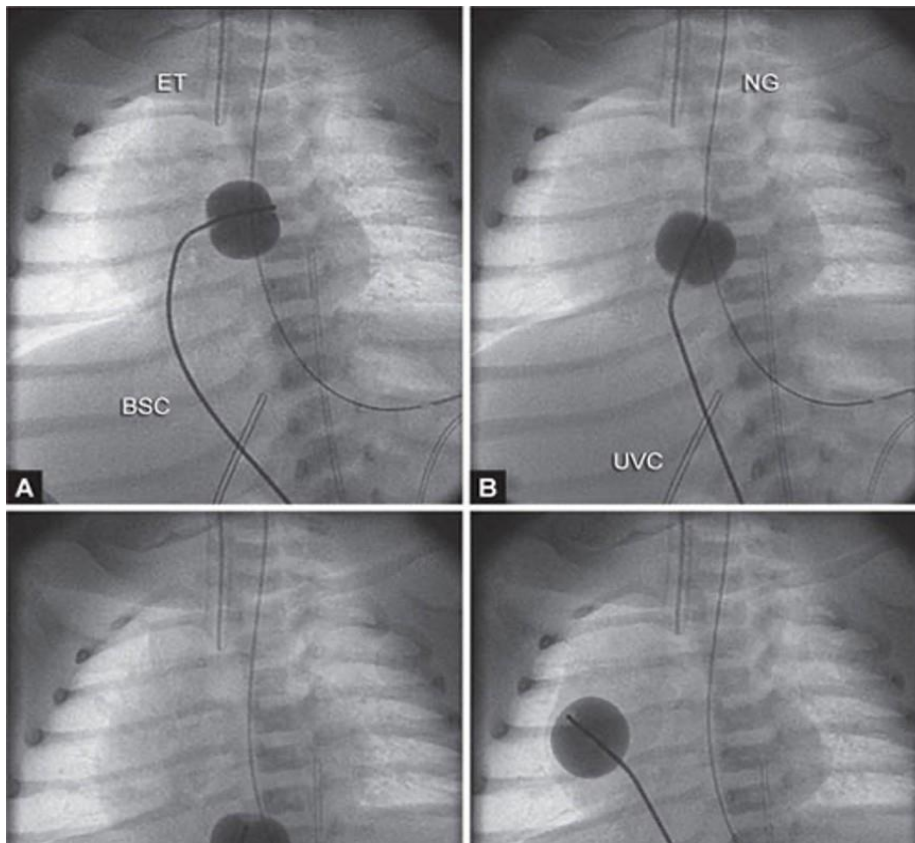


Figure 1. Characteristics of the Neonates undergoing Arterial Switch operation (ASO).





**Figure 3.** Intraoperative monitoring of a newborn undergoing ASO

### Preoperative Management:

The standard procedures and preoperative protocol applied are detailed below:

- Prostaglandin E1 Infusion: All patients received prostaglandin E1 to maintain ductal patency and ensure adequate systemic oxygenation (2).
- Balloon Atrial Septostomy (BAS): Performed in 15 cases (68%) with restrictive interatrial communication to improve oxygen mixing (3). (Figure 2)
- Monitoring: Preoperative monitoring included arterial blood gas analysis, pulse oximetry, and echocardiographic assessments of ventricular function and intracardiac shunting.

### Surgical Technique

The arterial switch operation (ASO) was performed under cardiopulmonary bypass (CPB) with moderate hypothermia (28–32°C). All newborns underwent continuous intraoperative

monitoring throughout the procedure. (Figure 3)

Key surgical steps included:

1. Transection and repositioning of the great arteries.
2. Reimplantation of the coronary arteries.
3. Anastomosis of the pulmonary arteries and aorta to their respective ventricles (1)(4).

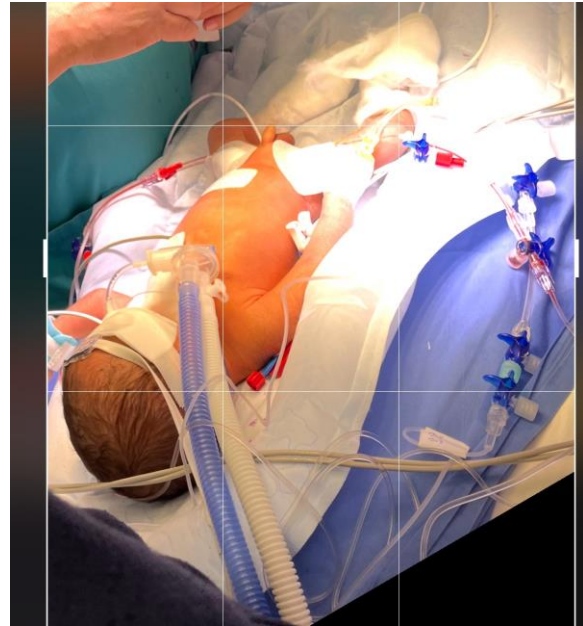
The median CPB time was 150 minutes (range: 120–180 minutes), and the median aortic cross-clamp time was 90 minutes (range: 70–110 minutes).

### Postoperative Management

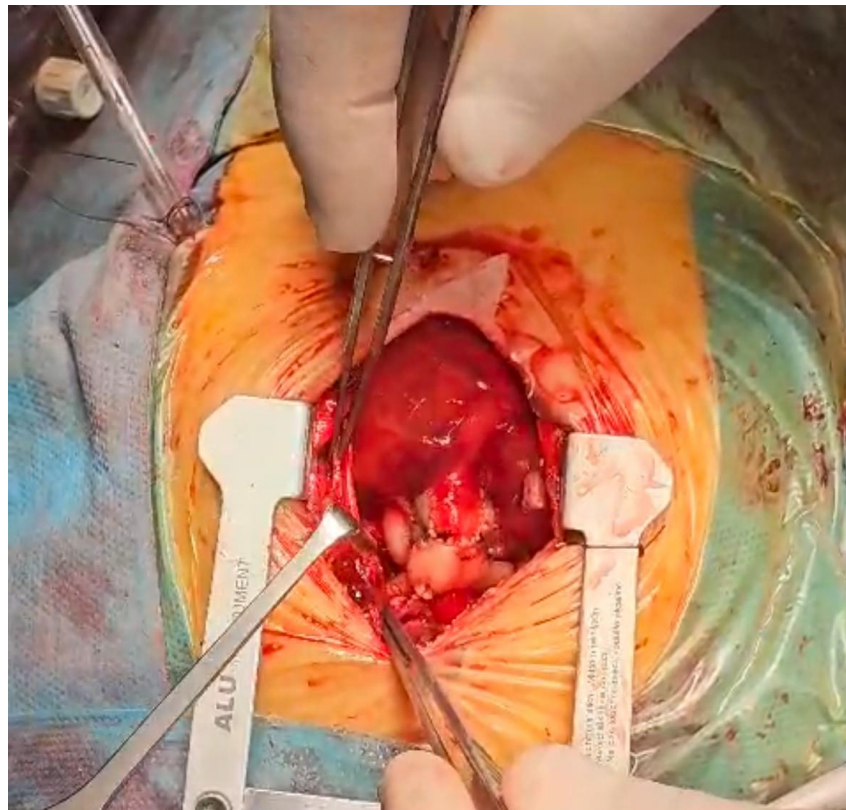
The following components were applied in all cases as standard postoperative management.

- Hemodynamic Support: All patients were managed in a dedicated pediatric cardiac ICU. Inotropic support (dobutamine, milrinone) was used as needed (4).
- Ventilation and Oxygenation: Patients were ventilated postoperatively, with a

- median duration of mechanical ventilation of 48 hours (range: 24–72 hours).
- Monitoring for Complications: Close monitoring for arrhythmias, low cardiac output syndrome (LCOS), and bleeding was conducted (3)(4). (Figure 4)



**Figure 4.** Neonate with TGA in the operating room.



**Figure 5.** Arterial switch operation after Cardiopulmonary Bypass.

## RESULTS

### Surgical Outcomes

- All 22 patients successfully underwent ASO (Figure 5).
- One patient required reoperation for bleeding, with no major surgical complications in the remaining cases.

### Postoperative Morbidity

- LCOS: Observed in 3 patients (14%), and was successfully managed with inotropic support therapy.
- Arrhythmias: Transient arrhythmias occurred in 2 patients (9%), which resolved with medical management (4).
- Pulmonary Hypertension: Mild transient pulmonary hypertension was noted in 4 patients (18%).

### Mortality

- There was one in-hospital mortality (4.5%) due to refractory LCOS and sepsis. Recovery Metrics

The median ICU stay was 5 days (range: 3–7 days), and the median hospital stay was 10 days (range: 8–14 days).

## DISCUSSION

This study highlights our center's experience with perioperative management of TGA, demonstrating excellent outcomes with an overall survival rate of 95.5%. Timely preoperative interventions such as prostaglandin E1 and BAS were crucial in stabilizing neonates before surgery (2)(3).

The success of ASO depends on precise surgical techniques, particularly coronary artery reimplantation, and vigilant postoperative monitoring. Despite the complexity of the procedure, advances in neonatal care, CPB techniques, and multidisciplinary collaboration have significantly improved outcomes over the years (1)(4).

Our mortality rate of 4.5% is consistent with rates reported in high-volume centers globally (2–8%) (1)(4). Postoperative complications such as LCOS and arrhythmias were infrequent and effectively managed, reflecting the efficacy of our protocols.

### Limitations

Our study is limited by its small sample size and retrospective design, which precludes randomization.

## CONCLUSION

Our experience demonstrates that a structured, multidisciplinary approach to perioperative management is critical for optimizing outcomes in newborns with TGA. Further studies with larger cohorts are warranted to validate and refine these strategies.

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**Conflict of Interest Statement:** The author declares that have no conflict of interest.

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