



CASE REPORT

Postoperative Physiotherapy Management of Bilateral Bidirectional Glenn Shunt: A Case Report

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Abstract

Paediatric cardiac surgery uses the bidirectional Glenn (BDG) shunt, also known as Cavo pulmonary anastomosis which is bidirectional, to temporarily increase blood oxygenation in individuals with congenital heart defects that result in a single functional ventricle. The purpose of this study is to report a case of right ventricle with two outlets, transposition of the great arteries, ventricular septal defect, and pulmonary stenosis with resolved brain abscess. A 8 yr. old female complains of tingling sensation over right palm, also had right side weakness and convulsions which were restricted to right side. After the investigation and diagnosis of the condition is a known case of congenital heart defects and was planned for surgical correction. Outcome measures like incentive spirometry, borg scale, 2 min walk tests were done to evaluate the patient's recovery. Surgery was successful in treating the issue, but the patient had to be returned to a life free of symptoms before the pathology. A carefully planned physical therapy rehabilitation is particularly beneficial for treating exhaustion and shortness of breath.

Keywords: Bidirectional glenn shunt, Physiotherapy intervention, Case report

Introduction

Using the Glenn method since the 1960s, which involves linking the pulmonary artery to the superior vena cava has been used to treat numerous. In addition to the single ventricle, cyanotic congenital heart conditions. [1]. In place of the traditional Glenn shunt (unidirectional superior Cavo pulmonary anastomosis), the Bidirectional Glenn operation (BDG), including bidirectional superior Cavo pulmonary anastomosis, has mostly been used. Due to the incorrect location of the Atrioventricular Node (AV) and the

improper path of the AV conduction system, Congenitally Corrected Transposition of the Great Arteries (CC TGA) has a high risk of total heart block [2]. The bidirectional Glenn shunt is a useful addition to birth defect heart surgery for the treatment of abnormal left superior vena cava to left atrial connections and pulmonary ventricular pressure volume issues. Additionally, it was suggested that the BDG might increase systemic arterial oxygen saturation without raising PVR or ventricular stress. A bidirectional Glenn is frequently indicated by the following conditions: Hypoplastic Left Heart Syndrome (HLHS), tricuspid atresia, double inlet left or right

ventricle, pulmonary atresia with an intact ventricular septum, unbalanced atrioventricular canal defects, congenitally corrected transposition of the great arteries, and anatomic variants resulting in significant hypoplasia of either ventricle [3]. The surgical repair is done through midline sternotomy. We are reporting the following case of child with congenital heart disease repaired with bilateral bidirectional glenn shunt surgery and physiotherapy in cardiac rehabilitation with enhancing quality of life.

Patient Information

An 8 yr old girl brought by parents with complaint of cough with sputum and cold. patients describe about the tingling sensation over right palm since day 1 which was associated with exertion and in resting position for long time. right side eye pain since 7 days, which was associated with exertion headache more often in the morning after waking up from sleep. which was associated with macular lesions over body. History was narrated by her mother. Patient is a well-documented example of congenital cardiac disease with having a double outlet right ventricle, transposition of the great arteries, ventricular septal defect, and pulmonary stenosis. previously patient was operated for tubercular brain abscess in left temporoparietal lobe on April 2022. Then after 9 months patient had right side weakness and convulsions, which were restricted to right arm. Then patient was brought to the hospital where investigation like chest radiography and 2d echo was done which showed the double outlet right ventricle with transposition great arteries, ventricular septal defect with pulmonary stenosis. The patient was recommended to have cardiac surgery.

Clinical Findings

The examination was done by taking consent from the patient. On general examination built was mesomorphic. Vitals were: Blood pressure was 90/60 mmHg. Pulse rate was 112 beats/min and oxygen saturation were 85% on 3 liters of O2 via face mask. Drain and foley catheter was inserted. Cyanosis present, clubbing grade 3 present. On the observation. The patient was checked while raised up, with cushions at the back providing enough support. On systemic examination S1S2 heard, pansystolic murmur present, parasternal heave grade 2 present, apical impulse at 5th intercostal space, murmur heard at 3 and 5 intercostal spaces. Auscultation revealed Air entry bilaterally reduced over lower zones. Patients demonstrate ICU acquired weakness.



Clubbing present with grade 3 (accentuated convexity of nail) as shown in Figure 1.

Timeline

Table 1: Shows the entire timeline of the events

1. Operated for tubercular brain abscess	April 2022
2. First time occurrence of symptoms	26/11/22
3. Admitted to government hospital	29/11/22
4. Diagnosis of congenital heart disease	1/12/22
5. Right hand weakness	January 2023
6. Recurrence of symptoms	21/2/23
7. Date of admission	23/2/23
8. Date of BDG Shunt surgery	27/2/23
9. Date of physiotherapy assessment and management	28/2/23
10. Discharge date	13/3/23
11. follow-up date	28/3/23

Diagnostic Assessment

Chest x ray shows the broncho vascular marking present over right middle and lower zones. Hilar markings present. Cardiomegaly seen and an obliteration of cardio-phrenic and costo-phrenic angle Figure 1.

MRI brain reveals gliotic changes in left temporal -parietal region with ex-vacuo dilation of ipsilateral lateral ventricle causing midline shift of 3mm towards left side with prominence of left sulcogyrar spaces & sylvian fissure.

2D echo report revealed transposition of the major arteries, a ventricular septal defect, a double outlet right ventricle, and pulmonary stenosis and ejection fraction is 60%.

ECG displayed a right ventricular enlargement, a normal sinus rhythm, along with potential lateral interaction.

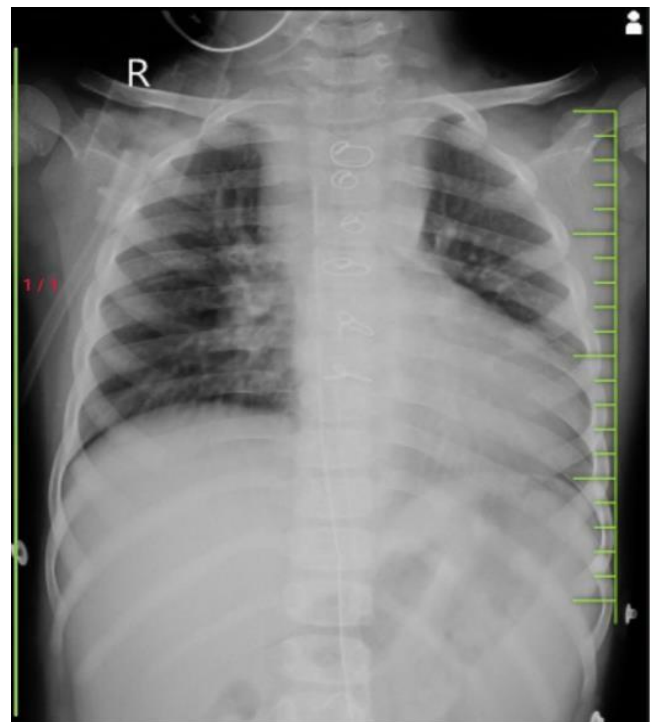


Figure 2: Chest Radiography

Diagnosis

It was determined that the patient had a double outlet right ventricle, transposition of the great arteries, ventricular septal defect, and pulmonary stenosis which was confirmed on the bases of various diagnostic assessment and investigation.

Medical Management

Patient is managed medically with antibiotics, nonsteroidal anti-inflammatory drugs, and anticoagulant.

Medicine and dosage along with its duration is given in Table 2.

Medication	Dosage	Duration
1. TAB. GABAPENTINE	100 MG	TDS
2. SYP. VACPARCIN	2 ML	BD
3. TAB. PARACETAMOL	250 MG	TDS
4. TAB. FUROSEMIDE	10 MG	BD
5. TAB. ASPIRIN	50 MG	OD
6. TAB. LANZOPRAZOLE	150 MG	BD

Therapeutic Intervention

Goal oriented chest physiotherapy protocol is given in Table 3.

S.No	Physiotherapy goals	Therapeutic intervention	Treatment regimen
1.	To educate the patient and family members about his current health status.	Patients and family members should be educated about the importance of designed rehabilitation and exercise regimen.	Education about early ambulation, positioning, and resuming Activities of daily living
2.	To reduce pain at suture site.	splinting	2 weeks
3.	To encourage airway clearance	Manual assisted huffing and coughing.	4-8 days
4.	To avoid post-surgery integumentary, circulatory, and pulmonary complications	1. Initially, In a semifowlers posture, the patient was lying down. And later bed side sitting was given.	Initially, positioning was given every 2 hours.
5.	To improve lung expansion.	1.Incentive spirometry feedback was achieved visually using red, yellow, and blue coloured balls to signify 600cc with a hold of 2 sec. 2. Thoracic expansion with upper limb coordination exercises.	10 reps×1set twice a day. 10 reps x 2 sets every 2 hourly
6.	To reverse ICU acquired weakness and prevent joint stiffness.	Initially Active Range of Motion work outs to U/L and L/L. Later, the application of mild to moderate resistance progressed.	10 reptations ×1 set. 3-4 times a day
7.	Improve breathing patterns and respiratory rate.	Deep breathing exercise.	10 repetitions ×1 set. 3-4 times a day
8.	To strengthen the right limb	Strengthening	Active assisted range of motion exercise. After 2 weeks she was advised to do strengthening with weight cuff.
9.	To improved functional recovery and endurance.	Ambulation and stairclimbing.	Walk within a hall.



Figure 3: Patient performing incentive spirometry and thoracic expansion

Follow Up-and Outcome

After receiving physiotherapy rehabilitation, there was frequent follow-up of 15 days. In comparison to day 1, the patient responded to our therapy in a remarkable way. Table 4 shows outcome measures taken on day 1, week 2 (at the time of discharge) and follow-up.

Table 4: Illustrates an outcome analysis of various scales used to monitor the patient's development.

Scales	Day 1	Week 2	Follow up
NPRS	8	2	Not at all
Incentive spirometry	600cc Without hold	900 cc with 2 sec hold	1200cc without hold
2min walk test	NA	100 m	150 m
Borg's scale	4	2	1

Discussion

Bidirectional Glenn shunt or open-heart surgery is the Glenn procedure this shunt is carried out for kids who are born with congenital cardiac conditions include double outlet right ventricles, hypoplastic left hearts, and tricuspid atresia. Depending on their cardiac condition, children may require glenn surgery. In this surgery, the surgeon joins the pulmonary artery to the superior vena cava (svc), which is separated from the heart. Now, the blood from the upper body enters the pulmonary artery directly. Blood travels through the pulmonary artery to the lungs. Cardiac surgery can treat CHD and save lives. Complications include diminished pulmonary and cardiac function, among others [4] to stop such complications physiotherapy rehabilitation, play a major role in recovery of patient. There are various interventions used like incentive spirometry and deep breathing were more successful than any other passive approach. The patient may develop ICU acquired weakness due to long stay in critical care unit .so this can be managed by active range of motion exercise.

Conclusion

Our planned physical therapy rehabilitation's main goal was to enhance her quality of life and enable her to resume her regular activities and in order to prevent any postoperative complications

aid the patient's recovery, our rehabilitation putting into practise patients to restore their pre-pathological states using a variety of physiotherapeutic techniques state. A 2 weeks of physical therapy regimen was taken which had a positive effect on patients and permitted her to begin her ADLs. Although patients' full recovery was not made, the physiotherapeutic objectives were met with various intervention which resulted after two weeks of physiotherapy rehabilitation, there was an improvement in chest expansion, an increase in functional vital capacity, a decrease in discomfort, and the ability to resume everyday activities. Every 15 days, the patient was to return for a follow-up appointment.

Conflict of Interest: None

Ethical Statement: None

Acknowledgements: None

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