

**Case Study**

## Effects of Bobath and Neurodevelopmental Treatment in A 3.5 Years Old Child with Lacunar Pure Motor Stroke Following Ventricular Septal Defect Repair

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## ABSTRACT

Lacunar pure motor stroke happens when an artery leading to the deep section of the brain, which contains the organs like the thalamus or basal ganglia is obstructed. Small and occurring outside of the cortex, lacunar strokes are a subtype of ischemic stroke. Lacunar strokes mostly affect patient's memory, judgmental skills and language. On the basis of symptoms, lacunar stroke is categorized as pure motor hemiparesis (45% cases), pure sensory stroke (7% cases) and ataxic hemiparesis (17-18% cases). We reported a case of 3.5 years old male patient with pure motor lacunar stroke following ventricular septal defect repair who was effectively treated with bobath therapy and neurodevelopmental therapy as bobath is a generally accepted theory in the rehabilitation of hemiparetic stroke victims worldwide. On examination, the patient had a total pure motor based right sided hemiparesis. The lower extremity movements were more compromised than upper extremity, strength of mainly antigravity or postural muscles was compromised and lower extremity muscles were scoring 1/5 on Manual Muscle Testing (MMT) and scored 1 on Modified Ashworth Scale (MAS). As such there was no spasticity factor in the upper or lower limb muscles but there was weakness (right sided hemiparesis), so the treatment plan was given and thoroughly explained to the patient's caretaker. There was no major cognitive and sensory deficit, as lacunar stroke has a better prognosis than other types of stroke, so, the recovery was good within 3 to 4 months by NDT and bobath therapy. Bobath therapy mainly improves the motor function with postural balance and stability.

## INTRODUCTION

When an artery leading to the deep section of the brain, which contains organs like the thalamus or basal ganglia is obstructed, a lacunar stroke happens [1]. Small and occurring outside of the cortex, lacunar strokes are a subtype of ischemic stroke [2]. Small, deeply penetrating branches of the circle of Willis' cerebral vessels, such as those from the middle cerebral artery (MCA), anterior cerebral artery (ACA), posterior cerebral artery (PCA), or basilar artery, can get blocked and result in lacunar infarctions. Lacunar infarctions are typically asymptomatic because of their tiny size. Yet, the distribution and buildup of several lacunar infarctions can cause serious cognitive and physical impairments [3]. One of the most prevalent

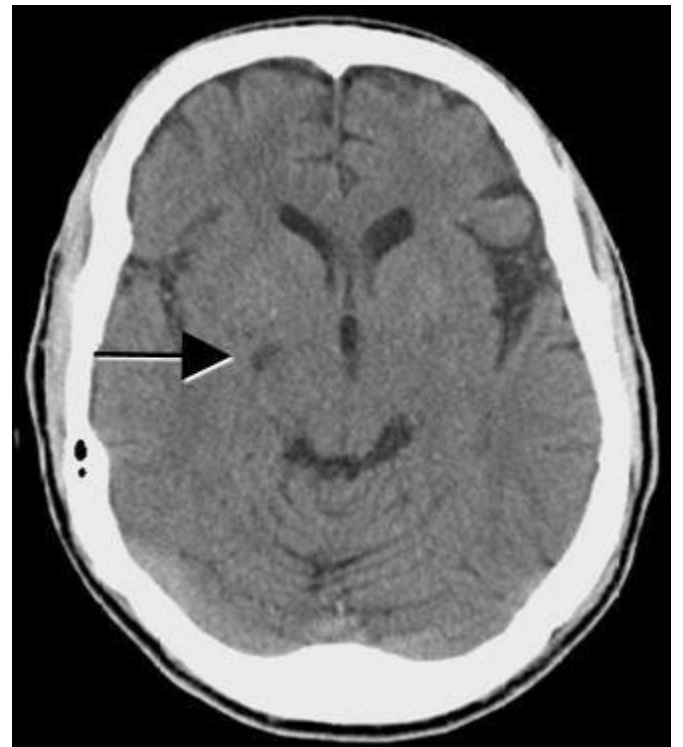
diseases that results in functional impairment and disability is stroke. According to data from the American Stroke Association, hemorrhagic stroke makes up the remaining 13% whereas ischemic stroke causes 87% of all strokes [4]. The fifth most common cause of mortality in the US is stroke [5]. The majority of ischemic strokes, or 25% of all ischemic strokes are lacunar strokes [6]. In a society study, the incidence rate of lacunar infarct in a largely White community was 29 over 100,000 individuals, whereas the incidence rate was 52 over 100,000 persons in a community-based study with a predominantly Black population [7]. Lacunar stroke was differentially diagnosed by an international systematic guidelines of stroke

assessment including sensory, cognitive and motor deficit, diagnosis of lacunar stroke was made by CT scan for more accuracy. In Lacunar stroke mostly people had effect on memory, judgmental skills and language. On the basis of symptoms lacunar stroke is categorized like pure motor hemiparesis (45% cases), pure sensory stroke (7% cases) and ataxic hemiparesis (17-18% cases) etc [8]. Recovery widely depends on symptoms onset and treatment. Either patient presented within 4.5 hours takes 24 hours to manage effectively or patient presented within 6-24 hours roughly takes 21 days to manage. Previous research indicated that lacunar stroke has a better prognosis than other types of stroke [8]. It has a high rate of survival, a low rate of recurrence, and a largely positive functional recovery. The prognosis for lacunar infarcts is generally quite good [9]. The Bobath technique, commonly referred to as neurodevelopmental treatment (NDT), is a generally accepted theory in the rehabilitation of hemiparetic stroke victims worldwide. It has been acknowledged that the neurodevelopmental treatment (NDT)/Bobath approach can be used to treat stroke patients who have mobility disorders [10].

**Clinical Presentation:** M. Burahan, a 3.5 years old boy was admitted in the ICU of National hospital due to ventricular septal defect repair. Due to ventricular septal defect repair patient perceived lacunar stroke at 2nd post-operative day with complications of atelectasis and chest congestion. On examination, the patient had a totally pure motor based right sided hemiparesis. Lower extremity movement was more compromised than upper extremity, strength of mainly antigravity or postural muscles was compromised and lower extremity muscles was scoring 1/5 on Manual Muscle Testing (MMT) and scored 1 on Modified Ashworth Scale (MAS). As such there was no spasticity factor in muscles but there was weakness (right sided hemiparesis), so plan was given and thoroughly explained to patient's caretaker. As patient has mainly weakness factor, it was improved by strengthening exercises. There was no as such cognitive sensory deficit, so, the recovery was good within 3 to 4 months by NDT and bobath therapy. Bobath therapy mainly improves motor function with postural balance and stability. Patient was recovered in 3 to 4 months following the plan of care with follow ups and contact via WhatsApp for assessment of recovery of patient. Contact through WhatsApp was easily accessible approach by patient due to rural background.



**Figure 1:** AP View of Right Sided Atelectasis of Upper and Middle Lower Lobe of Right Lung.



**Figure 2:** Axial CT scan of Brain without Contrast indicating Lacunar Infarct

## DISCUSSION

As patient was suffering from ventricular septal defect, aged 3.5 years to treat ventricular septal defect he had cardiac surgery and at the second day of surgery he had right sided lacunar stroke due to ventricular septal repair with complication of atelectasis. On the basis of symptoms, 1/5 grade of antigravity or postural muscles indicates weakness of muscles. In coordination with consultant physiotherapist, our team planned plan of care involving strengthening exercise, neurodevelopmental

treatment (NDT) and Bobath. As ischemic stroke, subtype of lacunar stroke involves 20 types of syndromes varying due to symptoms presentation inpatients. On the basis of symptoms right sided mainly motor lacunar stroke was diagnosed and this type of symptoms are 45% prevalent. Lacunar stroke has various reasons, but in this case lacunar stroke was caused by ventricular septal defect in M.Burhan. While during management and diagnostic procedure, CT scan (Axial without contrast) and X- Ray (Anteroposterior AP-view) of chest was performed. The patient was thoroughly assessed by physiotherapist team using international guidelines for stroke that diagnosed pure motor right sided lacunar stroke following MAS scored 1, Babinski reflex positive, slightly raised spasticity in patient and mainly weakness in postural or antigravity muscles. As the patient did not have cognitive sensory deficit and diagnosed within hours, recovery was good and quick in patient. It took 3 months to recover. Patient was mainly supervised by surgeon and as per his recommendations due to complications that patient was facing, he was admitted for 3 weeks in hospital so comprehensive rehabilitation program (inpatient rehabilitation) was executed to him. In rehabilitation program, there were following international guidelines for stroke population management that includes strengthening exercises (weight bearing and repetition, etc.), positioning, balance training. Along with managing muscle weakness by physiotherapy, pharmacotherapy was provided. Mainly bobath therapy is used to improve movement function involving proprioceptive and exteroceptive environment. Along with all of these aspects tone was also affecting factor that was managed by using mobilization, stretching technique.

## CONCLUSIONS

This case report described the male patient of 3.5 years diagnosed with pure motor right sided lacunar stroke due to the ventricular septal defect repair with the complication of Atelectasis and chest congestion. Pure motor lacunar stroke with lower extremity hemiparesis was effectively treated with bobath and neurodevelopment therapy.

## Conflicts of Interest

The authors declare no conflict of interest

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## REFERENCES

[1] Berberich A, Schneider C, Herweh C, Hielscher T, Reiff T, Bendszus M, et al. Risk factors associated

with progressive lacunar strokes and benefit from dual antiplatelet therapy. *European Journal of Neurology*. 2020 May; 27(5):817-824. doi: 10.1111/ene.14159.

- [2] Bashir S, Terceño M, Buxó M, Silva Y, Álvarez-Cienfuegos J, Vera-Monge V, et al. Progressive Lacunar Strokes: A Predictive Score. *Journal of Stroke & Cerebrovascular Diseases*. 2022 Aug; 31(8):106510. doi: 10.1016/j.jstrokecerebrovasdis.2022.106510.
- [3] Guzik A and Bushnell C. Stroke Epidemiology and Risk Factor Management. *Continuum (Minneapolis)*. 2017 Feb; 23(1, Cerebrovascular Disease):15-39. doi: 10.1212/CON.0000000000000416.
- [4] Gore M, Bansal K, Asuncion RM. Lacunar Stroke 2020.
- [5] Gorelick PB. The global burden of stroke: persistent and disabling. *Lancet Neurology*. 2019 May; 18(5):417-418. doi: 10.1016/S1474-4422(19)30030-4.
- [6] GBD 2016 Disease and Injury Incidence and Prevalence Collaborators. Global, regional, and national incidence, prevalence, and years lived with disability for 328 diseases and injuries for 195 countries, 1990-2016: a systematic analysis for the Global Burden of Disease Study 2016. *Lancet*. 2017 Sep; 390(10100):1211-1259. doi: 10.1016/S0140-6736(17)32154-2.
- [7] Katan M and Luft A. Global Burden of Stroke. *Seminars in Neurology*. 2018 Apr; 38(2):208-211. doi: 10.1055/s-0038-1649503.
- [8] Nair R, Gandeti R, Chatterjee A, Chandran V, Gorthi SP, Puppala G, et al. Clinical, radiological and risk factor profiles of acute lacunar stroke in a developing country. *Neurology Asia*. 2021 Mar; 26(1).
- [9] Clavier I, Hommel M, Besson G, Noëlle B, Perret JE. Long-term prognosis of symptomatic lacunar infarcts. A hospital-based study. *Stroke*. 1994 Oct; 25(10):2005-9. doi: 10.1161/01.str.25.10.2005.
- [10] Pathak A, Gyanpuri V, Dev P, Dhiman NR. The Bobath Concept (NDT) as rehabilitation in stroke patients: A systematic review. *Journal of Family Medicine and Primary Care*. 2021 Nov; 10(11):3983-3990. doi: 10.4103/jfmpc.jfmpc\_528\_21.