Transoral Migration of Ventriculoperitoneal Shunt: A Rare Presentation

Ventrikülоperitoneal Şantın Transoral Migrasyonu: Nadir Bir Sunum

Aizat Tamlikha[1], Fitri Shukri[2], Zakaria Zahari[2]

[1]Department of General Surgery, Selayang Hospital, Malaysia
[2]Department of Pediatric Surgery, Kuala Lumpur Hospital, Malaysia

ABSTRACT

Ventriculoperitoneal(VP) shunt in pediatrics is a common procedure to treat variety of neurological cases. Migration of VP shunt is one of the known complications. However, the migration through transoral extrusion is extremely rare and can lead to fatal outcome. We report a case of 2 year old boy with underlying hydrocephalus with right ventriculoperitoneal shunt inserted since 7 months old. Mother notice that he has been having cough and constitutional symptoms. Upon seeking treatment, noted a tube at the back of the throat. CT scan showed that the tube pierce through the diaphragm into the bronchus, trachea and into the oral cavity. He underwent emergency exploration and removal of shunt. under local anaesthesia and sedation. Post procedure child was monitored in critical care setting and remain well. Transoral VP shunt migration is extremely rare and uncommon. The aim is to externalize as soon as possible to prevent further complications.

Key Words: Ventriculoperitoneal shunt, Migration, Transoral, Complications

Received: 05.05.2020 **Accepted:** 07.30.2020

ÖZET

Pediyatride ventrikülоperitoneal (VP) şant, çeşitli nörolojik vakaları tedavi etmek için yaygın bir prosedürdür. VP şantının yer değiştirmesi bilinen komplikasyonlardan biridir. Bununla birlikte, transoral ekstrüzyon yoluyla göç son derece nadirdir ve ölümcül sonuçlara yol açabilir. 7 aylıktan beri sağ ventrikülоperitoneal şant takılan, altta yatan hidrosefali olan 2 yaşında bir erkek çocuk olgusunu sunuyoruz. Anne öksürük ve yapısal semptomlar yaşadığını fark etti. Tedavi arandığında boğazın arkasında bir tüp olduğunu fark etti. BT taraması, tüpün diyaframdan bronş, soluk borusu ve ağız boşluğuna doğru delindiğini gösterdi. Acil olarak araştırıldı ve şant çıkarıldı. lokal anestezi ve sedasyon altında. İşlem sonrası çocuk kritik bakım ortamında izlendi ve iyi durumda kaldı. Transoral VP şant göçü oldukça nadirdir ve nadirdir. Amaç, daha fazla komplikasyonu önlemek için mümkün olan en kısa sürede bildirmektir.

Anahtar Sözcükler: Ventrikülоperitoneal şant, Migrasyon, Transoral, Komplikasyonlar

Geliş Tarihi: 05.05.2020 **Kabul Tarihi:** 30.07.2020

ORCID ID: A.T. 0000-0003-3004-0719, F.S. 0000-0002-8666-9690, Z.Z. 0000-0002-0026-2815

Address for Correspondence / Yazışma Adresi: Muhammad Aizat Tamlikha, MD Department of General Surgery Selayang Hospital Malaysia E-mail: aizatamlikha@gmail.com

doi:http://dx.doi.org/10.12996/gmj.2021.28

INTRODUCTION

Ventriculoperitoneal (VP) shunt is a common procedure to treat variety of neurological diseases. Shunt failure due to infection and malfunction are common complications. Migration of the VP shunt has been reported but transoral extrusion is extremely uncommon and can lead to fatal complications such as ascending infection or tube obstruction. Here we report a case of transoral migration of VP shunt and discussed regarding its option of management.

CASE REPORT

A 2 year old boy, with history of bilateral burr hole for bilateral subdural effusion diagnosed at 3 months old and underlying hydrocephalus with right ventriculoperitoneal (VP) shunt diagnosed at 7 months old, presented to emergency for dislodge VP shunt. The child has been having cough for a month associated with poor oral intake.

Mother denies the child having any symptoms of infection or increase intracranial pressure such as irritability, neck stiffness, seizures or persistent vomiting. Mother brought the child to clinic which was then found to have a whitish tube at the back of the throat and was pulled to oral orifice. In our centre, clinical examination showed child not in distress with no signs of pneumothorax. The abdomen was soft with no signs of peritonitis. There was no sign of inflammation along the shunt tract in the subcutaneous layer. There was still flow of cerebrospinal fluid (CSF) at the end of the catheter signifying no obstruction. Radiographic imaging showed the tube passing through the thorax and upwards. (Figure 1) CT scan showed the tube piercing the diaphragm and went through the right lower lobe into the bronchus, trachea, vocal cord and oral cavity. (Figure 2) Multidisciplinary meeting was done and decided for emergency shunt removal. The procedure was to divide and externalized the proximal end near the abdominal entrance and removal of the distal limb by pulling through oral orifice at the same time. (Figure 3) The procedure was done under local anaesthesia and sedation in operation theatre. Post-procedure the child was monitored in intensive care unit in anticipation of respiratory distress or overwhelming sepsis. Post-operative chest radiograph showed small lucency at the right costophrenic angle suggestive of small loculated effusion or pneumothorax. (Figure 4) However, the child remains well and thus was treated conservatively. He was scheduled for shunt revision after a week of completing antibiotic and was discharge home later.

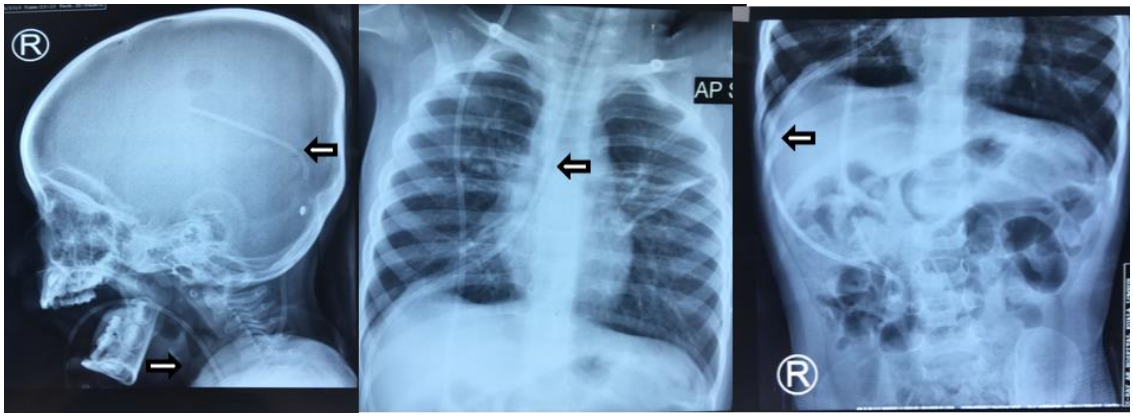

Figure 1: Radiographic imaging showing course of VP shunt catheter from cerebral to abdomen and to thoracic upwards in the tachea and orally

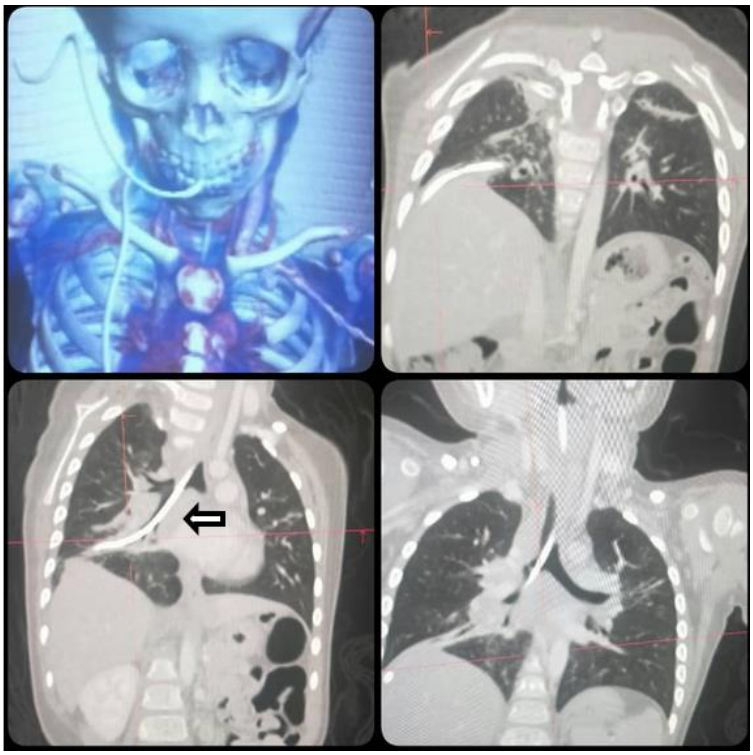

Figure 2: CT imaging and reconstruction showing course of VP shunt catheter from cerebral to abdomen and piercing the diaphragm posterior to liver, moving upwards in the thoracic cavity into bronchus, trachea and upwards. No evidence of pneumothorax or pneumonia seen

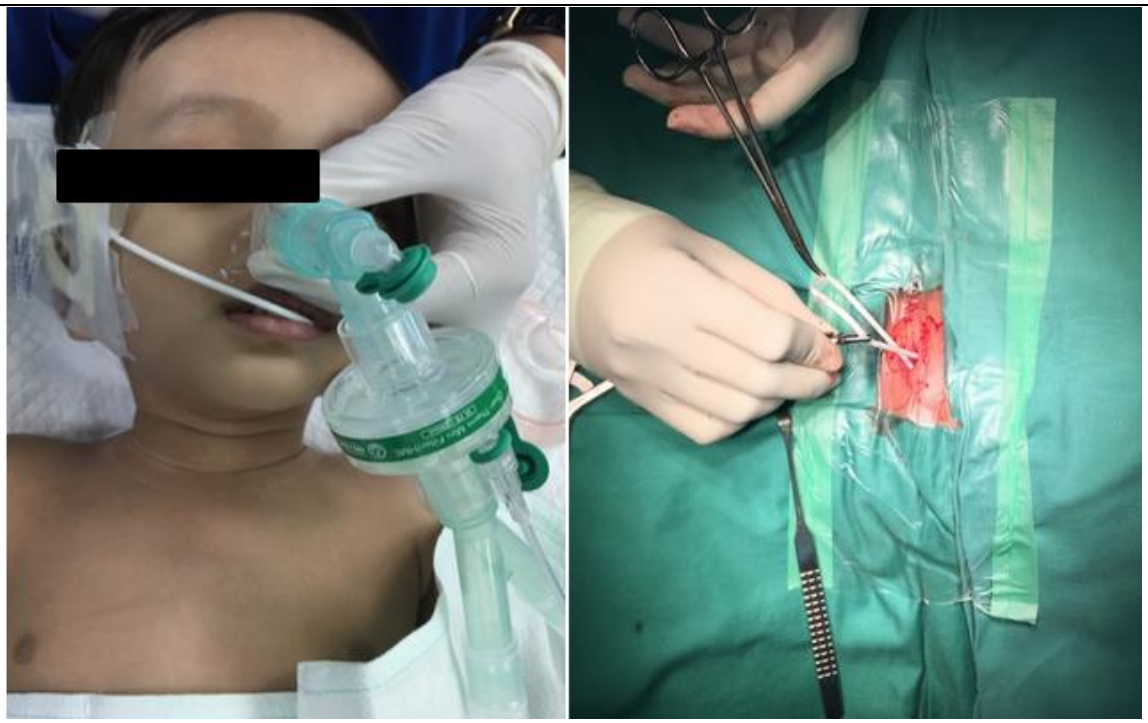

Figure 3: Child is sedated during the procedure. The distal end of the tube are removed through orally and the proximal end are divided, ligated and exteriorized done under local anaesthesia.

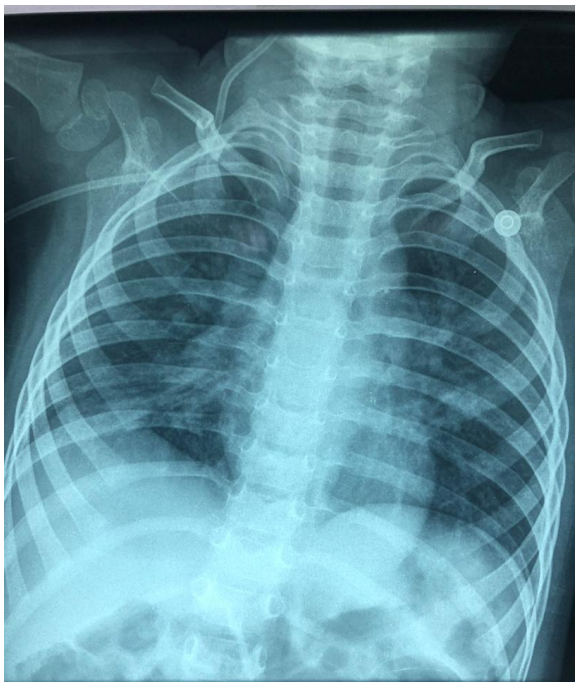

Figure 4: Post op chest radiograph showed small lucency at right costophrenic angle suggestive of small effusion or pneumothorax

DISCUSSION

Ventriculoperitoneal (VP) shunt is a common neurosurgical procedure to treat hydrocephalus, raised intracranial pressure and occasionally pseudotumor cerebri. The main aim of the shunt is to drain the cerebrospinal fluid (CSF) into body cavity, organ system and tissue spaces. Failure of treating hydrocephalus will lead to excess CSF increasing the intracranial pressure (ICP) causing in brain herniation, intracranial hematoma, cerebral edema and death.

A VP shunt consist of a tripartite catheter system: a proximal catheter that drains a cerebral ventricle (proximal limb), an extracranial one-way valve and a distal catheter (distal limb). Catheters and valves are impregnated with radiopaque markings to allow radiographic visualization. Placement of VP shunt is determined based on the type and location of the blockage. The proximal catheter passes from a cerebral ventricle, typically the frontal horn of the lateral ventricle, through hemispheric parenchyma and meninges, before exit from the cranial cavity via a burr hole to connect to one port in a one-way valve. The distal limb catheter is tunneled subcutaneously and can be located in any tissue with epithelial cells capable of absorbing the incoming cerebrospinal fluid.

Complications of VP shunt can be divided into 2 broad categories: malfunction and infection with incidence ranging from 25-60% [1] The risk of infection or malfunction is higher in children born prematurely and in children who are younger than 6 months of age or weigh less than 3 kg at the time of insertion. It has been reported that up to 40% of VP shunts fail within a year of placement requiring correction.[2] Mechanical failure includes equipment failure, breakage, obstruction, and migration of either proximal or distal catheter tip. Of the reported literature, shunt migration accounts for 7% of all complications.[3] There are reports of shunt migrations into rectum, gallbladder, bladder, scrotum, abdominal wall and thorax but through transoral remains very rare. This migration can cause drainage obstruction and ascending infection which can be fatal.

Transoral migration of VP shunt can occur in 2 mechanism, either through gastrointestinal or thoracobronchial pathway. The main cause of migration is due to incorrect catheter length or improper fixing of shunt to peripheral tissues. The location of distal limb catheter in the peritoneum may irritate any intraabdominal organs. As for our case, CT scan showed a transdiaphragmatic migration. We suspected the distal end causes repeated inflammation and local pressure to the diaphragm causing fibrosis and eventually small perforation. The catheter then slowly migrates into the thorax due to negative inspiratory pressure. Some author describe migration through hiatus or congenital fenestrations in diaphragm.[4] Intrathoracic migration of shunt may lead respiratory complications such as pleural effusion, pneumothorax, bronchial fistula, hydrothorax, empyema and pneumonia. In our case, the distal tip migrated into the lungs, bronchus and upwards to oral orifice. Alternatively, the tube can also be passed to oral via perforation into the bowel and extrusion to mouth due to abnormal peristaltic movement.

The hypothesized mechanism allows us to anticipate further complication that can developed during the course of treatment. Our patient underwent the procedure through local anaesthesia as general anaesthesia may cause respiratory complications.

A multidisciplinary approach involving neurosurgeon, paediatric surgeon, ENT surgeon and anaesthetist plays an important role. The principles of treatment of shunt migration is emergency removal, appropriate antibiotic, keeping nil orally and reinsertion if necessary. Treatment has to be based on case to case basis. Some author reported laparotomy or thoracotomy to aid in proper visualization for removal.[4] This is aimed to prevent further damage due to adhesion to the surrounding structures and to primary repair the perforations. The shunt should be examined carefully, and the adherences must be separated precisely, and the shunt should not be pulled extensively during these procedures to prevent from breaking. However, few authors suggested that invasive procedure are not necessary because the perforation is small and should seal off spontaneously.[5] Before removal, the proximal and distal catheter are divided and isolated. The proximal part is externalized while the distal part is removed by pulling through the extrusion site. Disconnecting the ventricular part from the peritoneal catheter further decreased the chance of infection, because there is no contact of the contaminated tube with neither the peritoneum nor the shunt tract. In our case, we followed the latter method with some modification. Our patient underwent the procedure under sedation and local anaesthesia as to avoid intubation which may exacerbate barotrauma from positive airway pressure.

Apart from surgery, patient should also be given prophylaxis antibiotics to prevent ascending infection. Further complications such as pneumothorax, peritonitis, meningitis or even sepsis should be monitored. Shunt replacement or revision can be done once patient is recovered. This rare complication can be avoided by keeping the intraperitoneal part of the shunt not too long. The longer and the more solid the material of shunt will cause higher possibility of irritation, perforation and migration. Dysfunctional and unnecessary shunt should be taken out thoroughly.

CONCLUSION

Transoral VP shunt migration is extremely rare. The aim of management is to externalize or remove the catheter immediately to prevent further complications. Dividing the catheter and removing the distal limb through orally or in any orifice has been shown to result in good recovery. Removal of shunt can be done under local anaesthesia to prevent lung complications with general anaesthesia.

Conflict of interest

No conflict of interest was declared by the authors.

Acknowledgements

Special thanks to Pediatric Surgery Unit HKL and OT staff for technical assistance for this study.

REFERENCES

1. Noetzel M, Baker RP. Shunt fluid examination: risks and benefits in the evaluation of shunt malfunction and infection. J Neurosurg 1984;61:328 – 32.
2. Browd SR, Ragel Bt et al (2006) Failure of cerebrospinal fluid shunts: part I: obstruction and mechanical failure. Pediatr Neurol 34(2):83-92
3. Shahi MV, Noorbakhsh S et al. The neuroimaging studies in children with VP shunt complication: a 10 years descriptive study in Tehran. Open Neuroimaging J 2018:12;1-9
4. Martin LM, Donaldson-Hugh ME, Cameron MM: Cerebrospinal fluid hydrothorax caused by transdiaphragmatic migration of a ventriculoperitoneal catheter through the foramen of Bochdalek. Childs Nerv Syst 13:282–284, 1997
5. Odebody To. Jejunal perforation and peroral extrusion of peritoneal shunt catheter. Br J Neurosurg 2008;31:335-6