Retrograde Migration of a Ventriculoperitoneal Shunt to the Neck after Dental Treatment

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ABSTRACT

The ventriculo-peritoneal shunt (VPS) is the technique most often employed for the treatment of hydrocephaly, but may present complications after placement. Retrograde migration of the peritoneal catheter to the cervical region is rarely reported. This manuscript to describes a case of migration of the distal portion of the VPS system to the neck after dental treatment in a child and discusses the possible causes for this complication. (J Dent Child 2013;80(1):47-9)

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The buildup of cerebrospinal fluid in the cranial cavity, whether in the ventricles or subarachnoid space, increases cranial pressure, causing injury to the brain tissue and increasing head circumference.¹ A small number of patients with hydrocephalus may be treated with endoscopic third ventriculostomy (ETV). Ventriculoperitoneal shunting (VPS), however, is the most commonly provided treatment worldwide.²

ETV is the procedure of choice when the hydrocephalus is due to an obstruction in the cerebral aqueduct. The procedure is performed by making a hole in the floor of the third ventricle. Thus, a new passage for the cerebrospinal fluid (**CSF**) is opened. VPS is indicated when there is no obstruction in the cerebral aqueduct. In this procedure, the CFS is shunted to other cavities in the body. With VPS, the CSF is shunted to the peritoneum with a ventricular catheter connected to a valve and a peritoneal catheter. The entire shunting system/apparatus is placed subcutaneously.

VPS placement can lead to many complications,² which are classified as infectious, functional, or me chanical.¹ The infectious complications are the most dangerous because of the risk of infecting the CSF, thereby causing meningitis. Common functional complications are over- or undershunting of the CSF. Mechanical complications include migration of the shunting system to the cranial cavity, anus, bladder, or vagina.³ These complications are due to various causes, such as trauma and surgical technique.

The cause of migration to other cavities is a difference in the pressure gradient between the cranium and the peritoneum. For example, when the patient has any abdominal abnormality with high abdominal pressure, the VPS system tends to move to the skull. Trauma can be caused by high abdominal pressure. Other authors argue that the size of the peritoneal catheter may be a cause of migration to the bladder, anus, or vagina.³ Catheters with greater length have increased risk.

The purpose of this report is to describe a case of migration of the distal portion of the VPS system to the neck after dental treatment in a child and discuss the possible causes for this complication.

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CASE REPORT

A 2-year-old boy was admitted to the Cranio-Maxillofacial Surgery and Neurosurgery Unit, Governador João Alves Filho Hospital, Aracaju, Brazil, with a 4-day history of increased volume in the right anterior cervical region. The patient had a history of congenital hydrocephaly, which was treated with a VPS 20 days following birth. He presented with a good nutritional status, was alert, and had a head circumference of 44 cm. An extensive subcutaneous swelling was noted in the right supraclavicular region, with no signs of inflammation (Figure 1). From this region downward, the distal portion of the catheter was not palpable. Plain radiography revealed that the swelling was due to the peritoneal catheter and CSF being lodged in the area (Figure 2).

After gathering clinical and radiographic data, the child's mother was asked about any abnormal event that had occurred to the child just prior to the emergence of the swelling. She reported a routine dental/restorative visit, for which restraint/protective stabilization had to be used due to the patient's inability to cooperate with treatment. The dentist who performed the procedure described the movements as flexion-extension of the head, for which the head, limbs, and trunk were vigorously restrained and no other associated events were reported.

The shunting system was surgically removed. CSF was collected for the laboratory exam, which revealed no abnormalities. The patient was monitored clinically and tomographically for 8 days, with no signs of complications. The patient was discharged without having to have a new shunting system placed, and with the recommendation of monthly monitoring. The child remains in good neurological health.

DISCUSSION

VPS is the most common surgical procedure for the treatment of hydrocephaly.² This system channels the CSF to another part of the body, where it can be absorbed as part of the normal circulatory system. Migration of the peritoneal catheter to the neck is a rare complication,⁴ whereas descending migration of the catheter to the abdomen is frequently described.^{1,3} The pressure gradient between the cranial and peritoneal cavities dictates the direction of the migration, if not impeded by barriers and sliding clips.^{5,6} The migration mechanism stems from adhesion, necrosis, penetration, perforation, and extrusion.^{3,4,7}

Although it rarely occurs, all components of the shunting system (flexible plastic tube, catheter, and valve) can become dislodged from their original position and migrate to different parts of the body.¹ Retrograde migration of the peritoneal catheter through the subcutaneous tissue to the cervical region is rare. This is the first reported occurrence after dental treatment. Perioral⁸ or transoral² extrusion is even rarer.

Two causes are described to explain the migration of the peritoneal catheter to the neck: (1) the mechanical force of the movement applied to the shunt; and (2) low-resistance catheters.⁴ In childhood, vigorous flexionextension movements of the head can act as a pulley,⁹ facilitating the upward migration of the catheter, which is suddenly ruptured and leaves the abdominal cavity. The CSF leaking from the distal portion of the peritoneal catheter, which continues functioning, further facilitates its upward movement.¹ The low resistance



Figure 1. Extensive swelling in the right supraclavicular region.



Figure 2. Radiograph showing the peritoneal catheter in the subcutaneous region of the neck.

of the catheters to movement may facilitate movement into the subcutaneous tissue. This hypothesis is supported by the present case. Moreover, the distance between the ventricular system and peritoneal cavity and the length of the catheter itself are shorter in children than adults, thereby facilitating proximal migration. In cases where the child's behavior and/or the amount of dental care needed are justified, treatment under conscious sedation or general anesthesia should be considered.

Negligence, a lack of knowledge, lack of preparedness among some professionals regarding patients with shunts (hydrocephaly), and the consequences stemming from interventions can lead to the occurrence of such cases. The diagnosis of this complication is performed through palpation of the entirety of the shunting system and confirmed by plain radiographs. Given the multiplicity of these systems, the possibility of migration should be considered in the differential diagnosis of patients with the signs and symptoms described in the present case.

Treatment consists of removing the shunt. If the patient exhibits a progressive increase in head circum-ference and neurological complications, implantation of a new system is indicated.¹⁰

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