Case Report

Cranial Migration of Subduroperitoneal Shunt Catheter: Report of Two Cases

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Summary

Subduroperitoneal shunting is a commonly used treatment option for subdural fluid collections. Cranial migration of subduroperitoneal shunt is a rare complication. We report two cases with cranial migration of subduroperitoneal shunts. Both of them had a previous cranial surgery and they secondarily developed subdural fluid collections. These collections were treated with subduroperitoneal shunting using a single peritoneal catheter. Inadequate fixing can result in migration of these single catheters. Elevated intra-abdominal pressure, due to any occasion may also help this migration. We recommend using silk or other braided non-absorbable sutures and anchoring wings for fixing single catheters when used in treatment of subdural fluid collections.

Key words: Subduroperitoneal, shunt, migration, cranial

INTRODUCTION

Subduroperitoneal shunting is an easy and effective method for management of subdural collections, both in adult and pediatric population. It is commonly used in cases that do not respond to other surgical interventions such as serial taps and burr hole drainage or it can be used as the first line treatment. Subduroperitoneal shunting has little complications with a high success rate. Most commonly reported complications are malfunctioning and infections. Migration of...
subduroperitoneal catheters into abdominal cavity can occur, although rare. Migration of the catheter to the cranial cavity is even rarer. We report two cases of cranial catheter migration. Distal peritoneal catheters were used as a subduroperitoneal shunt in these cases. We discuss the possible causes for this rare complication.

**CASE PRESENTATION**

**Case 1**

A 10-year old girl was operated for a right parietal lobe tumor on December 2012. Her pathological examination showed that the lesion was a low grade oligoastrocytoma. She was found to have a subdural effusion under her craniotomy defect on her sixth month routine imaging study. She did not have any complaints and her neurological examination was normal. She was hospitalized and a subduroperitoneal shunt was placed. She was discharged uneventfully. Control computerized tomography and roentgenograms after three months showed that the catheter was migrated to the cranial compartment, although effusion was resolved. Catheter was removed easily. The patient was discharged uneventfully. She does not have subdural effusion on her follow up (Figure 1).

**Case 2**

A 15-year old boy was first admitted on October 2011 with headache. He was found to harbor hydrocephalus and a ventriculoperitoneal shunt was inserted. He was discharged uneventfully. He admitted again 8 months later with gait disturbances and urinary incontinence. He was found to have a subdural effusion on left. A subduroperitoneal shunt was placed. Computerized tomography on second post-operative day showed migration of the shunt catheter cranially. The shunt was revised and the patient was discharged uneventfully. He does not have subdural effusion on his follow up (Figure 2).

A distal catheter of a usual shunt system is used in these cases. A short segment of the catheter was cut and used as proximal catheter. It is connected to the remaining distal part with a 90-degree connector located at the burr hole site and fixed to the periosteum.

![Figure 1: Antero-posterior and lateral roentgenograms of Case 1](image-url)
DISCUSSION

Subdural fluid collections can be caused by trauma, meningitis, tumor removal, ventricular over drainage etc. Advocated surgical interventions for subdural fluid collections include repeat subdural taps, external subdural drainage, burr hole drainage, and subduroperitoneal shunting\(^2\). Miyake et al classified infantile subdural fluid collections into four categories and suggested different intervention strategies for each stage\(^5\). Vinchon et al reported subduroperitoneal drainage as their standard treatment option in their large series of infantile subdural hematomas\(^9\). Although subdural fluid collection is a relatively frequent entity in neurosurgical practice, an accepted management algorithm has not been established yet.

Various complications have been reported related to subduroperitoneal shunting. Catheter obstruction and infection are the most common complications of subduroperitoneal shunts\(^2,5,9\). Migration of the catheter cranially into the subdural space is a rare complication of subduroperitoneal shunting. There are few reports on this subject in literature.

Emel et al reported a child with cranial migration of a subduroperitoneal shunt in whom a peritoneal catheter was used\(^1\). Collins and Pucci reported two patients with subduroperitoneal shunt migration\(^9\). The only adult patient reported with cranial migration of a subduroperitoneal shunt is by Sunada et al, an 82-year old man\(^6\). Thauvoy et al and Todorow et al also reported on subduroperitoneal shunt migrations into subdural space\(^7,8\).

The limited number of patients makes it difficult to speculate about the exact reasons for this complication. Short distance between the cranial and abdominal cavities may seem reasonable in infants. However, Vinchon et al did not report any migration in their large series of 244 infants with subduroperitoneal shunting\(^9\).

Our patients were older children and they had subdural fluid collection secondary to other surgical pathologies. There may be an etiological predisposition for cranial migration of subduroperitoneal shunts.

\[\text{Figure 2: Computerized tomography of Case 2}\]
which are needed after another neurosurgical procedure. But neither the number of reported cases in the literature nor the etiological information about these cases is sufficient enough to discuss on this subject.

Ersahin et al reported their series with subduroperitoneal shunting in children. They reported 8 migrations (not mentioned whether distal or cranial migration) in 109 shunts and stated that those migrated catheters were unishunts or peritoneal catheters. Although a reservoir or valve system will avoid migration, it is not recommended because of skin problems such as ulcers and necrosis\(^2\). These systems are also more prone to obstruction because of the high protein content seen in subdural fluid collections.

Reports on cranially migrated subduroperitoneal shunts put emphasis on technical problems about securing the catheter\(^{1,4,6,9}\). We agree that inappropriate fixation is the major cause of this complication. Suture material must be non-absorbable. Silk or other braided non-absorbable sutures have the advantage of their better securing properties. They can adhere strictly to the silicon materials and loosening is rare. But they cause more tissue reaction and due to its external three dimensional surface, it theoretically provides a suitable area for microorganisms to adhere. This can lead to infections. On the other hand monofilament sutures are known to be less prone to tissue reactions and infections. But they usually require more ties to assure adequate maintenance of the knot.It seems that both of them have their own advantages and disadvantages and the choice of suture material depends on the preferences of the surgeon. We recommend using silk or other braided non-absorbable sutures and anchoring wings for fixation of single catheters.

We also point to the effect of intra-abdominal pressure with single peritoneal catheters. Using a single peritoneal catheter may cause a pressure relationship between abdominal and cranial cavities. We think that elevated intra-abdominal pressure due to any occasion may also have a pushing effect on the catheter. Such a condition together with inappropriate fixation may cause cranial migration.

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