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CASE REPORT

Urinary Bladder Stone Complicating Ventriculovesical Shunt

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حصاة مثانة تعرقل تحويلة بطينية مثانية

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الملخص: تكمن الطريقة القياسية لعلاج استسقاء الدماغ في التحويلة البطينية الصفاقية أو البطينية الأذينية. لكن هذه التحويلات التقليدية قد ترتبط بتعقيدات ملحوظة و معدل تعديل مرتفع الأمر الذي يجعل هذه التحويلات المألوفة غير مناسبة لمجموعة معينة من المرضى. هنا نعرض تقريرا لحالة نادرة مرتبطة بأجراء غير معتاد لامرأة تبلغ من العمر 42 عاما لديها تحويله بطينية مثانية منذ أربع سنوات. تعرضت المريضة لالتهابات المسالك البولية المتكررة، بيلة دموية و سلس بولي اضطراري. تم اكتشاف وجود حصاة كبيرة في المثانة فوق النهاية المثانية للتحويلة. تم علاج المريضة باستخراج حصاة المثانة بعملية فتح فوق العانة وإعادة توجيه التحويلة إلى جوف الصفاق. وأخضعت المريضة للمراقبه لمدة اثني عشر شهرا بعد العملية وكانت النتيجة خلوها من أية أعراض للمسالك البولية.

مفتاح الكلمات: حصاة المثانة؛ التحويلة البطينية الصفاقية؛ سلس البول؛ بيلة دموية؛ العراق.

ABSTRACT: The standard treatment for hydrocephalus is either a ventriculoperitoneal or a ventriculo-atrial shunt. However, these conventional shunts may be associated with considerable complications and high revision rates which make these familiar shunts inappropriate for a certain subset of patients. A rare complication is reported associated with an unusual procedure in a 42-year-old woman who had had a ventriculovesical shunt for four years. She presented with recurrent urinary tract infections, haematuria and urge incontinence, and was discovered to have a large vesical stone over the vesical end of the shunt. She was treated with open suprapubic cystolithotomy and the redirection of the shunt to the peritoneal cavity. The patient was followed up for 12 months postoperatively and remained free of any urinary tract symptoms.

Keywords: Urinary Bladder Calculi; Ventriculoperitoneal Shunt, Surgical; Urinary Incontinence; Hematuria; Surgical Procedures, Operative; Case Report; Iraq.

Hydrocephalus due to various causes is typically managed with the diversion of the cerebrospinal fluid (CSF) via either ventriculoperitoneal or ventriculo-atrial shunts. Nevertheless, there are still patients who are no longer candidates for these conventional shunts and for them other more creative solutions must be considered.

Diversion of the CSF into the genitourinary system was first tried as early as 1925 when Heile used ureterodural anastomosis for the treatment of communicating hydrocephalus. Heile sutured the renal pelvis to the *lumbar dura* to drain the CSF.[1,2] Since then many similar procedures have been tried and revised as alternatives for the management of complicated conventional shunts. Foreign bodies are well-recognised causes for vesical stones formation where they act as a nidus for stone aggregation.[3]

Case Report

The patient was a 42-year-old-woman with a history of a brain tumour that had been resected a few years previously. She had initially been managed with a ventriculoperitoneal (VP) shunt which became obstructed at the peritoneal end, and therefore conversion to a ventriculo-atrial shunt was performed; this also became complicated by infection. Eventually, a ventriculovesical shunt (VVS) was inserted as a last resort four years prior to the current presentation.

The patient did well for the first year and then failed to return for follow-up; she presented three years later complaining of dysuria, suprapubic pain, haematuria, urgency, frequency and urge incontinence over the previous few weeks. She had been treated as a case of recurrent urinary tract infections (UTIs) by her general practitioner without any clinical response, following which she

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Figure 1: Plain pelvic X-ray showing the bladder stone attached to the ventriculovesical shunt.

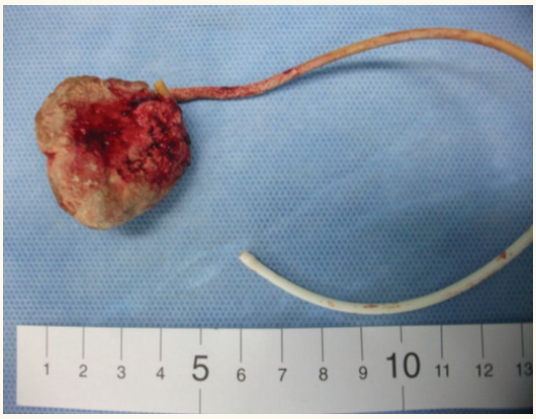

Figure 2: The removed urinary bladder stone with the attached lower end of the ventriculovesical shunt.

was referred to our centre. A urine analysis and culture revealed a UTI and appropriate antibiotic therapy was instituted. Renal function tests and haematological examinations were normal. A plain pelvic X-ray and an ultrasound examination revealed the presence of a large vesical stone that had formed around the lower end of the VVS without hydronephrosis [Figure 1]. Clinical examination confirmed the presence of a functioning valve.

The patient was evaluated and prepared for intervention under general anaesthesia. After obtaining consent, a cystoscopy was performed under general anaesthesia; this showed a vesical stone that had formed over and engulfed the lower end of the shunt. Cystolitholapaxy was an appealing treatment option, but the stone size and the presence of the shunt tube within the stone necessitated open cystolithotomy. During the procedure a solitary vesical stone about 4 cm in diameter was removed with the lower end of the shunt attached to it. The lower segment of the shunt tube was disconnected and the shunt tube was redirected to the peritoneal cavity. The patient was discharged the next morning and a urinary catheter was removed after five days. The patient was followed up clinically and radiologically for 12 months postoperatively and did well in respect to her bladder and shunt functions.

Discussion

In spite of the long history of CSF shunting procedures, there is as yet no ideal procedure. VP shunt surgery is the predominant mode of therapy for patients with hydrocephalus. However, it has potential complications which may require surgical procedures. Conventional ventricular diversion surgeries are reported to have a complication rate of about 20%.[4] In another recent study, the rate of surgical complications, which required revision among patients with VP shunts, was 17%. These complications included: catheter malfunction or obstruction; shunt infection; extrusion of the catheter (from the anus, neck, chest and abdominal wall); ventricular end displacement; subcutaneous collection, and a CSF pseudocyst.[5] In 1980, West reported on the use of VVS as a unique solution for patients with previously complicated standard shunts. He inserted the distal end of the shunt tubing at an oblique angle through the bladder wall.[6] In 2001, Ames *et al*. performed a VVS using a distal shunt catheter with a polyester cuff 5 cm from the tip of the catheter with the creation of a serosal tunnel around the shunt tubing aiming to provide stabilisation and infection control.[2] Another unusual site for CSF diversion in complicated cases is the gall bladder as a ventriculo-cholecystic shunt.[7]

The VVS has its own advantages and disadvantages. With regard to its advantages, the insertion of the distal shunt catheter into the bladder is, first, a technically simple procedure that can be performed rapidly, i.e. through a Pfannenstiel incision, where the shunt is pulled subcutaneously and introduced at an oblique angle to the bladder; the intravesical part of the shunt tube is kept to a minimum and fixed with non-absorbable sutures. Second, the risk of obstruction to the shunt is low. On the other hand, there are disadvantages. The continuous drainage of the CSF through the urine may be associated with an increased risk

of fluid-electrolyte depletion, especially in young children and in patients with high CSF output, as in choroid plexus papilloma. Moreover, the presence of a foreign body in the urinary bladder may increase the risk of recurrent UTIs and calculus formation; this has led some authors to discourage the use of this shunt.[8] Lastly, patients may have bothersome irritative voiding symptoms due to the presence of the distal shunt within the bladder.

Vesical stones usually develop secondary to underlying problems such as voiding dysfunction and/or the presence of intravesical foreign bodies. Various types of intravesical foreign bodies have been described,[2,9] but a VVS as the cause of a vesical stone has previously been reported only once in the literature.[8] Other related case reports have described vesical stone formation over the lower end of a migrated VP shunt which perforated the urinary bladder.[10,11] According to the modified Clavien-Dindo classification system, this complication is regarded as grade IIIb.[12]

This patient was managed with open cystolithotomy and the shunt was redirected to the peritoneal cavity to prevent the occurrence of this complication. Many factors may have contributed to stone formation in this patient, but the most significant of these is the length of the intravesical part of the shunt. By reducing its length as much as possible the risk of future vesical stone formation and the related irritative symptoms may have minimised.

Conclusion

The VVS technique may offer a unique solution for patients with complicated conventional shunts. It is a relatively simple and rapid procedure; on the other hand, it may be associated with particular complications like vesical stone formation. The modification of the procedure by proper patient selection, keeping the length of the intravesical part of the shunt as short as possible and a strict follow-up are mandatory steps to reduce the related complications.

DECLARATION

This case report was approved by the authorities of the Department of Surgery at Mosul College of Medicine and a consent form was signed by the patient.

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