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# Acute Abdominal Pain in Spinal Cord Injury Patient Induced by Indwelling Urethral Catheter Placed into the Right Ureter Through the Ureteral Orifice: A Case Report

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Diagnosis of acute abdomen in spinal cord injury (SCI) patients remains challenging. Classic peritoneal signs, such as rigid abdomen, rebounding pain and abdominal muscle guarding may be not reliable. It is still an important cause of morbidity and mortality in patients with SCI.

A 45-year-old woman with SCI and 7th and 8th thoracic vertebrae fractures suffered from lower abdominal pain, fever and chills for three days. Physical examination revealed diffuse abdominal tenderness with muscle guarding. Laboratory studies showed severe leukocytosis and mild pyuria. Abdominal contrast-enhanced computed tomography scans (CTS) revealed a urinary catheter, which had been accidentally inserted into the right ureter through the ureteral orifice. Abdominal pain improved dramatically after the urinary catheter was replaced.

We suggest further workup for possible causes of acute abdominal pain in SCI patients presenting with symptoms such as vomiting, vague abdominal pain, abdominal distension, spasms and cramps. Early investigation with abdominal X-ray, ultrasound, computed tomography scan or diagnostic video laparotomy may prevent delays in diagnosis and improvement of outcome. (Tw J Phys Med Rehabil 2010; 38(1): 35 - 39)

**Key Words:** spinal cord injury, acute abdominal pain, indwelling urethral catheterization

## INTRODUCTION

During the past three decades, life expectancy for patients with spinal cord injury (SCI) has increased steadily and is comparable with able-bodied individuals due to advancement in medical technology and medical

care. However, acute abdomen is still a major cause of morbidity and mortality in patients with SCI and its diagnosis presents a difficult challenge. The following report describes a rare case of abdominal pain in SCI after indwelling urethral catheterization, which was accidentally placed into the right ureter.

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## CASE REPORT

A 45-year-old woman sustained a spinal cord injury and 7th and 8th thoracic vertebrae fractures after falling from a stairwell in September 2006. Neurologic examination revealed complete SCI at level T10. After discharge, intermittent catheterization (IC) was used for monitoring her neurogenic bladder. Right hydronephrosis was diagnosed after routine reno-echography follow up; therefore, a long-term indwelling urinary catheter was inserted.

On June 11, 2008, the patient experienced lower abdominal pain, fever and chillness which lasted for three days. After urinary tract infection was confirmed by urinalysis, she was treated with oral antibiotics and the urinary catheter was replaced. According to the patient, the procedure was performed smoothly without causing any discomfort or pain. Unfortunately, the patient's clinical condition worsened on the next day, when the abdominal pain became diffused and persistent. She was admitted to our hospital on June 12, 2008, under the presumptive diagnosis of urosepsis and peritonitis. After admission, physical examination revealed diffuse abdominal tenderness with muscle guarding. Laboratory studies showed leukocytosis with left shift (WBC: 21660/cumm, Neutrophil: 90.0%) elevated liver enzymes and creatinine (Cr: 2.0 mg/dL, AST: 83 units/L, ALT: 61 units/L). Urinalysis only showed mild pyuria and hematuria (WBC: 5-10, RBC: 5-10). A second generation of cephalosporin was prescribed. Abdominal X-ray showed mild dilatation of small intestine in the right lower quadrant; abdominal contrast-enhanced computed tomography scan (CTS) revealed a urinary catheter placed into the right ureter through the ureteral orifice (Figure 1, 2) with right hydronephrosis and right hydroureter (Figure 3). The urinary catheter was immediately removed and replaced with a new one. Abdominal pain improved dramatically the next day and became localized only over the right flank with positive right costophrenic angle knocking pain. Both blood test and renal function returned to normal range on day 3 (WBC: 12130/cumm, Cr: 0.8 mg/dL, AST: 85 units/L, ALT: 80 units/L). Before discharge, a cystoscopy examination was arranged. The result showed intact bladder mucosa with both ureteral orifices in a typical position and normal shape. After seven months, follow up with an intravenous pyelogram

showed mild right hydronephrosis and a decrease in the size of right kidney. No hydroureter was noted. Persistent elevated liver enzymes were also noted during follow up in our outpatient clinic. The abnormal liver enzymes were unrelated to this episode.

## DISCUSSION

Mortality from abdominal conditions in patients with SCI has been documented at 10% to 15%,<sup>[1-3]</sup> due to delays in diagnosis.<sup>[4-5]</sup> In the innervated individual with an acute abdomen, the most common presenting symptom is pain, but the SCI patient may or may not experience pain. When an SCI patient presents with acute abdomen, the lack of classical symptoms and signs may hinder the ability of the clinician to make a correct diagnosis.

Normal somatic sensation to the anterior abdominal wall originates from T7 to L1.<sup>[6]</sup> Visceral sensory fibers of the abdominal viscera are more complicated. Sensory fibers from the rectum and bladder are carried via the S2 to S4 parasympathetic nerves. The sensory fibers of other organs, such as the stomach, gallbladder, and small intestine are carried from T1 to L3. Some nerve fibers reach directly to the paravertebral sympathetic chain. Others initially synapse in a prevertebral ganglion, such as the celiac, aorticorenal, superior or inferior mesenteric ganglion, before traveling to the paravertebral sympathetic chain.<sup>[7]</sup>

Juler differentiates between high and low levels of injury in patients with SCI,<sup>[3]</sup> where patients with injuries above T6 are deemed to have high cord injuries. Sometimes, acute abdomen in these patients may not present with abdominal pain. Increased spasticity (often generalized and including abdominal musculature), referred shoulder tip pain, alteration in bowel function, nausea and vomiting, autonomic dysreflexia or simply a feeling that there is 'something wrong' may be the only sign in these patients.<sup>[1,5]</sup> Juler refers to patients with injuries below T6 as having lower cord injuries.<sup>[3]</sup> They are more likely to present with some form of abdominal pain than high cord injuries. But abdominal pain is often poorly localized.<sup>[3,4,8]</sup>

On physical examination, patients with SCI usually also suffer from spasticity which includes the abdominal musculature. Chronic constipation is often present, which



Figure 1. Contrast-enhanced helical CT axial image showed urethral catheter tip in right distal ureter proximal to ureterovesical junction (arrow). Note the surrounding bladder wall thickening.



Figure 2. Contrast-enhanced helical CT coronal reformation showed urethral catheter passed through ureteral orifice and placed into right ureter (arrow).



Figure 3. Contrast-enhanced helical CTS: axial image at the level of kidney showed dilatation of right renal pelvis and upper ureter (arrow).

distends the abdomen. Classical peritoneal signs (clues leading to the presence of peritonitis), such as muscle guarding and rigidity, are obviously not valid parameters in such patients.

Previous studies have revealed that laboratory work alone is not reliable in the diagnosis of acute abdomen in the patient with SCI. Leukocytosis was documented in only 33%-55% of the cases. Urinary tract infections and pressure sores are common occurrences in patients with SCI, and pyuria is present in almost all patients with it.<sup>[4]</sup> Radiological investigations, particularly abdominal X-ray, ultrasound and CTS are useful in aiding the diagnosis of acute abdomen in these patients. Some studies showed reliability in 61.9% to 77% of patients.<sup>[4,8]</sup>

In our case, abdominal CTS confirmed the final diagnosis of right ureter injury due to urinary catheter insertion. The time taken to derive a diagnosis from admission was less than 24 hours. We attribute this to early radiological investigation.

Indwelling urinary catheterization into the ureter is rare. Only four case reports were found in the PubMed database from 2000 to 2008.<sup>[9-12]</sup> Interestingly, this is

more common when the female patient is catheterized on an empty bladder. This might be due to the difference between the length of the male and female urethra (male: 18-20 cm, female: 4 cm).<sup>[13]</sup> The distance between the ureteral orifice and the internal urethral meatus is about 3cm.<sup>[14]</sup> This allows enough catheter length to be inserted into the ureter.<sup>[10]</sup> A further cause might be found in the anatomic structure of the bladder and ureter. The ureter pierces the bladder wall obliquely, travels 1.5 to 2 cm, and terminates at the ureteral orifice. The triangle of smooth urothelium between the two ureteral orifices and the internal urethral meatus is known as the trigone of the bladder. The intravesical portion of the ureter lies immediately beneath the bladder urothelium and is therefore quite pliant; it is backed by a strong plate of detrusor muscle. When the bladder fills, this arrangement is thought to result in passive occlusion of the ureter, like a flap valve.<sup>[15]</sup> This prevents the ureterovesical reflux and the insertion of foreign bodies into the ureter when the bladder is full.

Although this patient was diagnosed with right hydronephrosis due to detrusor-external sphincter dyssynergia before this episode, the final cystoscopy study revealed a normal ureter orifice after removal of the obstructive lesion at the distal ureter. It is also possible that hydronephrosis was induced by the same obstructive lesion. According to the previous report, the injured ureter recovered under conservative treatment, as previous case reports suggested.<sup>[9-11]</sup>

## CONCLUSION

We recommend aggressive investigation for possible abdominal emergency in SCI patients presenting with suspicious symptoms such as vomiting, vague abdominal pain, abdominal distension, spasms, and cramps. Early investigation with abdominal ultrasound, CT scan or diagnostic videolaparotomy may prevent delays in diagnosis and improvement of outcome.

Although the complication of indwelling urinary catheter insertion is rare, it is still a foreign object placed inside the human body. We should, therefore, be highly cautious regarding any iatrogenic possibilities. A proper catheter insertion technique may prevent this complication.

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## 脊髓損傷病患因放置尿管所引起罕見併發症：病例報告

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尿管的放置在現今的醫療中被廣泛的使用。一般而言，被認為是相當安全有效的方式，我們要報告一個因放置尿管而引發的罕見併發症。一位 45 歲的女性在兩年因外傷導致胸髓第十節以下的完全性脊髓損傷。病患因下腹痛、發燒及畏寒，前往就診，給予口服抗生素及換置尿管。但之後，下腹疼痛加劇，因此住院接受進一步檢查及治療。理學檢查發現病人廣泛性腹部壓痛及肌肉緊張，實驗室數據除了白血球增多外，肝腎功能皆變差。尿液檢查有膿尿及血尿。腹部電腦斷層掃描發現右側水腎及輸尿管腫脹，另外尿管頂端被置於右側輸尿管底部。因此，給予換置尿管並繼續使用抗生素。在換置尿管之後，病人臨床症狀大幅改善。三天後的實驗室數據回復正常。在患置導尿管之後第四天，安排膀胱鏡檢，除膀胱呈現慢性發炎病變外，兩側輸尿管開口結構正常，並未發現明顯之異常。病人在完成抗生素治療之後順利出院。因放置導尿管而導致輸尿管外傷的機率甚少，目前只有零星的病例報告。而這些案例大都發生在女性且膀胱已排空時，故應該要特別注意。我們建議在臨床上，對於脊髓損傷病人腹部疼痛早期使用超音波、腹部電腦斷層甚至剖腹探查可以早期診斷脊髓損傷病人的腹部急症，進而改善其預後及死亡率。（台灣復健醫誌 2010；38(1)：35 - 39）

**關鍵詞：**脊髓損傷(spinal cord injury)，急性腹痛(acute abdominal pain)，導尿管放置(indwelling urethral catheterization)