

Letter to the Editor

DOI: 10.1038/sj/sc/3101252

Extra corporeal shock wave lithotripsy of calculi located in lower calyx of left kidney in a spinal cord injury patient who has implantation of baclofen pump in the ipsilateral loin

Introduction

When the shock waves encounter an interface between two materials with different acoustic impedance, energy is released leading to mechanical stresses in the target material and consequent disintegration. Given the potentially very high levels of local energy deposition during extra corporeal shock wave lithotripsy (ESWL), there is a theoretical risk of damage to any structure close to the target, which has different acoustic impedance. Subcapsular haematoma of spleen¹, perforation of sigmoid colon², and small intestine³, rectal bleeding due to haematoma of sigmoid colon⁴, dehiscence of gastrojejunal stapled anastomosis⁵, and pulmonary contusion resulting in life-threatening hypoxemia⁶ have been reported following ESWL of urinary calculi. In order to minimise the risk of damage to structures close to the target, positioning of the patient on the lithotripsy table and siting of the transducer head should be planned taking into account the needs of individual cases. For example, protection of the lungs may be accomplished by elevating the upper half of the body with supportive pillows, thus moving the kidney away from the lung fields.⁷

Selected spinal cord injury (SCI) patients with profound spasticity may be treated by implantation of a baclofen pump for intrathecal administration of baclofen. The pump is implanted in the abdominal wall. A catheter is introduced in to the subarachnoid space and a tube coursing across the abdomen connects the baclofen pump to the intrathecal catheter. SCI patients are at high risk for developing urinary calculi and ESWL is the treatment of choice for renal stones.⁸ It is likely that some SCI patients with a baclofen pump may develop urinary stones, when these patients may be considered for ESWL. The pump and the connecting tube may be at risk of damage by shock waves when a SCI patient with a baclofen pump undergoes ESWL of upper urinary calculi. Recently we treated stones located in the inferior calyx of the left kidney in a spinal cord injury patient, who had implantation of a baclofen pump in the left loin. We discuss methods to prevent damage to baclofen pump and tubing during ESWL.

Case report

A 38-year-old male sustained complete tetraplegia at C6 level 20 years ago, when he was assaulted. He developed increasing spasms and a SynchroMed baclofen pump was implanted in the left loin in 1996. He developed stones in both kidneys in 2001. A stent was inserted in the right ureter and ESWL of the right renal calculus was performed successfully. Subsequently the right ureteric stent was removed and a stent was inserted in the left ureter as a prelude to ESWL of stones situated in the inferior calyx of the left kidney (Figure 1). The tube connecting

the baclofen pump and the intrathecal catheter was coursing below the lower pole of the left kidney. The distance between the stones located in the inferior calyx of left kidney and the connecting tube was 3 cm; the distance between the renal stones and baclofen pump was 9.5 cm (Figure 2).

Special precautions were taken during ESWL of the stones in order to avoid damage to the baclofen pump and the connecting tube. Usually, we bring renal calculi into focus either by positioning the patient to lie on the side, or by targeting the stone sideways by placing the transducer in the ipsilateral loin when a patient cannot lie on the side because of spasm, shoulder pain, or spinal curvature. In this case, the baclofen pump was sited laterally; therefore, the transducer was positioned from behind, perpendicular to the cranio-caudal axis. A total of 1758 shock waves were delivered from a Dornier MPL 9000 Lithotripter using a blue electrode, which has a focal zone of approximately 4 cms × 4 mm × 4 mm, the 4 cms being in the line of propagation of the shock wave. The output voltage was 14 kV at the beginning of lithotripsy; the voltage was gradually increased to 20 kV after 781 shock waves. During ESWL, the blood pressure rose to 133/83 mmHg from the base line reading of 107/65 mmHg and the patient was given

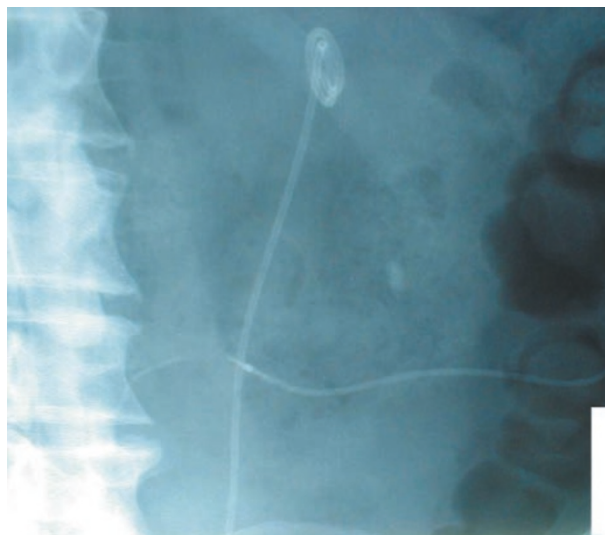


Figure 1 X-ray of left kidney showing calculi in the lower calyx: The ureteric stent is in place. The tube connecting the baclofen pump to the intrathecal catheter courses across the abdomen at a distance of 3 cm from the calculi situated in the lower pole of kidney



Figure 2 X-ray of abdomen shows the baclofen pump, which has been implanted in the left loin. A stent has been inserted in the left ureter. A distance of 9.5 cm separates the baclofen pump from the calculi situated in the inferior calyx of left kidney

nifedipine 5 mg sublingually to control lithotripsy-induced autonomic dysreflexia.

Discussion

Aneurysm of nephrostomy catheter has been reported following ESWL in a patient with nephrostomy tube. The very close proximity of the nephrostomy tube to the renal calculus was probably the cause of the focal damage to the catheter during lithotripsy.⁹ In our patient, a distance of 3 cms, as seen in the anterior–posterior X-ray, separated the tube connecting the baclofen pump to the intrathecal catheter, from the calculi located in the inferior calyx of left kidney. In reality, this means that the distance between the connecting tube and F2 was indeed more than 3 cm, as the tube had been placed in the abdominal wall. The risk of shock wave-induced damage to the connecting tube was minimal as the tube was located in the inter-muscular plane of the abdominal wall and not within the kidney or peri-renal fascia. We took the following precautions while positioning the patient for ESWL, in order to decrease the risk of damage to the baclofen pump and the tube.

- The transducer was kept away from the baclofen pump.
- The shock waves were focused on to the renal calculi from the posterior aspect of the abdomen.
- We ensured that the tube and the baclofen pump did not lie in the path of shock waves.

Spinal cord injury physicians should make an effort to place the baclofen pump and the connecting tube as far away from the kidney as possible while implanting baclofen pump in SCI patients.

S Vaidyanathan¹, H Johnson², G Singh¹, BM Soni¹ and KF Parsons²

¹Regional Spinal Injuries Centre, District General Hospital, Southport PR8 6PN and ²Mersey Regional Lithotripsy Unit, Department of Urology, Royal Liverpool University Hospital, Liverpool L7 8XP, UK

References

- 1 Chen CS, Lai MK, Hsieh ML, Chu SH, Huang MH, Chen SJ. Subcapsular hematoma of spleen – a complication following extracorporeal shock wave lithotripsy for ureteral calculus. *Changgen Yi Xue Za Zhi* 1992; **15**: 215–219.
- 2 Lipay M, Araujo S, Perosa M, Genzini T, Hering F, Rodrigues P. Perforation of sigmoid colon after extracorporeal lithotripsy. *J Urol* 2000; **164**: 442.
- 3 Kurtz V, Muller-Sorg M, Federmann G. Perforation of the small intestine after nephro-uretero-lithotripsy by ESWL – a rare complication. *Chirurg* 1999; **70**: 306–307.
- 4 Hidalgo Pardo F, Conte Visus A, Rebassa Lull M, Losada Gonzalez P, Gutierrez Sanz-Gadea C, Ozonas Moragues M. Rectorrhage as an unusual extrarenal complication after ESWL. *Actas Urol Esp* 1998; **22**: 366–368.
- 5 Fernandez-Lobato R, Cerquella C, Serantes A, Martinez-Santos C, Diaz-Gimenez LM, Moreno-Azcoita M. Dehiscence of gastrojejunal stapled anastomosis after lithotripsy for nephrolithiasis. *Dig Surg* 2001; **18**: 73–74.
- 6 Malhotra V, Rosen RJ, Slepian RL. Life-threatening hypoxemia after lithotripsy in an adult due to shock-wave-induced pulmonary contusion. *Anesthesiology* 1991; **75**: 529–531.
- 7 Demirkesen O, Tansu N, Yacyioglu O, Onal B, Yalcin V, Solok V. Extracorporeal shockwave lithotripsy in the pediatric population. *J Endourol* 1999; **13**: 147–150.
- 8 Vaidyanathan S, Hirst R, Parsons KF, Singh G, Soni BM, Oo T, Zaidi A, Watt JW, Sett P. Bilateral extracorporeal shock wave lithotripsy in a spinal cord injury patient with a cardiac pacemaker. *Spinal Cord* 2001; **39**: 286–289.
- 9 Orme R, Scott-Cook H, Farrar DJ. ‘Aneurysm’ of nephrostomy catheter complicating extracorporeal shock-wave lithotripsy. *Clin Radiol* 1999; **54**: 408–410.