

# The utilisation of post micturition bladder scan in the assessment of patients with suspected cauda equina syndrome (CES)

Michelle Angus, Mohammed Elmajee, Rajat Verma, Saeed Mohammad, Irfan Siddique  
Department of Spinal Surgery, Salford Royal NHS Foundation Trust, Salford, M6 8HD, UK

## Aim

To establish the clinical reliability of a post micturition bladder scan in independently predicting compression of the cauda equina.

## Introduction

CES is one of the most high profile conditions in medicolegal practise in the NHS; with 'damages more likely with a lack of crucial clinical detail including, neurological deficits and any changes in bladder function' (Gardner et al. 2011). The measurement of bladder function is often subjectively reported, with many of the objective clinical signs vague and inconsistent; NICE CKS (2015) describes bilateral neurological deficit and laxity of the anal sphincter as the only objective signs of CES. Could the use of a bladder scanner aid the clinical decision making when assessing a patient with CES prior to MR?

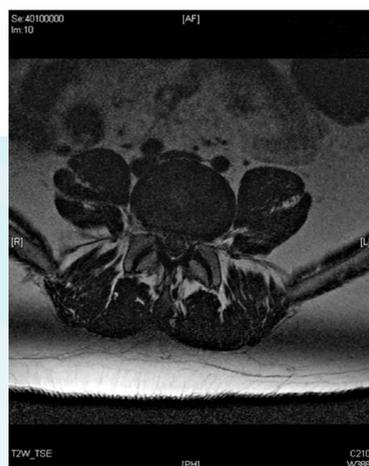
When looking at gaining the best possible surgical outcome, timing of surgery must be taken into account 'severity of bladder dysfunction at the time of surgery is the dominant factor in recovery of bladder function' (Qureshi, 2007). Is it therefore important to attempt to quantify the extent of the bladder dysfunction to aid the clinical decision making process?

## Method

The use of an ultrasound scan to measure residual bladder volume post voiding was described over 30 years ago (Nishizawa O et al. 1985). However, there is little in the literature suggesting the use of a bladder ultrasound scan to objectively measure the residual post micturition volume in patients with suspected CES.



61 consecutive patients over a six month period presenting at the Emergency Department (ED) of a tertiary care spinal centre investigated for signs of CES had a post micturition bladder scan as part of their clinical assessment in the ED (Emergency Department). They then went on to have an MR scan to establish if the cauda equina was compressed. We looked at the correlation between the inability to fully empty the bladder with a radiological diagnosis of CES as reported by a Consultant Neuroradiologist.



## Results

Of the 61 patients 25% were classed as positive for CES radiologically and 23% went on to have urgent surgical decompression.

From the CES group 24% were catheterised, compared to 4% in the non CES group. A further 30% had a residual volume of greater than 100ml after urinating; although none of this group could fully empty their bladder residual volumes in the remaining 47% varied from 12ml to 55ml.

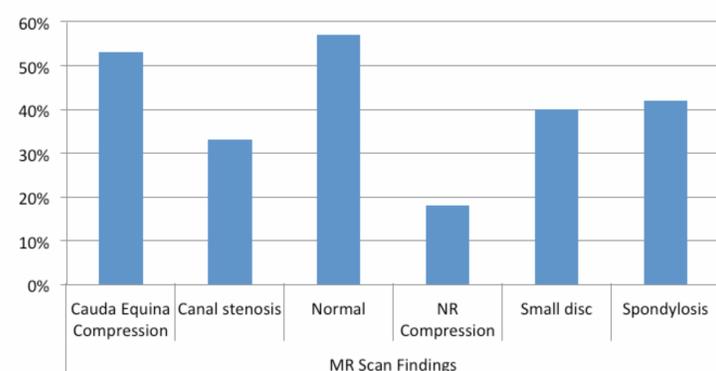
The larger volume of patients had no CES on MR, only 40% had a residual volume of greater than 100ml although this was often a smaller volume than the CES group; with the majority able to fully empty their bladder to less than 10ml.

### Patients with CES as confirmed on MR Scan

		CES Positive N = 15	CES Negative N = 46	
Post micturition bladder scan result	>100ml residual	TP N = 8	FP N = 16	PPV = 33%
	<100ml residual	FN N = 7 Sensitivity 53%	TN N = 30 Sensitivity 53%	NPV = 19%

The graph below shows the percentage of patients with a residual bladder volume of greater than 100ml with each radiological diagnosis. The group with a completely normal MR had the greatest percentage of patients with greater than 100ml residual volume on bladder scanning, these patients often had acute on chronic pain with significant psychological distress; all of this group had less than 200ml residual bladder volume and none required catheterisation.

### Patients with a residual bladder volume > 100ml



Even with the unexpected finding in the normal group there were still significantly more patients in the cauda equina compression group with a residual bladder volume of over 100ml after urination 53% of the cauda equina compression group compared to 35% of the non cauda equina compression group.

### Cauda equina compression



■ residual >100ml  
■ residual <100ml

### No cauda equina compression



■ residual >100ml  
■ residual <100ml

## Conclusions

A post micturition bladder scan is a useful adjunct to the clinical assessment of patients with suspected CES and can help quantify urinary dysfunction. However, it should be used with caution as an independent predictor.

Many other factors can influence the ability of patients with back pain to empty their bladder, such as psychological distress, muscle spasm, medication, constipation, other pathologies. Each should be considered as part of the examination process.

## References

- Gardner A et al (2011). Cauda equina syndrome: a review of the current clinical and medicolegal position. European Spinal Journal: 20; 690-697.
- National Institute for Health and Care Excellence (2015). Sciatica (lumbar radiculopathy). Clinical Knowledge Summary, London UK
- Nishizawa O et al. (1985) Noninvasive screening procedure for evaluation of bladder emptying function. Tohoku J exp med, 147:421-425.
- Qureshi A, Sell P (2007). Cauda equina syndrome treated by surgical decompression: the influence of timing on surgical outcome. European Spinal Journal, 16:2143-2151.