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Re: Evaluation and management of cauda equina syndrome in the emergency department. Am J Emerg Med. 2020 38:143-148

--Manuscript Draft--

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Re: Long B, Koyfman A, Gottlieb M. Evaluation and management of cauda equina syndrome in the emergency department. *Am J Emerg Med.* 2020 38:143-148

We read the paper of Long et al with interest and we support many of their conclusions. We wish to comment upon the issue of bladder ultrasound (U/S) scans which are becoming an ever more important method of assessing potential cauda equina syndrome (CES) patients in the emergency department.

Long et al¹ refer to a paper of Domen et al² which said that a bladder U/S of > 500 ml had an odds ratio of 4.0 for diagnosing CES, increasing to 15.5 if there was 1000 ml or more retention and to 48 if there was urinary retention of ≥ 500 ml with 2 or 3 of the following symptoms: bilateral sciatica, urinary retention or rectal incontinence. Long et al said that this was a post-void urinary volume but our reading of the paper suggests it was a pre-void bladder volume. Domen et al demonstrate that bladder retention is an important diagnostic feature of CES and the greater the volume of urinary retention the greater the probability that the patient has CES. We also need to establish whether retention is painful or painless. Painful retention is usually incomplete CES (CESI) where outcomes are more favourable than the patient with painless urinary retention with incontinence (CESR).

A pre-void bladder scan tells about the degree of bladder distension/retention. A post-void scan tells us about the extent to which the bladder is emptying to completion or not. The post-void residual urinary volume (PVR) is the volume of urine left in the bladder post-micturition. A PVR of up to 50 mls is normal, up to 100 mls may be normal in older patients. Katzouraki et al³ reported 260 possible CES patients studied prospectively. Pre- and post-void bladder scans were performed prior to MRI. A positive MRI was found in 34 (13%) with an average of 76% canal occlusion (95% CI 72 – 80%). Of the 34 patients with positive scans 33 (97%) had urinary incontinence (although most were said not to be CESR), 25 (73%) had saddle anesthesia, 23 (63%) had reduced perianal sensation, 13 (38%) had reduced or absent anal tone. A PVR of ≤ 200 ml was found in 151 of the scan-negative cases (67%) and in 2 scan-positive cases (6%). Patients who had normal

perianal sensation and voluntary anal contraction with a PVR of < 200 ml did not have emergency MRIs, a delayed MRI was negative in all patients. A PVR of > 200 ml was found in 107/260 (41%), 32 (29.9%) had a positive MRI. The authors recommended urgent MR imaging where the PCR is > 200 ml. The use of PVR helps to stratify the risk of CES in patients with symptoms and/or signs of CES but it must be interpreted cautiously. Although Katzouraki et al found no patient with a positive scan where the PVR was 200 mls or less and there were no objective signs we are aware of a small subgroup of CES patients with positive scans who have symptoms but no signs (symptom-only CES) with a positive MRI requiring emergency surgery. We estimate that the proportion of symptom-only CES is about 5% of all CES cases. More worryingly we have seen a trend of relying upon a low PVR to exclude CES even where there are objective signs. Clinical symptoms and signs cannot be disregarded despite the fact that their sensitivity and specificity are low. There is no assessment (clinical, bladder ultrasound or MRI) that conclusively determines whether a patient has CES, or not, particularly in early CES. We suggest that the PVR can help to determine the urgency of MR imaging and surgery in conjunction with the clinical picture.

Symptoms	Signs	PVR	Timing of MRI and surgery*
+	-	≤ 200 ml	Within 24 hours
+	-	> 200 ml	Emergency
+	+	Any	Emergency

*If MRI positive

In many neurological disorders, including CES, symptoms precede signs. Symptom-only CES or cases where the objective signs are modest are those patients in whom emergency decompressive surgery is likely to achieve the best outcomes. Conversely there is much to be lost if these patients are not imaged and treated prior to deterioration to more severe CES.

References

1. Long B, Koyfman A, Gottlieb M. Evaluation and management of cauda equina syndrome in the emergency department. American Journal of Emergency Medicine 38 (2020) 143-148.

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3. Katzouraki G, Zubairi AJ, Hershkovich O, Grevitt MP. A prospective study of the role of bladder scanning and post-void residual volume measurement in improving diagnostic accuracy of cauda equina syndrome. *Bone Joint J* 2020;102-B(6):677-682.