

[GA1-47] Surprisingly low levels of cortisol in patients during posterior spine fusion. Does it signify a pathological adrenal suppression?

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Introduction: Posterior spine fusion (PSF) is performed for both idiopathic and neuromuscular scoliosis (NM) patients. NM patients are known to experience more perioperative complications including hypothermia and hypotension (1, 2). Due to no obvious explanation for these complications being known, we measured total cortisol levels in our patients undergoing spine fusion. The research question we were asking was if cortisol levels in NM patients explain or even predict some of the complications experienced by them?

Methods: After IRB approval, we reviewed the anesthetic records of 89 patients with cortisol levels measured after anesthesia induction. Moderately low cortisol level was defined as a level > 5 and ≤ 10 $\mu\text{g}/\text{dl}$ while severely low cortisol level was defined as a level ≤ 5 $\mu\text{g}/\text{dl}$ (3). Of the 89 patients, 17 had idiopathic and 72 had NM scoliosis. We examined influence of anesthetic agents by separating the patients into those who had spinal cord monitoring, thus receiving total intravenous anesthetic (TIVA), n=62; and those who did not have TIVA due to inability to obtain baseline evoked potential values, n=27. Data collected included the following Intraoperative complications: hypotension requiring vasopressin use, bronchospasm and loss of evoked potentials.

Results: Surprisingly, a greater % of patients in the idiopathic group had lower levels of cortisol when compared to NM(Table 1)(P=0.03). To further analyze this unexpected finding we examined the anesthetic influence on cortisol levels. There was a greater % of idiopathic patients that had lower cortisol levels that received TIVA (P=0.02). We also examined Intraoperative complications in all patients to seek a possible association between cortisol levels and complications. Of the 18 patient who had complications, 14 (78%) were neuromuscular scoliosis patients. The majority of patients among both idiopathic and neuromuscular groups who had complications also had cortisol levels ≤ 10 . Complications experienced were as follows: eight patients had hypotension requiring pressor administration for varying lengths of time. One patient had severe bronchospasm while three had loss of evoked potentials.

Discussion: The search for the etiology of NM patients experiencing more complications during surgery led us to the unexpected finding of low cortisol levels in patients undergoing spine fusion surgeries both idiopathic and NM. Many of these patients experienced Intraoperative complications, both of minor and of major types. Whether the low cortisol levels are causative of these complications or are an association is unclear and warrants further prospective studies.

References:

1. Wass et al: 2012
2. Theroux (In Press)
3. Cohan et al: 2005

Table 1: Patients separated into Idiopathic and Neuromuscular groups. Number of patients with different levels of cortisol along with the number of patients who experienced complications are given in each group. Also, the number of patients with moderate or severely low cortisol levels from TIVA based anesthetic is given.

<i>Cortisol Level Grouping (µg/dl)</i>	<i>Neuromuscular</i>	<i>Idiopathic</i>
≤ 5	24/72 (33%)	11/17 (65%)
≤ 10	47/72 (65%)	14/17 (82%)
≤ 5 (Complications)	4/14 (29%)	2/4 (50%)
5-10 (Complications)	4/14 (29%)	1/4 (25%)
≤ 10 (Complications)	8/14 (57%)	3/4 (75%)
≤ 5 (TIVA)	14/45 (31%)	11/17 (65%)
≤ 10 (TIVA)	33/45 (73%)	14/17 (82%)