Effect of Anesthesia on Standard Voiding Cystourethrogram

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Introduction: A standard voiding cystourethrogram (VCUG) is obtained by instilling radiopaque contrast medium into the bladder and using fluoroscopy to image the bladder and renal fossa during filling and voiding. The study is performed in patients with prenatally diagnosed hydronephrosis, urinary tract infections and for diagnosing vesicoureteric reflux and voiding abnormalities in the pediatric population. The test is anxiety provoking, uncomfortable and traumatizes the patient, because a bladder catheter must be inserted and the patient is required to void when awake on the exam table. Stokland and colleagues used mild sedation with midazolam prior to VCUG without effecting examination results [1]. With the exception of a study using halothane and nitrous oxide for anesthesia, the use of a general anesthetic and its role in VCUG has not been identified [2].

This study aims to determine whether giving a short duration of anesthesia during bladder catheterization allows the patient to promptly return to an awake state and void on command in a suitable time. We are also interested in determining whether this brief anesthetic affects the grade of reflux, bladder capacity and emptying capability (post void residual bladder volume).

Methods: We conducted a retrospective chart study of 106 consecutive pediatric patients. Two patients were excluded due to their age > 18 yr. Therefore, 104 patients were in the study. There were 39 males and 65 females. The median age was 2.2 years (range of 5 days - 11 years) with a median weight of 16.5 kg (range 2.25 – 53 kg). Anesthesia was given to 35 patients; no anesthesia was given to 69 patients.

Results: The anesthesia used was either propofol or sevoflurane. Twenty-three patients received sevoflurane of which 2 were also administered propofol, 1 midazolam and 1 desflurane. Twelve patients received propofol of which 1 patient was also administered midazolam. Three of these patients were then given a propofol infusion. Thirty-two of the 35 patients bypassed the PACU with stable vital signs and an Aldrete score of 10. Of the 3 patients that required PACU admission, two spent 25 minutes in the PACU and one spent 40 minutes.

In the anesthesia group, 15 patients demonstrated reflux (42.8%); 20 did not demonstrate reflux (57.2%). In the no anesthesia group, 30 patients demonstrated reflux (43.5%); 39 did not demonstrate reflux (56.5%). There is no significant difference between the two groups (p = 0.95). The beta error is 0.95, making the Power test = 0.05 (Graph 1).

In the 35 patients who were anesthetized, 15 demonstrated reflux. Of those, 13 had no significant to mild significant post void residual volume (PVRV) and 2 had greater than mild PVRV. In the 20 who did not demonstrate reflux, all had no significant to mild 0 had greater than mild PVRV. There is no significant difference in the amount of PVRV between these two groups with anesthesia, p = 0.352 Fisher exact test. In the 69 patients who were not anesthetized, 30 demonstrated reflux. Of those, 25 had no significant to mild significant PVRV and 5 had greater than mild PVRV. In the 39 who did not demonstrate reflux, 37 had no significant to mild PVRV and 2 have greater than mild PVRV. There is no significant difference in PVRV between these two groups, p = 0.353 Fisher exact test. Overall, no significant to mild PVRV was present in 33 (94.3%) of the anesthesia group vs. 62 (89.6%) in the non anesthesia group (Graph 2). There is no significant difference in PVRV measured in either the anesthetized or non-anesthetized groups, independent of the presence or absence of reflux, p = 0.696 Yates Chic-Square test.

Discussion: This study shows that giving a brief interval of anesthesia does not adversely affect the outcome of a standard VCUG. The patient is fully awake in a timely manner and is able void on command. There is no significant difference in either the incidence of ureterovesical reflux or the ability of the radiologist to accurately assess bladder capacity and post void residual volume. Additionally, patients were moved from the procedure to same day recovery the majority of the time with no adverse sequelae. Limitations of this study are that it does not compare length of procedure in the anesthetized vs. non-anesthetized group. The effect of anesthesia on bladder capacity is difficult to measure because baseline capacities vary with age and weight. This could be studied in the future. Patient satisfaction could be studied as well, as many parents whose children had previous VCUG without anesthesia expressed the superiority of the experience when their child was anesthetized. In conclusion, general anesthesia may be used to reduce both the anxiety and discomfort associated with this procedure in a safe and appropriate fashion without compromising study results.

References: