

A REVIEW OF RADIATION EXPOSURE TO PATIENTS AND STAFF DURING VIDEO URODYNAMICS

Hypothesis / aims of study

Video urodynamics (VUDS) was introduced in 1980 with the goal of combining functional and anatomical data. Over the last few years the use of fluoroscopy in urodynamics has increased in popularity resulting in more VUDS being performed. This study aimed to review the data from a large urodynamics unit to assess the volume of radiation both patients and staff receive during VUDS.

Study design, materials and methods

A retrospective analysis of a urodynamic database from November 2012 to March 2017 was conducted. Both male and female patients were included. For staff, data from personal film badge dosimeters was collected and reviewed every three months. All members of staff wear lead gowns during the use of X-Ray/fluoroscopy and stand approximately 2 meters away from the image intensifier.

Department policy outlines strict criteria pertaining to which patients require VUDS [Table 1].

X-rays are only taken at certain points during the test including at first desire to void, while testing for stress incontinence, during episodes of detrusor overactivity and during voiding.

Table 1: Indications for video urodynamics

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| <ul style="list-style-type: none"> • Men under the age of 65. • Patients who have had previous surgery on their urinary tract (e.g. TURP, surgery for stress incontinence) • Neurogenic patients (e.g. multiple sclerosis, spinal cord injury) • Patients with high post void residuals or complex patients with pelvic reconstruction or kidney transplant patient |
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Results

A total of 1575 patients had VUDS between November 2012 and March 2017. There were 882 men between the ages of 17 and 91 years (median of 61 years) and 693 women between the age of 18 and 85 years (median 50). The median exposure time was 0.3 min (mean of 0.5 min). The median dose area product (DAP) was 112cGycm² (mean of 140cGycm²) with a median tube potential of 110KV (mean of 110KV). 14 members of staff were involved in VUDS. Readings taken from each individual's personal dosimeter revealed the surface dose to be 0mSv for all members of staff.

For the men, the median exposure time was 0.3min (mean of 0.66 min) with a median DAP of 111cGycm² (mean: 142cGycm²). As for the women, the median exposure time was 0.3min (mean of 0.33 min) with a median DAP of 114 cGycm² (mean: 136 cGycm²).

The only variable factor affecting the dose was body mass index (BMI) with a positive correlation ($R^2=0.06$, $P<0.0001$). [figure 1]

657 (74%) men and 595 (86%) women had normal findings x-ray findings. The most common pathology identified in both men and women was a trabeculated bladder (15% men, 6% women) follow by bladder diverticula (9% men, 3% women).

Interpretation of results

The results show that the median dose is higher in women. This can be explained by the fact that women who require video urodynamics are usually complex patients and might require more images.

Our results also show that the BMI is positively correlated with DAP. The bigger dose in high BMI is expected, as more radiation will be required to deliver a good contrast image through a greater mass of tissue.

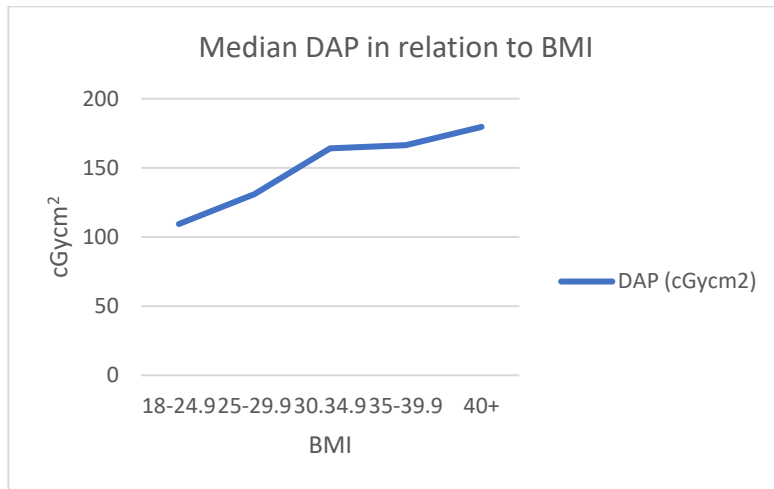


Figure 1: Corralation between DAP and BMI

Compared to other radiological investigation, our average (140 cGycm²) is significantly low when compared to a CT abdomen (900 cGycm²) or an abdominal X-Ray (300 cGycm²). (1)

The overall dose in both men and women is less than described in the literature. Giarenis et al (2) measured the dose in VUDS in women and the mean DAP reported was 163.76 cGycm². Alloussi et al (3) reported and even higher mean at 487.7 cGycm². Even at the higher dose of 487.7cGycm², it is equivalent to a lumbar spine X-ray.

Concluding message

Our findings show that only a small radiation dose is required for VUDS with a mean DAP of 140 cGycm². This is a lower required dose than previously reported in the literature. No significant exposure was recorded among staff. The data also suggests that BMI is a significant factor affecting the dose needed to complete the test. VUDS appears to provide useful information for the management of patients in a manner which is safe for both patients and staff.

References

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Disclosures

Funding: None **Clinical Trial:** No **Subjects:** HUMAN **Ethics not Req'd:** It involved retrospective analysis of urodynamic studies from a database **Helsinki:** Yes **Informed Consent:** No