Turkish Continence Society
ICS Recognised Urodynamics Certification Course

VIDEOURODYNAMICS

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Videourodynamics (VUDS)

- Standard multichannel urodynamic tests
  - Some pathognomonic findings in patients may be misdiagnosed
- Videourodynamics
  - Radiologic imaging

    +
  - Urodynamic evaluation
- Enhances differential diagnosis
- However;
  - Cost
  - Risk of ionizing radiation

Indications

- VUR
- Anatomic variations of bladder
    - Trabeculation, cellule, diverticulum
    - Filling defects
- Voiding dynamics in patients with POP
- Bladder neck function and coordination during voiding
- Urethral pathology
    - Stricture
    - Diverticulum
- DESD
- Dysfunctional voiding / pelvic floor dysfunction
- Fistulas
- İncontinence

EAU Neurourology Guidelines 2022

3.3.7.4 Summary of evidence and recommendations for urodynamics and uro-neurophysiological tests

Summary of evidence	**LE**
Urodynamic investigation is the only method that can objectively assess the (dys-)function of the LUT.	2a
Video-urodynamics is the optimum procedure for urodynamic investigation in neuro-urological disorders.	4
Specific uro-neurophysiological tests are elective procedures and should only be carried out in specialised settings.	4

EAU Neurourology Guidelines 2022

Recommendations	Strength rating
Perform a urodynamic investigation to detect and specify lower urinary tract (dys-)function, use same session repeat measurement as it is crucial in clinical decision making.	Strong
Non-invasive testing is mandatory before invasive urodynamics is planned.	Strong
Use video-urodynamics for invasive urodynamics in neuro-urological patients. If this is not available, then perform a filling cystometry continuing into a pressure flow study.	Strong
Use a physiological filling rate and body-warm saline.	Strong

Level of Evidence (LoE)

Table 1: Level of evidence*	
Level	**Type of evidence**
1a	Evidence obtained from meta-analysis of randomised trials
1b	Evidence obtained from at least one randomised trial
2a	Evidence obtained from one well-designed controlled study without randomisation
2b	Evidence obtained from at least one other type of well-designed quasi-experimental study
3	Evidence obtained from well-designed non-experimental studies, such as comparative studies, correlation studies and case reports
4	Evidence obtained from expert committee reports or opinions or clinical experience of respected authorities

**Modified from CEMB (1).*

AUA/SUFU Guideline

- Neurogenic Bladder

neurological conditions with or without symptoms and as part of ongoing follow-up when appropriate, in patients with other neurologic disease and elevated PVR or in patients with persistent symptoms. (*Recommendation*, Evidence Strength: *Grade C)*

12. When available, clinicians may perform fluoroscopy at the time of urodynamics (videourodynamics) in patients with relevant neurologic disease at risk for neurogenic bladder, in patients with other neurologic disease and elevated PVR or in patients with urinary symptoms. (*Recommendation*; Evidence Strength: *Grade C*)

13. Clinicians should perform electromyography (EMG) in combination with CMG with or without PFS in patients with

AUA/SUFU Guideline

- Neurogenic Bladder

Grade A (high quality; high certainty)

Grade B (moderate quality; moderate certainty)

Grade C (low quality; low certainty)

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AUA/SUFU Guideline

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Table 2: AUA Nomenclature
Linking Statement Type to Evidence Strength

Standard: Directive statement that an action should (benefits outweigh risks/burdens) or should not (risks/burdens outweigh benefits) be taken based on Grade A or B evidence

Recommendation: Directive statement that an action should (benefits outweigh risks/burdens) or should not (risks/burdens outweigh benefits) be taken based on Grade C evidence

Option: Non-directive statement that leaves the decision regarding an action up to the individual clinician and patient because the balance between benefits and risks/burdens appears equal or appears uncertain based on Grade A, B, or C evidence

Clinical Principle: a statement about a component of clinical care that is widely agreed upon by urologists or other clinicians for which there may or may not be evidence in the medical literature

Expert Opinion: a statement, chieved by consensus of the Panel, that is based on members' clinical training, experience, knowledge, and judgment for which there is no evidence

AUA/SUFU Guideline

- LUTS

Evidence Quality: *Grade C*)

19. Clinicians may perform videourodynamics in properly selected patients to localize the level of obstruction, particularly for the diagnosis of primary bladder neck obstruction. *(Expert Opinion)*

AUA/SUFU Guideline

- LUTS

Evidence Quality: *Grade C*)

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Equipments

- Multichannel urodynamics

Equipments

- Multichannel urodynamics
- C armed fluoroscopy

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- Multichannel urodynamics
- C armed fluoroscopy
- Contrast media

Equipments

- Multichannel urodynamics
- C armed fluoroscopy
- Contrast media
- Fluoroscopy table

Images

- Before filling
- During filling
- While valsalva maneuver
- During voiding
- After voiding

International Commission on Radiological Protection (ICRP)

Limits

- Radiation workers
  - The average of consecutive five years → 20 mSV
  - Yearly maximum → 50 mSv

- Normal population
  - In a year → 1 mSv

Int Urogynecol J (2013) 24:1547–1551
DOI 10.1007/s00192-013-2062-6

ORIGINAL ARTICLE

Radiation exposure during videourodynamics in women

Ilias Giarenis · Jonathan Phillips · Heleni Mastoroudes · Sushma Srikrishna · Dudley Robinson · Cornelius Lewis · Linda Cardozo

Table 1 Primary indications for videourodynamics (VUDS)

Indication	*n* (%)
Urinary incontinence	106 (40.15)
Pelvic organ prolapse[a]	76 (28.79)
Previous continence surgery	30 (11.36)
Recurrent urinary tract infection	29 (10.98)
Neurogenic bladder	11 (4.17)
Voiding difficulties	9 (3.41)

[a]Pelvic Organ Prolapse Quantification (POPQ) stage≥2

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Table 2 VUDS findings (n=264)

Findings	n
Urodynamic stress incontinence	101
Idiopathic detrusor overactivity	79
Neurogenic detrusor overactivity	10
Bladder diverticulum	7
Dysfunctional voiding	7
Vesicoureteric reflux	4
Bladder hernia	3
Detrusor sphincter dyssynergia	3
Urethral diverticulum	2
Urethral stricture	2
Vesicovaginal fistula	2

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Table 4 Organ absorbed dose for women with normal range BMI ($n=100$)

Organ	Total mean absorbed dose, mGy (SD)
Bladder	1.57 (0.79)
Uterus	1.39 (0.69)
Ovaries	0.90 (0.46)
Colon	0.70 (0.36)
Kidneys	0.50 (0.27)
Bone marrow	0.30 (0.16)
Skeleton	0.28 (0.14)
Liver	0.09 (0.05)

mGy milligray

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Ilias Giarenis · Jonathan Phillips · Heleni Mastoroudes · Sushma Srikrishna · Dudley Robinson · Cornelius Lewis · Linda Cardozo

Results: Out of 345 consecutive VUDS, 264 were included in the study. The mean effective dose was 0.34 mSv (SD: 0.15) and the mean fluoroscopic time was 63.15 s (SD: 21.81). Multivariate linear regression analysis of factors affecting the radiation dose showed that BMI ($p = 0.009$) and fluoroscopy time ($p < 0.001$) were the only statistically significant factors. The final linear regression model for the estimation of the effective dose was Eff. Dose (mSv) = -0.049 + 0.003 · BMI (kg/m(2)) + 0.005 · fluoroscopy time (s).

Conclusions: This study reveals that women are exposed to relatively small amounts of radiation during VUDS. The use of fluoroscopy only without additional static radiographic images minimises exposure to a level consistent with the "as low as reasonably achievable" radiological principle.

Low Urin Tract Symptoms. 2018 May;10(2):181-185. doi: 10.1111/luts.12161. Epub 2016 Dec 19.

Radiation Exposure During Videourodynamics: Establishing Risk Factors

Benjamin M Brucker [1], Lysanne Campeau [2], Eva Fong [1], Sidhartha Kalra [1], Nirit Rosenblum [1], Victor W Nitti [1]

Results: A total of 203 videourodynamic studies were assessed in 106 female and 97 male patients with a mean age of 64.3 and body mass index of 26.8. The average fluoroscopy time was 100.2 sec and exposure was 560.9 radcm^2 . The most common indication for videourodynamics was incontinence, 40.9%. On multivariate linear regression analysis body mass index, vesico-ureteral reflux, sex, number of fill cycles, and larger capacity were independent predictors of increased radiation exposure.

Conclusions: We have shown that increased radiation exposure as measure with Dose Area Product during VUDS was significantly associated with larger BMI, female gender, larger bladder capacity, presence of VUR, junior operator, and higher number of fill cycles. Further studies are now underway to attempt to reduce exposure based on these findings.

Limitations of the VUDS

- Some patients are unable to void during VUDS
  - Due to a catheter in the urethra
  - Physical and psychological anxiety
  - Unsuitable voiding environment
  - Voiding position not suitable with normal
  - Crowded staff during the test

Who should undergo V-UDS?

- Neurogenic LUT dysfunctions
- Bladder outflow obstruction
- Congenital genitourinary anomalies
- Patients underwent genitourinary reconstruction

Who should undergo V-UDS?

- Neurogenic LUT dysfunction and voiding dysfunction in young people and women and,
- Possibly in persistent/recurrent incontinence in both men and women

Azuero J et al
Videourodynamics: Current indications, technique and considerations.
Arch Esp Urol. 2021 Sep;74(7):664-675.

If you do no have access to VUDS…

- It is not the end of the world!
- Perform a separate VCUG and combine with your UD findings.
- The absence of the urethral catheter may even result in better voiding.