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VIDEO-PELVIMETRIC APPROACH IN URODYNAMIC OF THE UPPER URINARY TRACT IS ALLOWING A NEW UNBIASED REPRODUCIBLE CLASSIFICATION OF UPPER URINARY TRACT OBSTRUCTIONS

Hypothesis / aims of study

So far examinations of urodynamic of the upper urinary tract consist in transvesical, retrograde examinations by ureteral stents (KIIL 1957, MELCHIOR 1980) with irritation and obstruction of the cavity-system or by percutaneous transrenal examinations (WHITAKER 1973). These observations must be critical scrutinized caused by their unphysiological examination conditions consisting unphysiological filling orders, unphysiological patient placement and mono luminal access without elimination of perfusion pressure.
To receive physiological conditions of measurement, high evidence and useful outcome we were pushed to use a new approach by Video-Pelvimetry leading to a new classification of upper urinary tract obstruction.

Study design, materials and methods

In 33 patients with upper urinary tract obstruction or after removed obstruction we performed Video-Pelvimetry realized by double luminal nephrostominal catheter (elimination of perfusion pressure), continuing filling orders with contrast medium by using different physiological filling rates, continuing evaluation of upper urinary tract by fluoroscope intermitted periodic observation, simultaneous registration of pelvic and intra abdominal pressure (transmitted by rectal probe), continuing control of patient sensations (under variable well defined filling rate with 2, 5,10 and 20ml/min). Ending point of measurements was acute flank pain, with definition of intra pelvine pressure at this point as pain point pressure.

Results

In the normal upper urinary tract after removing obstruction there is active isotonic renal pelvic contraction to clear out the contrast medium independent of the chosen filling rate (stage 0). An increased filling rate is answered by the cavity-system in form of increasing peristaltic frequency and increasing urine transport volume. The pain point pressure can not be reached even using a filling rate of 20ml/min.
In incomplete drilled compensated obstruction of upper urinary tract (stage I) there is an increasing intrapelvin pressure without reaching the pain point pressure by using filling rates of 2, 5 or 10ml/min. Compensation mechanisms are due by increased peristaltic frequency and urine transport volume again. The morphological observation of the cavity-systems shows a beginning dilation of renal pelvis with calices alterations.
In incomplete obstruction of upper urinary tract with decompensation (stage II) there is an increasing intrapelvin pressure until reaching the pain point pressure by $\Delta P > 15 cmH_2O$ dependent on the filling rate of 5 or 10ml/min with abnormal pelvine and ureterale peristaltic reaction. In fluoroscopy observation the cavity-system is presenting an abnormal dilation of renal pelvis and calices.
In total obstruction (stage III) of upper urinary tract the pain point pressure is reached in low filling rate conditions (even 2ml/min) with early increasing of intrapelvin pressure after fulfilling the extremely dilatated cavity system. In order to diagnose of ureteral occlusion no draining of into the bladder can be observed

Interpretation of results

(1) With the new Video-Pelvimetric approach to the Urodynamic of the upper urinary tract there is now an objective examination of the upper urinary tract available.
(2) By using different filling rates it is possible to discriminate a compensated (stage I obstruction) from decompensate (stage II obstruction) cavity system, permitting a direct and reliable conclusion of therapeutic procedures.
(3) The well defined examination conditions and the accurate classification of upper urinary tract obstruction represent a precise design for further studies about pharmacological influence of the upper urinary tract and renal pelvic or ureterale behaviour.

Concluding message

The Video-Pelvimetric is an exact instrument to examine the urodynamics of the upper urinary tract. It is more objective in categorizing upper urinary tract dysfunctions and pathologies, the effect of pharmaceuticals can be inspected, and the results in further studies can be more reliable for the treatment of the patients.

FUNDING: NONE
DISCLOSURES: NONE
HUMAN SUBJECTS: This study was approved by the Ärztekammer des Saarlandes and followed the Declaration of Helsinki Informed consent was obtained from the patients.