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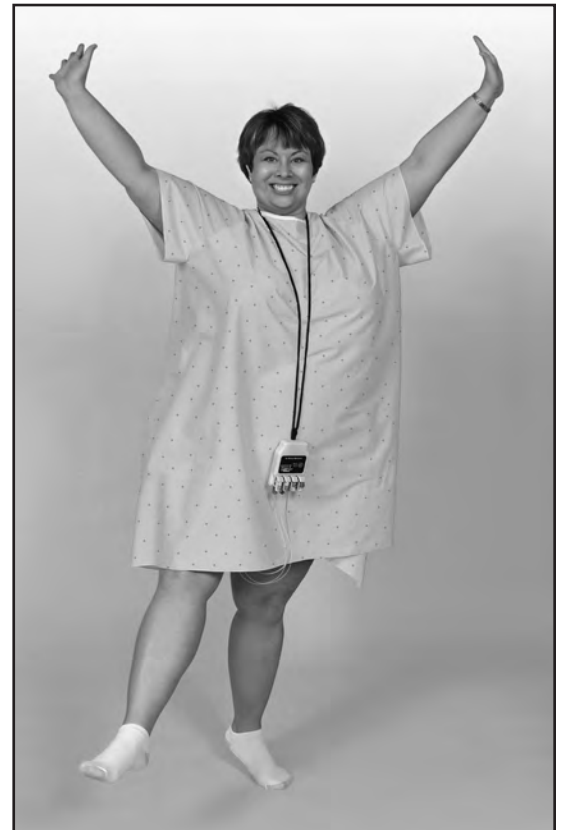
REPRINT

## NEW OPPORTUNITIES IN URODYNAMIC TESTING

“**M**ulti-channel urodynamic evaluations are significantly associated with changes in medical and surgical treatment recommendations in a referral population.” So concluded Renée Ward and colleagues in a recent study of the impact of urodynamic testing.<sup>1</sup> Urodynamic studies provide accurate diagnostic information: a path to patient satisfaction, improved patient communication regarding illness, and practice satisfaction for the physician.

The fact of urinary incontinence remains a clinical diagnosis. That is, physicians rightly rely largely on patients or caregivers to report when urinary incontinence is present. However, as advocated by Hermieu and colleagues, “Before any form of surgery for pure stress urinary incontinence, evaluation of bladder emptying by determination of maximum flow rate and residual urine is recommended. Further, the authors advocate, “A complete urodynamic assessment is recommended to investigate complex or complicated urinary incontinence, mainly in the case of: history of surgery for urinary incontinence, urgency with or without urinary leakage, severe urinary incontinence, voiding abnormalities, negative cough test, decreased bladder capacity, suspected obstruction or decreased bladder contractility, failure of first line treatment.”<sup>2</sup> Or, as advocated by Gormley, “Urodynamics are performed to determine if the incontinence is due to bladder or urethral dysfunction or both, to assess if the patient has a storage or emptying problem and lastly in an effort to identify patients whose upper tracts are at risk due to high bladder storage pressures.”<sup>3</sup>

With the aging of the population, there has been a growing need for urodynamic testing. Twenty years ago, the study was confined to



*The wireless TAMI™ system offers patients greater freedom of movement.*

larger hospital centers and was thought to be a difficult study performed by a few experts. But today, urodynamic investigation has become one of the most widely used tests in the urology setting. The need to improve and simplify the study so more physicians can utilize this valuable information is a common desire among today’s urologists.

Equipment and supply manufacturers have been on the forefront of finding methods to make urodynamics simpler and more accurate to perform. Computerized reporting and plug-and-play catheters are examples of easier methodology.

Now wireless communications between patients and machines is about to emerge as the latest significant improvement. Jim Seidmon, MD, (Professor of Urology; University of Minnesota, Department of Urology) has been using a new device called TAMI™ (trans-air method of investigation) from T-DOC Company, which removes the cable connections from the patient to the urodynamic machine. The TAMI system offers wireless communications for his pressure channels and surface EMG electrodes. Dr. Seidmon emphasizes the value of “untethering” the patient from the recording equipment. “It gave me what I wanted. It allowed me to do urodynamic testing the way I wanted to do it.” Dr. Seidmon continues, “The patient can now stand and move around. You get the three positions of the bladder: lying, sitting, standing. This gives me a whole new world of understanding what is going on in the bladder and urethra. We also get better feedback from the anal EMG patches.” Dr. Seidmon has found the ability to record both catheter data and EMG data remotely as a particular benefit. In his own experience the remotely recorded EMG data was even more accurate than that obtained with a directly connected machine. (The reasons for this may relate to analog to digital processing algorithms; however, this remains to be elucidated.) He continues, “The TAMI has offered improved sensitivity.”

Jill Peters-Gee, MD, (Professor of Urology, Women’s Health Specialty Care; University of Connecticut, Department of Urology) has been doing urodynamic studies for approximately 20 years. Her practice consists of approximately 85% of patients with voiding dysfunction, and her patients are almost exclusively women.

She recognizes the importance of incontinence as a symptom and as a life issue. In a particularly poignant observation she says, “Elderly patients

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**Jim Seidmon, MD**

are afraid that the incontinence will drive them into a nursing home.” They are afraid that odor or wetness will be intolerable to family and will lead to domiciliary care. In addition, in regards to women and sexual activity Dr. Peters-Gee observes, “They lack the desire for intercourse because of fear of leaking or odor. They have a leak, or a ‘total flood’ with orgasm.”

The majority of Dr. Peters-Gee twenty-year experience has been spent doing evaluations which employed water-filled catheters. In the last year and a half she has switched over to T-DOC® air-charged catheters and to the wireless TAMI system. She notes improved ease of use, accurate results and lowered concerns of possible infection (as compared to water-charged systems) as benefits to air-charged catheters.

In her academic position Dr. Peters-Gee has also found it useful to switch residents to use of air-charged systems. In regard to older systems she observes, “There is a lot more troubleshooting you have to do with a water-based system.”

Just as observed by Dr. Seidmon, Dr. Peters-Gee observes practical patient advantages to newer systems. With respect to patient convenience she notes, “It is much, much easier to get them to void with the catheters if they can do this in a private room.” Also, “The patient can walk to a totally separate room and get a more normal readout.” And, as she advises her residents, “If they [patients] are complaining of stress incontinence you want to reproduce it.” Thus, being able to test patients in varying positions and activities is critical to this pursuit.

In regard to the wireless system Dr. Peters-Gee has found no problems with electrical interference or signal dropout. She does note, “you do have to remember to recharge it.” Dr. Peters-Gee finds signal accuracy to be easily reproducible and more sensitive with less artifact.

Overall, asked if she would go back to earlier systems Dr. Peters-Gee says, “We’re a hundred percent satisfied.” She sees no reason to go back.

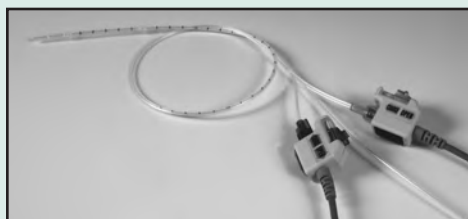
The advantages of the newer systems to patients is evident and influential. At another level, physicians themselves may find advantage to wireless systems. The physician may be in another room as data is retrieved. This allows some conveniences of the testing procedure.

Newer systems may also aid in productivity. With older systems urodynamic evaluation averaged approximately one patient per hour—due, in part, to increased amount of time required for calibration and cleanup. However, newer systems may allow productivity of two patients per hour. Water filled systems require calibration for both atmospheric and hydrodynamic pressure. An air-charged system is easily normalized to atmospheric pressure and the “column” of air within the system does not have

## AIR-CHARGED CATHETERS: AN ADVANCE

In 1923 Bonney was one of the first to record urethral pressures using an open-ended, fluid-filled catheter.<sup>4</sup> However, practical measurement limitations related to calibration difficulties in fluid-filled catheters impaired physician pursuit of this valuable information. Fluid-filled catheters may require significant setup time related to air bubbles in the catheter. Also, hydrodynamic pressure in a fluid-filled column produces further calibration requirements. Dr. Jill Peters-Gee notes, "The problem with the water transducer system is that you have to be very careful you don't have gel in the line, and there are potential infection issues." The latter are related to transducers in contact with the water column.

Later, catheter-mounted transducers were introduced by Karlson in 1953.<sup>5</sup> Various versions have been developed subsequently. Sensor-



*Air-charged catheters have become the standard in the U.S. for sensing physiologic pressures during urodynamic studies.*

tipped catheters employ a distally placed sensor which has the advantage of being located at the area of measurement—simplifying calibration. However, directional sensing artifacts, maintenance, and cost issues limit this technique. Directional sensing artifacts derive from the mechanical issue that a distal sensor "faces" one side of the catheter and is relatively insensitive in other directions. Alternatively air-charged balloon catheters may avoid some of these problems by placing the sensor proximally. And, the circumferential balloon of an air-charged catheter results in catheter-circumferential pressure measurements—thus avoiding some of the potential problems and inaccuracies associated with distal sensor, unidirectional-sensing catheters.

Timothy B. McKinney, MD, PhD and colleagues compared various measurement systems including: fiberoptic, microtip, water-charged and air-charged catheters.<sup>6</sup> In conclusion the authors note the air-charged catheters, "utilizes all the advantages and theory of water-filled balloons with none of the disadvantages of water-filled hydrostatic head pressure and frequency response". The authors further note in regard to air-charged catheters that, "the catheter is inherently inexpensive, easy to use ("plug and play") and is disposable." The study employed air-charged catheters by T-DOC. ♦

a weight which requires postural consideration. Further, disposable catheters result in quick clean up.

Finally, safety is improved by newer systems. As noted by Dr. Peters-Gee, there has been some concern about infection from water-filled catheters, and this is not present in the disposable air-charged catheters. In addition, freedom from multiple-tethering lines creates less concerns about a patient becoming entangled.

So, whether viewed from the vantage point of diagnosis, accuracy, patient convenience, provider convenience, safety, or practicality the newer tools of urodynamic testing improve the procedure. Patients seek relief and doctors are now better able to seek accurate diagnosis and accurate treatment. ♦

### To Learn More

For more information, call T-DOC at 1-866-TDOC LLC (1-866-836-2552), or visit the company's Web site at [www.tdocllc.com](http://www.tdocllc.com).

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