WORKSHOP M7 — LOW PRESSURE URETHRA: WHAT DOES IT MEAN?

Chair: Gunnar Lose, Werner Schäfer

FUNCTIONAL ANATOMY

Daniele Perucchini

No abstract available

BASIC BIOMECHANICS OF URETHRAL CLOSURE

Werner Schäfer, Aachen

I will discuss some aspects of the bio-mechanics of urethral closure function in a most basic, simplistic way, and will outline my problems with sophisticated models which I think are often misleading.

Most of my results may sound very theoretical and partly even speculative. Because communication between physicians, physiologists, anatomists and physicists, engineers is difficult, I will describe a mechanical approach in such a basic way that should be understandable and even applicable in general for clinical urodynamic investigation as well as for scientific conceptualization of lower urinary tract function. I will discuss the potential and limitation of simple mechanical concepts which are helpful, starting from a very basic level and describe their application in urodynamic research and clinic.

Only when we measure clearly defined parameter, such “urethral pressure” (see Neurourol Urodyn 21:258-260;2002), we will be able to perform signal quality control as described in GUP ” (see Neurourol Urodyn 21:261-273,2002). Therefore, we must clarify all physical, technical and mechanical aspects of our parameters before we can start a physiological interpretation. We should test our functional interpretations of anatomical findings or physiological investigations for agreement with the fundamental principles of physics and mechanics. Even very simple concepts alone such as the incompressibility of tissues and the equilibrium of forces allow wide-ranging theoretical conclusions on a microscopic and macroscopic level. I am convinced that such mechanical considerations are under-utilized in urodynamics, and that they should be used to guide anatomical/physiological/clinical/surgical investigations and can serve as reliable and objective controls. Some examples are:

1) Sphincter function: The consequences of different arrangements of more or less complete circular muscle fibers for sphincter function; the need for a central filler volume; the effects of sphincter diameter and amount of filler volume; the relation between sphincter size and closure pressure; the combination of circular and longitudinal muscle for optimal closure function; the interaction and co-ordination in space and time between the different muscles; the contribution of the lamina propria and blood volume.

2) *Abdominal pressure space:* The confusion of “pressure arrows” and direction of movement for the conceptualization of the pathophysiology of incontinence; the inadequate resolution in space and time of observation and interpretation of organ movement and deformation; the difficulty of abstracting causal relations from observed movements and deformations; the fact that there is no independent movement in an incompressible space; the importance of understanding the local equilibrium of forces in a three-dimensional space; the difficulty to identify the contribution of different structures separately, and the careful investigation for local pressure and pressure transmission differences; the problem of correct definition of “pressure transmission” and its precise measurement; the critical analysis of passive “pressure transmission” and distinction from active contractions; the detailed investigation of the anatomy and mechanical properties of the urogenital border zone.

3) *Pelvic Floor, Sphincter, and Slings:* The anatomical and mechanical integration of the urethral sphincter into the urogenital border zone; some aspects of the impact of pelvic floor descend and distension on closure function; the influence of sphincter mobility within the urogenital border zone; the equilibrium of forces between urethra and a sling; the mechanical influence of a sling and the static and dynamic situation; the relation between forces, sling geometry, and elasticity.

Schäfer: Some biomechanical aspects of continence function. Scand J Urol Nephrol. Suppl 207:44-60, 2001

CONVENTIONAL URETHRAL PRESSURE MEASUREMENT

Gunnar Lose

The term low pressure urethra (LPU) is not well-defined since different pressure parameters (MUP/MUCP), cut-off levels and techniques and circumstances of measurement have been used for the determination of LPU.
LPU does not distinguish between urethral “laxity” or “rigidity” (e.g. because of fibrosis). Thus, LPU does not provide pathophysiological insight and hence is a poor predictor or intrinsic sphincter deficiency.
The concept of LPU needs reappraisal.

IMAGING

Hans Peter Dietz

No abstract available

THE ELECTROPHYSIOLOGY OF THE URETHRA

Linda Brubaker

The urethra is an important, although overlooked, part of the continence system. Traditionally, surrogate urodynamic measures of sphincteric integrity have been used to estimate the neuro-muscular status. More direct measures of neuro-muscular integrity can be obtained with electrophysiologic measures including needle EMG, quantitative needle EMG, and current perception thresholds. This presentation will provide the participant with an overview of relevant literature. In addition, we will review the clinical indications for electrodiagnostic testing and the possibilities for further research in this field.