RELATIONSHIP OF XIPHO-PUBIC DISTANCE, WEIGHT, HEIGHT AND BODY MASS INDEX TO BASELINE INTRAVESICAL AND ABDOMINAL PRESSURES IN THE SITTING POSITION

Hypothesis / Aims of the Study:
While performing urodynamics the tester always begins by evaluating whether the urodynamic test values are plausible. When standard are followed, with the transducers zeros set to atmospheric pressure and placed at the level of the upper edge of the symphysis pubis, typical range for initial resting pressure values for intravesical pressure ($p_{ves}$) and abdominal pressure ($p_{abd}$) depends on the patients position [1]. If we consider the abdomen to be a semi-aqueous compartment and the thorax to be an air compartment, it is possible that the distance between xiphoid process and symphysis pubis (xipho-pubic distance) could be a determinant of baseline $p_{ves}$ and $p_{abd}$, and serve as an individual quality control measure. Further, body mass index has been shown to correlate with abdominal pressure and urinary incontinence in women [2, 3]. The aim of the study was to evaluate the relationship of xipho-pubic distance, weight, height, and body mass index to $p_{ves}$ and $p_{abd}$ in sitting position, and compare these pressures to the typical range values (between 15 and 40 cm H$_2$O) [1].

Study design, material and methods:
One hundred consecutive women with lower urinary tract symptoms candidates for urodynamic study were enrolled in a prospective descriptive study. Xipho-pubic distance, weight and height were measured, and body mass index was calculated [weight (kg) / height$^2$ (m)]. Conventional cystometry following “Good urodynamic practices” was done in the sitting position [1]. Baseline $p_{ves}$, $p_{abd}$ and $p_{det}$ were recorded blinded to previous data, after an equal cough signal and a live trace signal were confirmed. The relationship of xipho-pubic distance, weight, height and body mass index to $p_{ves}$ and $p_{abd}$ was studied using linear regression (with Pearson correlation coefficient calculation) and Student’s t-test. Statistical significance was defined as $p<0.05$.

Results:
One hundred women age 59.2 ± 13.3 (range: 15 – 81), parity 2.9 ± 1.6 (range: 0 – 10) were analyzed. Table 1 shows the general results of the variables evaluated. There was a significant correlation between $p_{ves}$ and xipho-pubic distance ($p < 0.0001$, $r = 0.50$), weight ($p < 0.0001$, $r = 0.61$) and body mass index ($p < 0.0001$, $r = 0.59$) and no correlation with height (Figure 1). Table 2 shows the results of $p_{ves}$ categorizing the variables. Only 3 patients had baseline $p_{ves}$ out of the typical range values in sitting position of 11, 12 and 41 cm H$_2$O respectively (xipho-pubic distance of 31, 23.5 and 34.5 cm; weight of 49.1, 41 and 97.5 kg; body mass index of 18.48, 18.72 and 35.81 kg/m$^2$, respectively). The difference between $p_{ves}$ and xipho-pubic distance was 3.8 ± 4.9 (range: -6.5 – 20). There was also a significant correlation between $p_{abd}$ and xipho-pubic distance ($p < 0.0001$, $r = 0.45$), weight ($p < 0.0001$, $r = 0.56$) and body mass index ($p < 0.0001$, $r = 0.58$) and no correlation with height (Figure 2). Only 2 patients had baseline $p_{abd}$ out of the typical range values of 9 and 9 cm of H$_2$O respectively (the first same two patients with $p_{ves}$ out of the range values).

Interpretation of results:
A clear relationship of $p_{ves}$ and $p_{abd}$ to xipho-pubic distance, weight and body mass index was demonstrated. Due to the wide range of difference between $p_{ves}$ and xipho-pubic distance, xipho-pubic distance can’t be used as an individual quality control measure before urodynamic testing. Differences in intestinal gas content could explain this result at least partially. Patients having $p_{ves}$ and $p_{abd}$ out of the typical range values are either underweight (or near) or severely obese. Moreover, obesity results in increased intravesical and abdominal pressures which can lead to weakening of the pelvic support structures, placing patients at higher risk for developing stress urinary incontinence.

Concluding message: There is a relationship of xipho-pubic distance, weight and body mass index to $p_{ves}$ and $p_{abd}$. Out of range values of $p_{ves}$ and $p_{abd}$ occur in underweight (or near) or severely obese patients.
References


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