INCIDENCE OF LOWER URINARY TRACT DYFUNCTIONS IN DIABETIC PATIENTS PLACED ON THE WAITING LIST FOR A COMBINED KIDNEY AND PANCREAS TRANSPLANTATION AND THEIR RELATIONSHIP TO THE SEVERITY OF DIABETES MELLITUS.

Hypothesis / aims of study
To assess the presence of lower urinary tract dysfunctions in diabetic patients placed on the waiting list for a combined kidney and pancreas transplantation.

Correlation of lower urinary tract dysfunctions with parameters of severity of diabetes mellitus.

Study design, materials and methods
From March 2014 to July 2016 were examined 71 patients placed on the waiting list for a combined kidney and pancreas transplantation in our department. Every patient underwent complex pre-transplantation examination in urology, diabetology, nephrology, ophthalmology and neurology. Measured lower urinary tract dysfunctions parameters:

1. uroflowmetry in patients with preserved diuresis whose minimal voiding volume is 150ml
2. filling cystometry (filling rate 25ml/min) - evaluated parameters:
   Cmax (ml): normal volume ≥ 90 ml
   Cmax (ml): normal rate ≥ 15 ml/s
   Qmax (ml/s), normal rate ≥ 15 ml/s
   Qave (mean 7 ml/s) GFR (mean 0.27), Compliance (ml/cm H2O) normal rate > 30 ml/cm H2O, presence of detrusor involuntary contractions
3. voiding cystometry - evaluated parameters:
   ● Obstruction: - men according to Bladder Outlet Obstruction Index (PdetQmax – 2xQmax), BOOI > 40 = obstructed;
   - women according to Blaivas-Groutz nomogram (obstruction is present if Qmax < 12 ml/sec combined with PdetQmax > 20 cm H2O)
   ● Hypocontractility: - men according to Bladder Contractility Index (PdetQmax + 5xQmax), BCI < 100 = hypocontractility
   - women according to formula: hypocontractility is present if Qmax ≤ 12 and at the same time PdetQmax ≤ 10

Measured diabetological parameters: glycated hemoglobin - HbA1c (mmol/mol), grade of autonomic neuropathy measured according to Ewing’s battery of cardiovascular tests (1 - borderline, 2 - manifest, 3 - severe).

Measured nephrological parameters: glomerular filtration - GFR (ml/s), proteinuria (g/24h), Creatinine measured according to formula: normal value: 85-100 mol/l, grade of renal impairment.

Measured ophthalmological parameters: visual impairment, grade of retinopathy, grade of autonomic neuropathy and grade of peripheral neuropathy.

For women was measured visual impairment, grade of retinopathy, grade of autonomic neuropathy and grade of peripheral neuropathy.

Results
We investigated 71 patients, 48 men and 23 women. From the data file we were interested to nine continuous variables - Cmax (average 310ml), compliance (average 96.27 ml/cm H2O), Qmax (average 13.44 ml/s), Qave (mean 7 ml/s) GFR (mean 0.27), proteinuria (mean 4.67g/24h) and HbA1c (average 72.51). BOOI value was measured only for men, and the average value was 18.98. Similarly BCI value, the average value was 100.10. Categorical variables were grade of chronic kidney disease, grade of visual impairment, grade of retinopathy, grade of autonomic neuropathy and grade of peripheral neuropathy. For women we measured the presence of obstruction and hypocontractility. In our group of patient we have not found any statistically significant correlations between urological parameters and diabetic parameters.

<table>
<thead>
<tr>
<th>Variable</th>
<th>number of patients with pathological value</th>
<th>average pathological value</th>
<th>range of measured pathological values</th>
<th>number of mens with pathological value</th>
<th>number of womens with pathological values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qmax</td>
<td>13</td>
<td>10,7 ml/s</td>
<td>4-14 ml/s</td>
<td>11 ( average 10,2ml/s )</td>
<td>2 ( average 13.5ml/s )</td>
</tr>
<tr>
<td>Cmax</td>
<td>46</td>
<td>226 ml</td>
<td>92-337 ml</td>
<td>32 (average 216ml)</td>
<td>14 (average 249ml)</td>
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<tr>
<td>compliance</td>
<td>25</td>
<td>14,3 ml/cm H2O</td>
<td>4,3 – 24,5 ml/cm H2O</td>
<td>18 (average 15 ml/cm H2O)</td>
<td>7 (average 12 ml/cm H2O)</td>
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<tr>
<td>involuntary contractions</td>
<td>3</td>
<td></td>
<td></td>
<td>3</td>
<td></td>
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<tr>
<td>obstruction</td>
<td>12</td>
<td></td>
<td></td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>hypocontractility</td>
<td>23</td>
<td></td>
<td></td>
<td>19</td>
<td>4</td>
</tr>
</tbody>
</table>
Interpretation of results
In our group of patients the great majority of patients have lower urinary tract dysfunctions which include decreased urinary bladder capacity, compliance, urinary bladder hypocontractility and obstruction of lower urinary tract. We have not found any statistically significant correlations between lower urinary tract dysfunctions and diabetic, nephrological, ophthalmological and neurological parameters.

Concluding message
We have found a large number of dysfunctions of lower urinary tract in patients placed on the waiting list for a combined kidney and pancreas transplantation. The most frequent dysfunctions are decreased urinary bladder capacity, lower compliance, urinary bladder hypocontractility and obstruction of lower urinary tract. We have not found any correlation between lower urinary tract dysfunctions and parameters of severity of diabetes mellitus. These results are probably caused by extremely advanced and extensive damage of tissue and organ systems in the patient group that is placed on the waiting list for a combined kidney and pancreas transplantation. To confirm a relationship between lower urinary tract dysfunctions and severity of diabetes mellitus it will be necessary to perform further studies in patients with earlier stages of diabetes mellitus.

Disclosures
Funding: NONE Clinical Trial: No Subjects: HUMAN Ethics Committee: Ethics Committee of the Institute of Clinical and Experimental Medicine and Thomayer Hospital Helsinki: Yes Informed Consent: Yes