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

Mokris J1, Zachoval R2, Ridzon P3, Lovasova V4, Koznarova V5

1. Department of Urology, Thomayer hospital, 3. Faculty of Medicine, Charles University in Prague, Czech Republic, 2. Department of Urology, Thomayer hospital, 1.and 3. Faculty of Medicine, Charles University in Prague , Czech Republic, 3. Department of Neurology, Thomayer hospital, Prague, Czech Republic, 4. Department of Transplant Surgery, Institute for Clinical and Experimental Medicine, Prague, Czech Republic, 5. Department of Diabetology, Institute for Clinical and Experimental Medicine, Prague, Czech Republic

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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

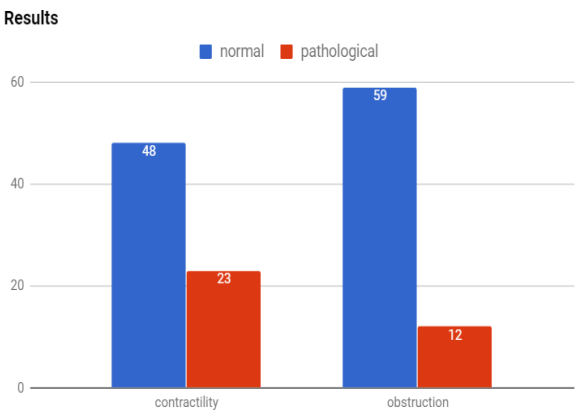
From March 2014 to July 2016 were examined 71 patients placed on the waiting list for a combined kidney and pancreas transplantation in our department. Every patient underwent complex pre-transplantation examination in urology, diabetology, nephrology, ophthalmology and neurology.
Measured lower urinary tract dysfunctions parameters:
1. uroflowmetry in patients with preserved diuresis whose minimal voiding volume is 150ml
- evaluated parameters: Qmax (ml/s), normal rate ≥ 15ml/s
2. filling cystometry (filling rate 25ml/min) - evaluated parameters:
Cmax (ml): normal volume > 350ml, Compliance (ml/cmH_2O): normal rate > 30 ml/cmH_2O, presence of detrusor involuntary contractions
3. voiding cystometry- evaluated parameters:
- Obstruction: - men according to Bladder Outlet Obstraction Index (PdetQmax – 2xQmax), BOOI > 40 = obstructed;
- women according to Blaivas-Groutz nomogram (obstruction is present if Qmax < 12 ml/sec combined with PdetQmax > 20 cmH_2O)
- 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

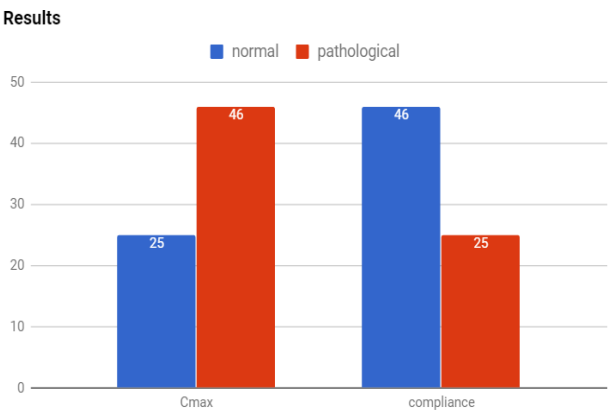
Measured ophthalmological parameters: visual impairment and blindness according to WHO (1 - mild visual impairment, 2 - moderate visual impairment, 3 - severe visual impairment , 4 - practical blindness, 5 - blindness)
Measured nephrological parameters: glomerular filtration- GFR (ml/s), proteinuria (g/24h), Creatinine
Measured diabetological parameters: glycated hemoglobin- HbA1c (mmol/mol) , grade of autonomic neuropathy measured according to Ewing's battery of cardiovascular tests (1 - border 2 - manifest, 3 - severe).
Measured neurological parameters: grade of peripheral neuropathy according to electromyography (1 - mild, 2 - moderate, 3 - severe)
To assess statistical significance between two continuous variables correlation coefficient and Spearman correlation test were used. Analysis of variance (or two sample t test) was used for comparison between continuous and discrete variable. For graphical representation scatterplots and boxplots were drawn.

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/cmH_2O), 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 neuropaty. For women was measured the presence of obstruction and hypocontraktility. In our group of patient we have not found any statisticaly significant correlations between urological parameters and diabetic parameters.
In the table below you can see the most common pathological urodynamic parameters in our group of patients.

	number of patients with pathological value	average pathological value	range of measured pathological values	number of mens with pathological value	number of womens with pathological values
Qmax	13	10,7 ml/s	4-14 ml/s	11 (average 10,2ml/s)	2 (average 13,5ml/s)
Cmax	46	226 ml	92-337 ml	32 (average 216ml)	14 (average 249ml)
compliance	25	14,3 ml/cm H_2O	4,3 – 24,5 ml/cm H_2O	18 (average 15 ml/cm H_2O)	7 (average 12 ml/cm H_2O)
involuntary contractions	3			3	-
obstruction	12			8	4
hypocontractility	23			19	4





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.