

DECREASE OF BLADDER CONTRACTILITY IS SLOWER THAN INCREASE OF FLOW AFTER PROSTATIC OBSTRUCTION SURGERY

Hypothesis / aims of study

Since we adopted a non invasive urodynamic technique (1) before and after surgical treatment of bladder outlet obstruction (BOO) in order to check the feasibility of the procedure and to find a predictive value for the outcome of the surgery, we found that shortly after surgery for prostatic obstruction the flow rate significantly improved but the detrusor contraction only slightly decreased. We now want to check what is happening after at least one year from the operation when many variants as inflammation or slow adaptation of the bladder to the new situation no more interfere with the results of these studies.

Study design, materials and methods

Patients waiting in our clinic for surgical intervention for Lower Urinary Tract Symptoms and prostatic enlargement were evaluated with a non-invasive pressure/flow measurement using a uroflowmeter and a penile cuff before surgery and 3 months and 1 year after the operation. We excluded from the study patients with indwelling catheter, bladder stones, high volume diverticula or reflux. We asked patients to fill in an International Prostatic Symptom Score (IPSS) questionnaire on the occasion of the examinations. We also took account of prostate volume before surgery (with abdominal or transrectal ultrasound) and the amount of tissue removed during surgery.

The cuff was placed around the penis and the subject asked to void without straining into the uroflowmeter connected to the cuff machine. Once voiding commenced the cuff was automatically inflated at 10 cm H₂O/sec until flow was interrupted or a safety cut off of 200 cmH₂O was reached. The cuff pressure (Pcuff) at which flow was interrupted provides a valid and reproducible estimate of isovolumetric bladder pressure, that is a measure of detrusor contraction strength. The cuff then automatically rapidly deflated with resumption of flow, allowing the process to be repeated until voiding was complete. Maximum values of Pcuff and maximum urinary urine flow rate (Qmax) were read from the continuous plot of flow rate and cuff pressure obtained for each void (1). The test together with IPSS (from which we extrapolated the question about quality of life QoL) and postvoiding residue (PVR) evaluations were repeated 3 months and at least 1 year after surgery in order to check the change of clinical and non invasive urodynamic parameters on short and long term using the pressure-flow nomogram.

Results

19 patients completed the 3 months follow-up, 17 completed the 1 year follow-up (1 patient is lost at follow-up and 1 patient died). So we used 17 patients for the statistical analysis. Results appear in the following table.

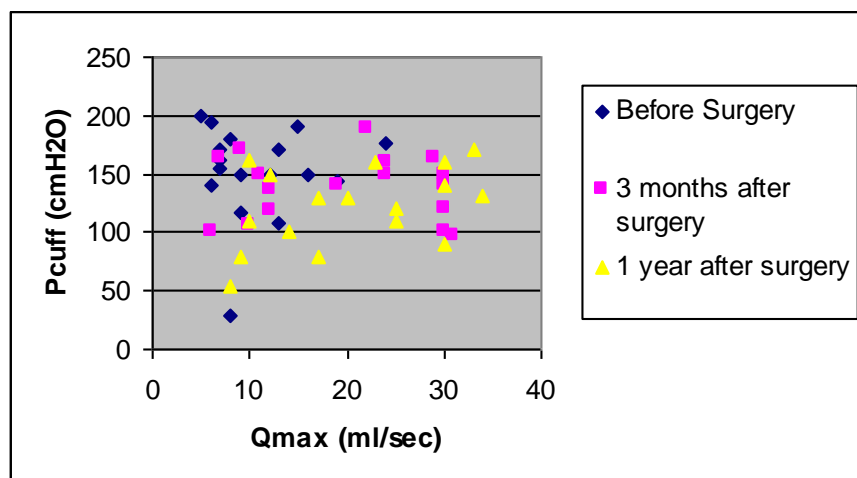
N°	Before						Type of surgery	Grams removed	3 months					1 year				
	IPSS	QoL	Prostatic vol	PVR	Pcuff	Qmax			IPSS	QoL	PVR	Pcuff	Qmax	IPSS	QoL	PVR	Pcuff	Qmax
1	24	4	113	174	150	12	MILLIN	90	1	0	115	140	19	1	0	250	130	17
2	23	5	150	182	200	5	MILLIN	75	3	1	159	118	12	2	1	0	90	30
3	29	6	30	191	190	15	TURP	10	17	4	23	189	22	5	0	0	80	17
4	17	5	69	121	170	7	MILLIN	50	7	1	4	164	29	5	1	40	171	33
5	13	3	98	50	140	6	TURP	70	7	2	128	170	9	8	2	6	100	14
6	8	6	127	487	180	8	MILLIN	90	4	1	20	107	10	16	2	100	54	8
7	9	2	40	300	108	13	TURP	15	7	1	80	97	31	4	1	0	131	34
8	22	5	90	97	162	7	MILLIN	20	6	4	50	163	7	14	5	0	162	10
9	21	5	117	119	150	9	MILLIN	70	1	1	60	136	12	0	0	0	130	20
10	29	4	63	180	29	8	TURP	30	7	2	58	120	30	9	3	0	80	9
11	10	0	28	80	155	7	TURP	50	2	0	0	140	30	2	0	0	120	25
12	18	3	93	70	149	16	MILLIN	80	6	1	0	150	24	4	0	100	110	25
13	19	5	80	80	177	24	TURP	30	2	1	0	160	24	1	1	0	160	23
14	15	3	65	70	143	19	TURP	30	4	1	0	150	30	4	0	0	160	30
15	13	4	70	40	117	9	TURP	20	5	1	160	150	11	4	1	86	110	10
16	15	5	120	80	170	13	MILLIN	90	6	2	0	100	6	2	1	0	150	12
17	31	5	40	100	194	6	TURP	10	4	0	25	100	30	1	0	26	140	30

Surgery performed was TURP in 9 cases and retropubic prostatic adenomectomy (Millin) in the other 8. Before surgery average IPSS was 19, 3 months and 1 year after surgery was 5, with highly significant difference ($p < 0,001$). Average QOL improved from 4 to 1 with a highly significant difference ($p < 0,001$) and remained stable after 1 year. Post-voiding residue reduced from an average of 142 ml before to 52 ml 3 months after surgery ($p < 0,01$) and 36 ml 1 year after surgery ($p = 0,002$). Average P_{cuff} and Q_{max} before surgery were respectively 152 cmH₂O and 11 ml/sec; 3 months after surgery were respectively 138 cmH₂O ($p = 0,24$) and 20 ml/sec ($p = 0,001$); 1 year after surgery were 122 cmH₂O ($p = 0,02$) and 20 ml/sec ($p < 0,001$).

Eventhough detrusor contraction did not reduced significantly 3 months after removal of BOO, it decreased significantly 1 year after. Highly significant improvement of IPSS and QOL score remained the same after 3 months and 1 year later. Unchanged improvement was also seen for PVR and Q_{max}.

Interpretation of results

Symptoms improvement and reduction of PVR occurred already 3 months after surgery and remained stable after 1 year. Concerning urodynamic parameters as it is shown in the following nomograms, plotting Q_{max} against P_{cuff}, Q_{max} improvement is seen immediately after 3 months from surgery for prostatic obstruction and remain stable after 1 year. Decrease of bladder contractility is happening much more slowly, reaching statistical significance only after 1 year. The rapid improvement of Q_{max} is certainly due to the release of the obstruction, while bladder contractility is reducing slowly probably due to intravesical slow change of many chemical factors influencing the detrusor fiber contraction.



Concluding message

Non-invasive urodynamic evaluation of BOO has been shown to improve outcome prediction for men undergoing prostatic adenomectomy (2). Our study also shows that traditional clinical outcome of BOO surgery is in agreement with the changes of the non-invasive urodynamic evaluation. Among these changes, we observed major and more rapid improvement of Q_{max} while the bladder pressure reduced significantly only after a follow up of at least 1 year. Therefore the slope of the equivocal area distinguishing obstructed from unobstructed patients using the ICS plot for definition of obstruction should be thinner and steeper when using P_{cuff} or isovolumetric bladder pressure.

References

1. McIntosh SL et al. Noninvasive assessment of bladder contractility in men. J Urol. 2004, 172:1394-8.
2. Harding C et al. Predicting the outcome of prostatectomy using noninvasive bladder pressure and urine flow measurements. European Urology 2007, 52:186-192

Disclosures

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