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TRANSURETHRAL PROSTATECTOMY: REVIEW OF 1,000 PATIENTS USING DISTILLED WATER AS IRRIGATING FLUID AND THE SUPRAPUBIC SHUNT

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ABSTRACT

Objective: To review in 1000 patients the results of the transurethral resection of the prostate (TURP) using distilled water as irrigating fluid and the suprapubic shunt to allow a low bladder pressure procedure.

Material and Methods: 1000 patients 36 to 94 years old (average 65 years) with benign hyperplasia submitted to TURP between 1985 and 1999 were retrospectively evaluated for the immediate postoperative complications and the long-term results. The degree of bladder outlet obstruction symptoms (BOO) was the most decisive factor for the resection of the prostate. The Nesbit technique of resection was followed and distilled water was used.

Results: Immediate complications in 1000 procedures were: re-insertion of the urethral catheter in 3.8% of them; re-examination for hemorrhage in 1.8%; re-resection in 0.8% and acute renal failure in 0.2%. Blood transfusion was necessary in 0.9% of them, rectum-prostatic fistulae, ileal or prostatic perforation occurred in 0.1% each, and mortality rate was 0.3%. Incidental carcinoma was found in 4.2%. Median follow-up of 32 months (4-168 months) in 803 patients showed bladder neck stenosis in 8.72%, acute epidydimitis in 3.73%, a new TURP in 1.37% and urge or stress incontinence in 1.25%. Patient's satisfaction was 94.23% after solving the bladder neck/meatal stenosis and the epididymitis. A group of 197 patients followed at least from 5 to 14 years revealed that satisfaction was maintained in 91.6%, a new TURP was necessary in 2.8%, and prostatic carcinoma was detected in 3.9% of them.

Conclusion: The TURP for the benign prostatic hyperplasia using distilled water and the suprapubic shunt is a safe, efficient procedure that has few major complications, a low re-operation rate and satisfactory results up to 14 years comparing favorably with other minimally invasive therapies.

Key words: prostate; prostatic hyperplasia; prostatic neoplasms; prostatectomy; endoscopy Braz J Urol, 27: 215-221, 2001

INTRODUCTION

During the last decade many minimally invasive treatments for benign prostatic hyperplasia (BPH) have been introduced as well as the results and complications of the transurethral resection of the prostate (TURP) were evaluated (1) and compared to them. Transurethral microwave termotheraphy (TUMT), visual laser ablation (VLAP), transurethral electrovaporization (TUVP), transurethral needle ablation (TUNA), transurethral incision of the prostate (TUIP) are examples of the wide range of possible therapies. No agreement has been reached about the safer, reproducible, most effective, less expensive and most durable treatment.

The evaluation of the TURP complications and results using the contemporary tools, distilled water as irrigant and the suprapubic shunt to allow a low fluid pressure operation is necessary in our country. Outcome data for transurethral prostatectomy in the 1990's are lacking (2).

| Pathology | | Concomitant Proc | Concomitant Procedures | | |
|-----------------------|------|------------------------------|------------------------|--|--|
| Urethral stricture | 8.0% | Internal urethrotomy | 11.7% | | |
| Acute retention | 7.1% | Urethral meatotomy | 8.4% | | |
| Bladder lithiasis | 4.4% | Bladder lithotripsy | 3.5% | | |
| Abscess/prostatitis | 3.7% | Inguinal herniorraphy | 1.2% | | |
| Prostatic residuals | 3.2% | Scrotal surgery | 1.2% | | |
| Chronic renal failure | 1.0% | Bladder diversion / Incision | 0.7% | | |

 Table 1 - Associated pathologies and concomitant procedures.

MATERIAL AND METHODS

From 1985 to 1999 we retrospectively evaluated 1000 patients 36 to 94 years old (average 65) that underwent TURP for BPH because of severe obstructive and irritative symptoms. The age distribution was: 36-49 years (3.4%); 50-59 years (21.7%); 60-69 years (46.2%); 70-79 years (23.0%); 80-89 years (5.2%) and 90-94 years (0.5%). The International Prostate Symptoms Score (I-PSS) and the prostate specific antigen (PSA) were not in use at the beginning. Patient workup comprised a list of urologic complaints followed by physical and rectal examination, laboratory analysis, abdominal ultrasound or a urogram. Urethrocystography or urethrocystoscopy, fluxometry or complete urodynamic evaluations were used in selected cases before and/or after the TURP. The American Society of Anesthesiology (ASA) index for the surgical risk was ASA I in 44.5% of the patients, ASA II in 41.5%, ASA III in 12.8% and ASA IV in 1.2%.

The associated pathologies as well as the concomitant procedures are listed in Table-1.



Figure - Weight of tissue resected.

The TURP was performed under epidural or spinal anesthesia and 20 mg of furosemide were given in the middle of the procedure. The Nesbit technique for the resection was used always attempting a complete adenomectomy. Through a trocar puncture, the suprapubic bladder shunt was established allowing the irrigating fluid to drain by gravity. The irrigating water height was 30-45 cm above the patient mid-axilar line. Usually the TURP was performed using a 26F resectoscope. An internal urethrotomy or meatotomy was done whenever it was felt to be necessary to prevent postoperative (PO) urethral stenosis. Distilled water absorption during the TURP was estimated considering patient pre and postoperative weight, blood loss and fluids administered.

The Figure shows the weights of the resected prostates.

At the end of the resection, the anesthesiologist was instructed to raise the patient blood pressure looking for a better homeostatic control. Urinary stream was tested by pressing the full bladder (Credé) and an urethral 22F Foley was inserted. Whenever irrigation on the first day was necessary, it was done by a suprapubic 16F Foley catheter left through the suprapubic abdominal wall. This catheter was removed the next day and the urethral catheter on the second or third day. Average hospitalization period was 4 days. Cephalosporine was administered during the hospitalization. Norfloxacin or sulfa-trimethoprin was prescribed for 3 weeks after discharge. Patient was scheduled to return between 4 to 6 months and then yearly for the prostatic cancer prevention.

Immediate PO complications are related to 1000 patients. A median follow-up of 32 months (4-168 months) was possible in 803 patients. Among them, a group of 197 patients followed during a minimum of 5 years up to 14 years was evaluated for long-term results.

Follow-up consisted of the patient evaluation of his satisfaction about the TURP results related to voiding and sexual performances as well as by physical and rectal examination. A good result meant voiding with a good and continent stream and no frequency, dysuria, or infection. Retrograde ejaculation was consistently explained before the TURP. Office urethrocistoscopy and urinalysis was usually done for the patients with miccional complaints. Retrograde and miccional urethrocystography or urodynamic evaluation was done in selected cases.

RESULTS

Table-2 lists the immediate complications in 1000 patients.

Absorbed water was estimated as 500 ml in 0.6% of the procedures; between 500-1500 ml in 0.6%; between 1500-2000 ml in 0.1% and more than 2000 ml in 0.2%. No increase in the postoperative weight occurred in 98.5% of the patients.

The suprapubic/abdominal pain soon after the resection was indicative of extravasation of fluid in the abdominal wall, in the trocar puncture or in the

| Re-insertion of the urethral catheter | 3.8% |
|---------------------------------------|------|
| Endoscopic revision for hemorrhage | 1.8% |
| Suprapubic/abdominal pain | 1.5% |
| TURP revision for obstruction | 0.8% |
| Transient hyperazotemia | 0.8% |
| Deaths | 0.3% |
| Peritoneal dialysis | 0.2% |
| Rectum-prostatic fistulae | 0.1% |
| Prostatic perforation – SP drainage | 0.1% |
| Ileal repair – trocar perforation | 0.1% |
| Myocardial infarction | 0.1% |
| Total | 9.6% |
| | |

peri-prostatic tissue. One patient required a suprapubic peri-prostatic surgical drainage due to the intensity of the symptoms and abdominal rigidity (prostatic capsule perforation with water infiltration). Blood transfusion was necessary in 0.9% (9/1000) of the patients. One 400 ml unit in 7 patients and 2 units in 2 other patients. The urethral catheter was re-inserted for intense dysuria or by leakage of urine through the suprapubic orifice.

Ileal repair was done in the second PO day in one patient whose trocar puncture was misplaced (ileal perforation). The rectum-prostatic fistula was caused by an over-resection that did not seal with the indwelling urethral catheter requiring a suture and temporary colostomy.

The three deaths were due to rupture of an abdominal aortic aneurysm, a brain stroke and a vasculogenic shock of uncertain cause.

No immediate complications occurred in 90.4% of the patients and incidental carcinoma was observed in 4.2% of the patients. No total incontinence was noted.

Table-3 lists the complications on 803 patients that were followed between 4 and 168 months (mean follow-up of 32 months).

The patient's satisfaction with the TURP was 82.63%. After the incision of the meatal or bladder neck strictures and the treatment of the epididymitis it reached 94.23%. Sexual dysfunction related to the procedure was detected in less than 4% of the healthy patients.

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Table 3 - Complications on 803 TURP with a mean follow-up of 32 months.

| Bladder neck stenosis | 8.72% |
|--|--------|
| Epididymitis | 3.73% |
| TURP for new obstructions (4-14 years) | 1.37% |
| Urethral stenosis | 1.25% |
| TURP for residual tissue (4-9 months) | 0.80% |
| Urethral meatal stenosis | 0.75% |
| Urge incontinence | 0.75% |
| Stress incontinence | 0.75% |
| Total | 17.37% |

The long-term results in the group of 197 patients that have had a follow-up over 5 years and up to 14 years are shown in Table-4.

Table 4 - Long-term results on 197 patients.

| Miccional satisfaction | 91.6% | |
|---------------------------|-------|--|
| Miccional no satisfaction | 5.6% | |
| TURP for new obstructions | 2.8% | |
| Prostatic carcinoma | 3.9% | |
| | | |

Miccional satisfaction means I-PSS between 0-4. Miccional unsatisfaction were related to urgency, urge-incontinence, stress incontinence, sexual dysfunction and re-operations.

DISCUSSION

Discussions about the results and complications of the TURP were raised by Mebust cooperative study (1) on 3885 patients when new options of minimally invasive methods were being introduced. The label of "gold standard" for the TURP was questioned. At the same time as the continuous-flow resectoscope, the Hopkins rod-lenses, the fiber-optic light transmission, the video-surgery facilities, the solid-state digital power supply were being improved, new data about the TURP results were desirable.

The comparative results from the Mebust study (1989) (1), Borboroglu (520 patients between 1991-1998) (2) and ours, are shown in Table-5.

It is well known that the use of water for irrigation during the TURP carries a risk of hemolysis should absorption occur (3-6). However water has advantages over other irrigants: the visibility is slightly better as blood in the operating field is hemolysed and, if absorbed, water molecules are rapidly distributed in the total body water, resulting in less hypervolemia and less hyponatremia than with glicine and mannitol solutions (7). The absorption of 3% mannitol seems to have fewer neurological symptoms than 1.5% glicine (8). Water was considered safe as irrigant for transurethral electrovaporization of the prostate (9).

| Complications % | Mebust (1) | Borboroglu (2) | Present Study |
|--------------------------------|------------|----------------|---------------|
| Grams of resection (mean) | 2.2 | 18.8 | 43 |
| Transoperative period | | | |
| Cardiac arrhythmia | 1.1 | 1.3 | - |
| TURP syndrome | 2.0 | 0.8 | 0.9 |
| Blood transfusion | 6.4 | 0.4 | 0.9 |
| Myocardial infarction | 0.05 | 0.2 | 0.1 |
| Immediate postoperative period | | | |
| TURP revision | 6.5 | - | 0.8 |
| Discharge with catheter | 2.4 | 7.1 | 0.2 |
| Catheter re-insertion | - | - | 3.8 |
| Retention by clots | 3.3 | 1.3 | 1.8 |
| Urologic infections | 2.3 | 2.1 | 3.7 |
| Deaths | 0.1 | 0.0 | 0.3 |

Table 5 - Transoperative and immediate postoperative complications.

Using distilled water as irrigant fluid and the suprapubic shunt by a trocar (10) we had 1.5% of fluid absorption greater than 500 ml, 0.7% of transient TURP syndrome (vomiting, restlessness, illness sensation, oliguria, etc), 0.2% of acute renal failure requiring peritoneal dialysis, and no deaths. The incidence of the syndrome in recent studies not using distilled water ranges from 0 and 10%, the severity of symptoms being mild up to 2.000 ml of fluid absorption and its mortality rate being 0.2-0.8% (5,11).

Monitoring the hemolysis/water absorption with the 2% ethanol added to the irrigating water and breath analyzing its concentration through the alcolmeter, it was possible to confirm the greater absorption at the end of the TURP, and that in most cases there was yet haptoglobin available to "buffer" the free-hemoglobin in the plasma. The complex formed by both molecules is eliminated by the reticulo-endothelial system, the normal way to clear the blood of free-hemoglobin (7). The authors suggest that the presence of ethanol at breath monitoring could be a "warning-signal" for the training resectionist to end quickly or stop the procedure. The stop level was settled by an ethanol level equal or greater than 0.25‰ on the alcometer (7).

The method we have been using seems to compare favorably in regard to this syndrome (5,11). It also allows a faster TURP even in the presence of a contracted bladder. The complications were related to one case of ileum perforation (0.1%) and a few cases of suprapubic pain (1.2%).

The transfusion rate was 6.3% in the 80's series (1), and near 1% in the 90's best series (2). Transfusion was necessary in 0.9% of our patients mainly those with larger (> 80 g) and more vascularized prostates. It is a fact that there is now a general tendency for fewer blood transfusions.

The use of antibiotic remains controversial for the patients having a negative culture. For patients having a pre-existing infection, studies show that the risk of bacteriuria ranges from 30 to 75% if no antibiotic is administered at surgery versus 2 to 15% if it is given perioperatively. Studies involving patients without preoperative infection show a decrease from 2 to 10% to almost none postoperative infection if perioperative antibiotics are used. The period of antibiotic use after hospital discharge usually is of 6-7 days (11). Our custom of prescribing 3 weeks of fluoroquinalone or sulfa-trimethropin is being re-evaluated.

Some late complications are listed in Table-6 including the Nudell-Cattolica update (11), a revision on 1486 cases by Horninger in 1996 (12), Rodrigues (13) and our findings.

The high incidence of bladder neck stenosis in our study occurred mainly in small prostates (14), when the muscular fibers of the bladder neck were over-resected or desvascularized prostatic tissue was left in this region, leading to a fibrotic tissue. The incidence in the literature is 0.5-3.0% (6,11).

Urethral stenosis was prevented by inserting the resectoscope sheath without tension and by using the Ottis internal urethrotomy whenever necessary. The incidence of this complication was 3.1% in 2003 patients reviewed by the Agency for Health Care Policy and Research (AHCPR) BPH guidelines (12).

A second TURP was done in 0.8% of the 803 patients caused by incomplete resection usually at 4-9 months. At 9 months to 4 years, no re-operations were done, and it was necessary in 1.37% in the period between 4-14 years. Among the 197 patients that were followed for at least 5 to 14 years there was a 2.8% incidence of re-operations showing that this rate increases with time. Sidney et al. reviewing almost 8000 patients in northern Califor-

| Complications % | Nudell (11) | Horninger (12) | Rodrigues (13) | Present Study |
|-----------------------|-------------|----------------|-----------------------|---------------|
| Bladder neck stenosis | 0.5 - 3.0 | 1.9 | - | 8.7 |
| Urethral stenosis | 1.9 - 3.1 | 3.7 | 6.3 | 1.2 |
| Stress incontinence | 1.0 - 2.0 | - | 8.3 | 0.5 |

 Table 6 - Some late complications of the TURP.

nia submitted to the TURP found 1.3% of re-operations in one year, 4.2% in 5 years and 7.6% in 8 years (12). Lu-Yao et al. found in 285.000 Medicare patients 5.4–5.7% in 7 years (12).

Incidental carcinoma in the resected tissue is decreasing as reported by Mebust = 22%(1989)(1); Estey = 15% (1993)(15); Horninguer = 7.5% (1996)(12); Borboroglu = 6.3% (1999)(2), and ourselves = 4.2%. The widespread use of the prostatic specific antigen (PSA) will probably bring this incidence to a lower level. Our follow-up detected 3.9% of new cases of prostatic carcinoma in 807 patients.

Rodrigues (13) evaluated 237 patients with pre and post-TURP urodynamics. The patients were divided in two groups: one, the clearly obstructed, and the other comprising the indeterminate and the non-obstructed. The I-PSS was not different in the two groups. The detrusor median voiding pressure fell significantly in the first group, but also fell in the latter (13). The pre-op maximum flow-rate in the group was 7.75 ml/s and it was 18.49 ml/s after the TURP. The figures for the obstructed group were 6.89 ml/s pre and 19.95 ml/s post. For the second group, they were 7.14 ml/s pre and 16.45 ml/s post. The difference between the 2 groups was not statistically significant (p = 0.14). It is now understood that the urodynamic findings do not strictly correlate with the symptoms (15). Nevertheless, pre-op. urodynamic evaluation is paramount in patients with intense irritative symptoms and for the 10-15% with persistence of symptoms after the TURP. Detrusor instability can be found in up to 67% of them (6).

Patient's satisfaction with the TURP reaches 80-90% (1,12,15) and our finding of 91.6% in the 197 patients followed at least for 5 up to 14 years confirms that. The dropout of patients during the follow-up seem to us to be caused by many possible factors: satisfactory efficiency of the TURP, occurrence of new diseases, better urological assistance in the region they live, among others.

Although some minimally invasive therapies may have acceptable results, our concern is that longterm follow-ups are lacking and higher re-operation rates are expected. A very good review of the available laser techniques concludes that VLAP was less effective than TURP and had a higher re-operation rate at 18 months, and that evidence does not support the conclusion that VLAP should be adopted as a preferred alternative to TURP. Also that Holmium laser resection of the prostate (HoLRP) is time-consuming and requires considerable training (16).

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