

THE LEARNING CURVE IN TRANSURETHRAL RESECTION OF PROSTATE (TURP) – THE EXPERIENCE OF EIGHT YOUNG UROLOGISTS DURING A SIX-YEARS PERIOD

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REZUMAT

Introducere și obiective: Scopul lucrării noastre a fost de a evalua rezultatele rezecției transuretrale a prostatei (TURP) în perioada de învățare, în cazul a opt tineri urologi din clinică și de a aprecia gradul în care experiența personală influențează rezultatele imediate și tardive ale TURP. De asemenea, am căutat să determinăm numărul minim de proceduri după care incidența complicațiilor intra- și postoperatorii sunt apropiate de cele descrise în literatură pe serii mari de pacienți.

Material și metode: Am analizat retrospectiv 536 proceduri TURP efectuate de cei opt urologi tineri de-a lungul unei perioade de șase ani. Au fost urmăriți următorii parametri: vârsta, volumul estimat al prostatei (prin ecografie suprapubică), greutatea țesutului rezecat, durata rezecției, complicațiile intra- și postoperatorii și rata de re-TURP.

Rezultate: Numărul de proceduri TURP efectuate de cei opt urologi a crescut de la 25 (în primul an) la 200 (în al șaselea). Greutatea țesutului rezecat a crescut de la 20.3 grame la 29.6 grame. Durata rezecției s-a redus de la 51 minute la 40 minute. Complicațiile intraoperatorii au fost reprezentate de: perforarea capsulei prostatice și sângerare intraoperatorie severă. Conversia la chirurgia deschisă a fost necesară la un pacient. Rata de re-TURP a scăzut de la 12% la 4.5%. Incidența sindromului TUR a scăzut de la 2.6% (în primul an) la 1.5% (în al șaselea an). Durata spitalizării postoperatorii a scăzut de la 4.5 zile la 3.5 zile.

Concluzii: Hands-on training-ul este cea mai eficientă metodă de a deprinde tehnica TURP. Curba de învățare este relativ lungă, cu un număr mai mare de incidente și complicații la începutul perioadei de învățare.

Cuvinte cheie: TURP, adenom de prostată, curba de învățare

ABSTRACT

Introduction and Objectives: The aim of our study was to evaluate the results of TURP performed in our department by eight young urologists during their learning curve, to assess how experience influences the quality of resection, intraoperative and postoperative complications and to appreciate which would be the minimum number of procedures until gaining satisfactory skills.

Material and Methods: During a six years period, eight urologists performed 536 TURP. We analyzed these cases by following: age, estimated prostate volume (suprapubic ultrasonography), weight of resected tissue, time of resection, intraoperative complications, postoperative complications, re do TUR rate (for retention of urine after removal of catheter or for postoperative gross hematuria), length of hospitalisation.

Results: The number of TURP procedures performed by the eight urologists increased from 25 (in the first year) to 200 (in the sixth year). The weight of resected tissue slightly increased from 20.3 grams to 29.6 grams. The time of resection decreased from 51 to 40 minutes, with a weight/time ratio increasing from 0.4 gr./min. to 0.74 gr./min. The intraoperative complications decreased as follows: perforation of the prostate capsule: from 4% to 1% and severe intraoperative bleeding from 4% to 1%. Conversion to open surgery (caused by severe intraoperative bleeding not responsive to endoscopic hemostasis) was necessary only in one patient. The rate of re TURP procedures (for acute retention of urine after removal of catheter or for postoperative gross hematuria) decreased from 12% to 4.5%. The TURP syndrome rate was 2.6% (in the first year) and 1.5% (in the sixth year). The length of postoperative hospitalisation decreased from 4.5 days to 3.5 days.

Conclusions: The “hands-on training” is the most appropriate way to achieve satisfactory skills in TURP. As in other urological procedures, the first steps are difficult, with a relative large number of complications and reinterventions. Experience leads to better results.

Key Words: TURP, BPH, learning curve

INTRODUCTION AND OBJECTIVES

It is credited that the first transurethral operation to relieve bladder outlet obstruction has been performed by Ambroise Pare (in the 16-th century) who used a curette and a sharpened hollow sound to shear off urethral strictures.¹

Introduced in practice in 1943 by Nesbit,¹ transurethral resection of prostate (TURP) suffered improve-

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ments both on technical aspects (equipment of better quality including fiberoptic lighting system, wide angle lenses, constant flow-low pressure resectoscopes, video equipment, lubricating jelly, irrigating fluids) and on surgical technique which has been successively modified and improved.²

Thus, TURP steadily became a safer and more effective alternative for surgical treatment of benign prostatic hyperplasia (BPH), replacing step-by-step classical open prostatectomy. Nowadays, TURP represents more than 90% of surgical procedures for treatment of BPH in western countries, being considered as “the golden standard”.

In our department, TURP was introduced in 1981 and last year represented more than 92% of surgical procedures for the treatment of BPH.

Once the standard equipment for transurethral resection is available, a question raises, concerning the number of procedures which are necessary to achieve satisfactory skills. How long the learning curve, until obtaining results comparable with those from the literature? To analyze these aspects was the aim of our study.

MATERIAL AND METHODS

In this study we retrospectively analyzed 536 TURP procedures performed by eight young urologists, from their first procedures, during a six years period. All procedures have been performed in the same conditions, using Ch24 or Ch28 continuous flow (Iglesias type) Storz resectoscopes (Karl Storz Endoskope, Tuttlingen, Germany) with sterile water as irrigating fluid. TURP procedures were performed under spinal anesthesia (98.5%) and, rarely, using epidural anesthesia (1.5%).

The charts and surgical report files of all the above mentioned cases were analyzed focusing on the following aspects: age, estimated prostate volume (by suprapubic ultrasound), weight of resected tissue, resection time, intraoperative complications, postoperative complications, re-do TURP, length of hospitalization.

The suprapubic ultrasound is considered in the literature as the routine procedure to assess the prostate volume and the values obtained can be considered reliable since all the eight urologists have had at least 2 years of previous experience in this type of examination. To assess the weight of resected tissue, weighting of resected tissue is mandatory.

As the number of procedures per year significantly differs and from the practical point of view it is important to evaluate the tendency of results and complications during the training period, we considered that

the most appropriate way is to directly compare the results (in percents) for each item.

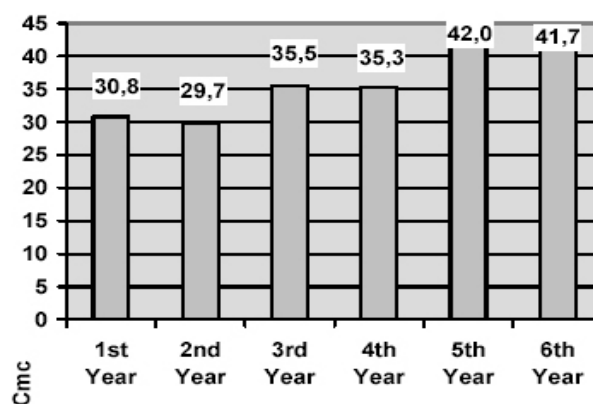
RESULTS

The number of procedures during the six years period increased from 25 (1-st year) to 200 (6-th year), as follows: 38 cases (2-nd year), 39 cases (3-rd year), 79 cases (4-th year) and 155 cases in the 5-th year.

The mean age of the patients ranged between 67.4 and 69.1 years.

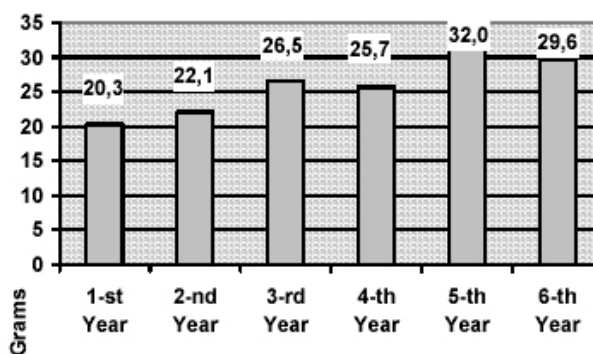
Using suprapubic ultrasound examination, the estimated prostate volume increased from 30.8 cmc (in the first year) to 41.7 years (in the sixth year). (Figure 1)

Figure 1. The estimated volume of prostate (by suprapubic ultrasound) before TURP



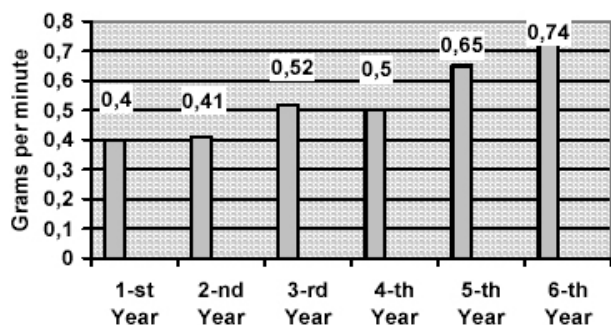
The mean weight of resected tissue (in grams) increased from 20.3 grams (1-st year) to 29.6 grams (6-th year) as is shown in Figure 2.

Figure 2. The weight of resected tissue



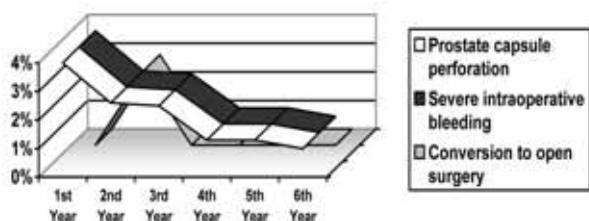
The mean time of resection slowly decreased from 51 minutes (1-st year) to 40 minutes (the sixth year), as follows: 54 min (year 2), 51 min (year 3), 51 min (year 4) and 49 min (year 5). It is obvious that this happened in conjunction with increasing of the weight of resected tissue as shown above, thus, a steadily increase in the speed of resection (from 0.4 grams per minute in the first year to 0.74 grams per year in the sixth year) were noted, as results in Figure 3.

Figure 3. Variations of the speed of resection (by years)



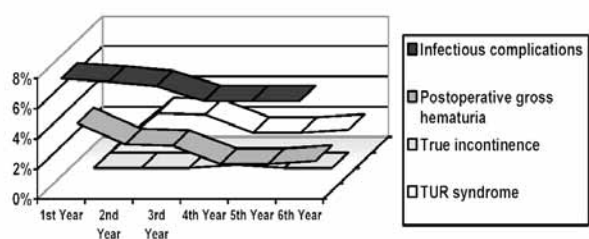
Intraoperative complications were represented by: perforation of the capsule, severe intraoperative bleeding and conversion to open surgery. The incidence of these complications, detailed by years is represented in Figure 4.

Figure 4. Intraoperative complications during the learning curve



Postoperative complications were represented by: fever (over 38.5 Celsius degrees), postoperative gross hematuria, TUR syndrome, acute urinary retention after catheter removal and urinary incontinence. The incidence of these complications, detailed by years, is presented in Figure 5.

Figure 5. Postoperative complications during the learning curve



Endoscopic hemostasis due to gross postoperative haematuria was necessary in 4% of cases (in the first year) and decreased to 1% (in the 6-th year): 2.6% (2-nd year), 2.5% (3-rd year), 1.3% (4-th year) and 1.3% (in the 5-th year).

The re-do TURP rate decreased from 8% (in the first year) to 3.5% (in the sixth year) as follows: 7.8% in the second year, 7.5% in the third year, 6.5% in the fourth year, 3.9% in the fifth year.

Length of postoperative catheterization decreased from 4.5 days (in the first year) to 3.5 days in the sixth days.

DISCUSSIONS

It is widely accepted that for TURP, spinal anesthesia is a safe and effective alternative, which offers enough comfort both to surgeons and patient.³ For the patients with a poor health status, epidural anesthesia should be considered as an alternative.⁴ TURP under local anesthesia has been reported in 1977 by Mc Gowan and Smith³ and thereafter by Birch et.al.⁵ who presented a series of 100 men who underwent TURP under local anesthesia supplemented with intravenous sedation. They did not find any differences between regional and local anesthesia in terms of blood loss, complications and perioperative mortality, but the average weight of resected tissue was lower in local anesthesia group (11 grams) compared with regional anesthesia group (22 grams).

We do not have experience with the use of local anesthesia but it can be presumed that the current climate of health care economics will encourage physicians to seek alternative ways to reduce costs of surgical procedures, including the use of local anesthesia and other measures.⁶

The problem, which is of paramount importance in TURP, is the technique of resection that is undoubtedly correlated with intraoperative and postoperative complications. Various techniques have been developed for systematic removal of the adenomatous tissue. All of these are based on the principle of step-by-step resection, as initially described by Nesbit¹ and modified by Mauermayer and Green.^{7,8} As bleeding is the resectionist's nemesis, leading to loss of visual field and disorientation, it is imperative that resection and hemostasis should both be completed in one area of the fossa before the next area is tackled. As it results from the literature, lesser bleeding leads to lesser intraoperative complications and fewer postoperative complications.^{9,10} This fact can be seen in our results too. However, it is obvious that experience leads to better technique, better hemostasis and, by consequence reduces both intra- and postoperative bleeding.

Other aspect is related to the impact of experience in weight of resected tissue. Larger prostates (50-60 grams) are preferred for resection by the beginners due to low risk of intraoperative complications but the risk of postoperative complications and acute urinary retention after catheter removal is higher.⁹ Our data suggests that it has been started with small prostates which leads to better postoperative results with low rates of postoperative complications and re-do TURP rates, despite they are quite difficult to be resected. The "price" for choosing smaller prostates for the beginning is the low speed of resection (the weight/time ra-

tion), which was on first two years of resection lower than 50% of so-called "optimum speed of resection" which is considered 1 gram per minute. In spite of this, the incidence of TUR syndrome among first 500 cases was comparable with the average TUR syndrome incidence in large series.^{9,10} We can presume that this fact is due to the incomplete resection. This does not open larger vessels located beneath the prostate capsule, thus the irrigation fluid resorption is not significant. It is accepted that the average resorption rate during TUR procedures are between 10 and 30 ml per minute.¹⁰

By gaining experience, the resection tends to be complete, the larger vessels are opened and, on the other hand (despite the higher speed of resection) the time of procedure can increase by operating larger prostates, thus, the risk of facing with TUR syndrome is higher.

The technique used by the eight young urologists is that commonly used in our department which consists in creating a tunnel on the floor of prostate, followed by the resection of one lobe and thereafter the second lobe (Nesbit technique modified by Mauermayer). Rarerly we have to choose another technique, including "the English channel".

We have to mention that all urologists from our department learned the technique of resection from three mentors (Assoc. Prof. Boiborean, Prof. Miclea and Prof. Dragan), which started the resection in the 80's, gaining a very large experience. Their experience led to the changed attitude in the management of large prostate adenoma (over 60-80 grams) which steadily became a TURP-resort issue, having results comparable with TURP on smaller prostates. This fact represented a priority and the results were appreciated when communicated on Central European Congress of Urology, Vienna (1999).¹¹ Being trained with this attitude, all the young urologists are trying to improve the quality of the resection and, by this, to be able to resect larger prostates. Another aspect that has to be mentioned is that in our department Ottis urethrotomy prior TURP is widely used in order to prevent urethral strictures post TURP, by an adequate calibration of the urethra.¹²

The length of postoperative hospitalization is directly related with the length of postoperative evolution, complications and at least but not last, with the operator's experience: the tendency is to maintain the catheter a little bit more than necessary (on the beginners) with an earlier catheter removal after gaining experience. There are authors which suggest that an early catheter removal (extremely careful hemostasis, bladder irrigation postoperatively plus furosemide, catheter removal in day 1 postoperatively and discharge of the patient after 2-3 micturitions in the same day) could be a safe attitude, without significant additional complications.¹³⁻¹⁵

Postoperative infectious complications (e.g. acute pyelonephritis, epididymitis etc) did not significantly change during the six-year period, revealing that are not experience-related.

The rate of re-do TURP, as mentioned before, constantly decreased from 8% to 3.5% as a consequence of gaining experience, with better resection which tends to be complete, as results from the weight of resected tissue/estimated prostate volume ratio which increased from 0.65 to 0.70).

Most authors suggest that a mean number of 40-50 procedures for each urologist are the minimum to achieve satisfactory skills on TURP.^{7,9} Indeed, after a mean number of 320 procedures (in the fifth year) which means 40 procedures per each urologist, the incidence of intraoperative and postoperative complications are comparable with those from large, multicentric, randomized studies.^{9,10,13,16,17}

CONCLUSIONS

Learning curve in TURP is steep, with a wide range of intra- and postoperative complications. The incidence of these complications is not very high but some of them, like TUR syndrome, unrecognized, can be life threatening. Larger experience leads to better results.

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