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Comparison of Bipolar and Monopolar Transurethral Resection of the Prostate, Functional Outcomes and Analysis of Factors Predictive of Complications: A Prospective Study

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Abstract **Original Research Article**

***Introduction*:** In Morocco, RTUP-m is considered the gold standard for the surgical treatment of prostate adenomas, recommended for prostates with a volume suitable for resection in less than 60 minutes. Additionally, the challenge arises when dealing with patients on antiplatelet or anticoagulant medications due to the associated risk of bleeding, hence the significance of RTUP-b. The objective of our study is to compare the functional outcomes and immediate postoperative complications between these two techniques and to identify predictive factors for complications. ***Methods*:** This is a prospective randomized study conducted between January 2022 and September 2022. The variables age, BMI, surgical indication, transrectal prostate volume, ASA classification (American Society of Anesthesiologists), previous pharmacological treatments, IPSS score, quality of life index (QLI), maximum flow rate (Qmax) and postoperative complications were collected. The Chi^2 test and Student's t-test were used for statistical analysis. ***Results*:** Sixty-nine consecutive patients were included, 38 patients in the monopolar TURP group and 31 in the bipolar TURP group. Both groups were homogeneous in their baseline characteristics. The overall pre-surgical IPSS/QLI/Qmax score was 24,03/4,73/9,47. Functional results at 1st and 3rd month are shown in Table 1. For complications, see Table 2 and 3. These differences were not statistically significant (p = 0,427): the most frequent were hematuria (9,4%) and febrile urinary tract infections (9,4%). Only one patient presented hyponatremia due to glycocol reabsorption in the monopolar group. All complications were Clavien 1 or 2. We found no significant differences between the two groups with regard to complications or their predictive factors. ***Conclusion*:** Analysis of our data over the first three months reveals no differences between the two techniques in terms of functional results and postoperative complications, and there are no predictive factors for the occurrence of complications regardless of the type of energy used.

Keywords: RTUP-m, anticoagulant medications, quality of life index.

INTRODUCTION

For the past eight decades, TURP has been considered the gold standard in the surgical treatment of benign prostatic hypertrophy.

In Morocco, TURP-m is the gold standard in the surgical treatment of prostate adenomas, and is proposed for prostate volumes that allow resection in less than 60 minutes.

But despite technical improvements in recent years, conventional single-polar current TURP remains a surgery fraught with a number of complications, such as hemorrhage and TURP syndrome, to which we can add the limitations of this technique, notably those linked to the patient's terrain, such as the use of an old-generation Pacemaker. In addition, the risk of bleeding poses the problem of managing patients on antiaggregants or anticoagulants, hence the interest in new minimally invasive instrumental techniques that have been developed to reduce the complications of conventional TURP [1]. Among these techniques is bipolar current TURP, which has the advantage of reproducing the same conditions as traditional resection, but using physiological saline as the irrigation fluid.

The objective of our study is to compare functional results and immediate postoperative complications between the 2 techniques, and to identify factors predictive of complications.

MATERIALS AND METHODS

This is a prospective randomized comparative study including 69 patients with symptomatic BPH requiring surgical treatment with TURP during the period between January 2022 and September 2022.

Written informed consent was obtained from all 60 patients. Patients were randomized into two groups: monopolar or bipolar TURP.

Treatment efficacy (maximum flow rate [Qmax], IPSS score) and complications (adverse events, clinical and biological TURP syndrome measured by postoperative drop in natremia and hemoglobin level) were studied first.

The variables age, BMI, surgical indication, transrectal prostate volume, ASA classification, previous pharmacological treatments, IPSS score, quality of life index (QLI), maximum flow rate (Qmax) and postoperative complications were collected.

We excluded patients with documented prostate cancer, bladder tumour, urethral stricture, bladder lithiasis or neurological bladder, as well as patients with a history of TURP.

All patients were followed for at least one year, with follow-up at 1, 3, 6 and 12 months post-operatively, including clinical examination, flowmetry, calculation of the IPSS quality-of-life score and assessment of complications.

We carried out a descriptive and analytical statistical study; the chi-square test and Student's t-test were used for statistical analysis.

RESULTS

Sixty-nine consecutive patients were included, 38 patients in the monopolar RTUP group and 31 in the bipolar RTUP group. The two groups were homogeneous in their baseline characteristics and were comparable with regard to age, PSA level, IPSS score, flow meter (Qmax) and prostate volume.

The overall pre-surgical IPSS/QLI/Qmax score was 24.03/4.73/9.47 respectively (Table 1). Mean operating time was 4 minutes shorter in the bipolar group (52 versus 49 minutes, p = 0,56) (Table 1).

Table 1: Preoperative characteristics

	TURP-m	**TURP-b**	**Total**	**p**
Number	38	31	69	-
Preoperatoire characteristics :				
Mean age (years)	69,62 ± 8,03	70,15 ±7,67	69,88±7,85	NS
Mean PSA (ng/ml)	3,1 ±0,67	3,25 ±0,21	3,18±0,44	NS
Mean IPSS score	23,23 ± 2,34	24,83± 2,89	24,03±2,61	NS
Mean Qmax (ml/s)	9,51 ± 2,01	9,43 ±1,9	9,47±1,95	NS
QLI score	4,85 ± 0,93	4,61±1,03	4,73±0,98	NS
Prostate (g)	49,30 ± 4,65	49,7±3,92	49,5±4,29	NS
Operating (min)	52 ± 8,9	49 ±6,8	50,5±7,85	NS
Other variables: Mean weight of resected tissue, mean change in natremia, mean change in hematocrit (%), mean change in haemoglobin Complications: Number of transfusions (GII), bladder retention (GIIIa), TURP syndrome (GI),urethral stricture, cervical stenosis (GIIIb)				
IPSS: international prostate symptom score; QLI score: Quality of life index score; M-TURP: monopolar transurethral resection of the prostate; B-TURP: bipolar transurethral resection of the prostate; NS: not significant; G: Clavien Perioperative Morbidity Classification grade;				

For complications (see Table 2), the differences were not statistically significant (p = 0,427): the most frequent were hematuria (9,4%) and febrile urinary tract infections (9,4%). Only one patient presented hyponatremia due to glycocol reabsorption in the monopolar group.

All complications were Clavien 1 or 2 (table 3).

Table 2: Intraoperative results, biological variations and complications

	M-TURP	**B-TURP**	**p**
Average operating time (min)	52 ± 8,9	49,5 ± 6,8	0,54 NS
Average weight of resected tissue (g)	21,6 ± 6,71	30,23 ± 6,74	0,25 NS

	M-TURP	**B-TURP**	**p**
Average change in natraemia (mEq/L)	7,5 ± 1,32	1,3 ± 0,48	0,005
Average change in Ht (%)	2,71 ± 0,48	2,95 ± 0,53	0,39 NS
Mean change in Hb (g/dL)	2,22 ± 0,25	2,13 ± 0,33	0,21 NS
Number of transfusions (GII)	1	0	-
Bladder retention (GIIIa)	1	0	-
TURP syndrome (GI)	1	0	-
Urethral stricture, cervical stenosis (GIIIb)	0	0	-

Table 3: first- and third-month complication rates

Complications			
In the first month		**In the third month**	
M-TURP	B-TURP	M-TURP	M-TURP
28,3%	24%	27%	20%

Functional results at months 1 and 3 are shown in Table 4.

Table 4: Functional results at month 1 and 3

		M-TURP	B-TURP	p
In the first month	IPSS score	15,1	14,6	0,84 NS
	QOL index score (quality of life index)	3,82	3	0,24 NS
	Max. flow (ml/s)	17,4	19,9	0,3 NS
In the third month	IPSS score	13,4	10,8	0,31 NS
	QOL index (quality of life index)	3,3	2,8	0,51 NS
	Max. flow (ml/s	17,75	17,9	0,9 NS

We found no significant difference between the two groups in terms of complications or their predictive factors.

DISCUSSION

Monopolar TURP has long been considered the reference technique for patients with moderate prostate volume (between 30 and 60cc). It remains a benchmark in clinical research and daily practice due to the number of procedures performed, the experience accumulated by urologists, and the length of clinical follow-up available.

Monopolar TURP is the surgical technique evaluated with the longest follow-up [2]. The retreatment rate has been evaluated at 6, 12, and 15% after 1, 5, and 8 years of follow-up [3]. Some studies even report follow-ups of up to 15 years, confirming the stability of clinical results over time.

TURP results in an average 71% reduction in the intensity of LUTS (assessed by self-questionnaires). There is, of course, significant variability between studies and between patients, but, on average, the IPSS score decreases by 12 points.

The increase in maximum urinary flow rate (Qmax) is also highly significant. It increases on average by 120%, or 10 mL/s, with variability remaining high. Post-micturition residual decreased by 60% on average.

The efficacy and stability of clinical results confirm the privileged position of monopolar TURP in the management of benign prostatic hyperplasia. However, as with any medical intervention, it is essential to assess the risks and benefits on an individual basis for each patient.

Bipolar TURP has been compared to conventional TURP in several randomized studies. These studies showed no significant difference in symptomatic (IPSS score) or urodynamic (Qmax) outcomes at 3 and 12 months. Similarly, the two techniques were considered similar in terms of the risk of retrograde ejaculation.

The main advantage of bipolar TURP over monopolar is the use of saline, which eliminates the risk of irrigation fluid resorption syndrome (already very low in monopolar TURP). The reduction in bleeding risk remains more uncertain with this technique.

Several comparative studies have reported a reduction in the rate of blood transfusion and post-operative retention on bladder clotting, as well as a reduction in catheterization time and hospital stay [4]. Nevertheless, the latest published meta-analyses differ as to the hemostatic advantages of this technique [5, 6]. In particular, we can cite a randomized double-blind European multicenter study that failed to demonstrate any significant difference in morbidity including for large-volume prostates [7, 8]. Contrary to popular belief,

the advantages of bipolar TURP in terms of haemostasis qualitý therefore remain to be consolidated.

Blood loss during TURP is usually low [9], but bleeding (grade II according to Clavien and Dindo's classification) remains one of the major perioperative complications of TURP, especially as it may lead to clot retention, blood transfusions or even reoperation. Although transfusion rates in monopolar TURP series have been significantly reduced over time, thanks in particular to technical improvements, the incidence of clot retention remains between 2% and 5%, and bleeding is still a concern [9]. A number of ex vivo studies have highlighted the superior hemostatic capacity of bipolar current, possibly attributed to deep coagulation [10, 11], as well as to the cut-and-seal effect of plasma created by bipolar energy [12]. The results of various studies have confirmed́ this superior hemostatic capacity, in fact the drop in hemoglobin levels during RTUP using bipolar current was not very significant and remained significantly lower than the drop found when using monopolar resection [13, 14]. In the same context of haemostasis, all studies agreed on the significantly lower frequency of bladder retention on clot with bipolar TURP [15], an indirect sign of the superioritý of the bipolar technique in terms of haemostasis.

The main late complications of TURP include urethral stricture (grade IIIB according to Clavien and Dindo's classification), the incidence of which has not changed much over time, despité improved surgical techniques, lubricants and instruments. Several authors have suggested́ a higher incidence of urethral complications with bipolar systems [16-18], explained by certain risk factors (a larger diameter of the resector in some models [19], greater energy used and leakage of electric current through the system sheath [16, 17]. However, several other studies have refuted these results, finding an equivalent rate of urethral stenosis between monopolar and bipolar resection [20-21], a finding that was also confirmed in our study.

Regarding the efficacy of bipolar TURP as assessed by changes in IPSS score and Qmax, in most series, the decrease in IPSS score and improvement in Qmax postoperatively were significant compared with preoperative values. These results were comparable to those of other techniques, notably conventional TURP. Indeed, all comparative studies have shown no statistically significant difference in efficacy between the two techniques [15-22].

Another way of assessing the efficacy of the procedure was to study the duration of postoperative bladder drainage. The majoritý of authors agreed on the superiority and contribution of bipolar TURP in terms of postoperative drainage. Indeed, our study concurs with the results of the meta-analyses by Mamoulakis in 2009 [15], and Sascha in 2010 [22], which highlighted a significantly lower postoperative bladder drainage time for bipolar TURP despité the significant heterogeneity of the series due to the different protocols used in each series. Like the duration of bladder drainage, hospitalization time during bipolar TURP was significantly lower than that found during monopolar TURP.

CONCLUSION

The surgical management of benign prostatic hyperplasia (BPH) has changed considerably over the past 15 years. Open surgery, once the standard treatment for large prostates, has gradually given way to less morbid endoscopic techniques. Similarly, transurethral resection of the prostate (TURP) with monopolar current has evolved towards the use of bipolar current or laser techniques.

These technological developments have been instrumental in achieving a reduction in perioperative morbiditý and hospital length of stay. Nevertheless, certain urinary and sexual risks persist, prompting urologists to turn to alternative techniques that are even less invasive and better suited to respecting patients' overall quality of life (both urinary and sexual).

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