

Is Routine Measurement of Post-operative Hemoglobin and Electrolytes Necessary in Every Patient After Transurethral Resection of the Prostate?

Transüretral Prostat Rezeksiyonu Sonrası Her Hastada Postoperatif Hemoglobin ve Elektrolitlerin Rutin Ölçümü Gerekli midir?

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What's known on the subject? and What does the study add?

Although subject is not new but little scientific evidence available, most urologists practice based on their preference and experience. Results will have positive impact on cost and other issues related to this subject.

Abstract

Objective: To evaluate the importance of post-operative hemoglobin and electrolyte monitoring after transurethral resection of the prostate (TURP) and establish the parameters to be considered for monitoring.

Materials and Methods: Data of patients who underwent TURP between 2007 and 2017 were reviewed. Data regarding prostate size, irrigation fluid volume, resection time, pre- and post-operative electrolytes, hemoglobin levels taken within 48 hours before and after surgery, and blood transfusion information were collected. In order to establish parameters for post-operative laboratory monitoring, we categorized prostate size, resection time, and irrigation fluid into groups i.e. (<45 g, 45-60 g, 61-80 g and >80 g), (<30 min, 31-60 and >60 min) and (<20 L, 21-40 L and >40 L) respectively.

Results: A total of 1.000 patients were included. The median age was 66 years with the minimum of 46 years and maximum of 98 years. The median prostate size was 54.26 g. Among all pre- and post-operative laboratory parameters, only hemoglobin and sodium showed a significant change, which were analyzed further. Drop in hemoglobin was significantly associated with increasing prostate size and volume of irrigation fluid. Patients with a prostate size of >80 g had 27.3 times higher chance of significant (>2 g) drop in hemoglobin while 5.1 times higher when irrigation volume exceeded 40 liters. Low levels of sodium were strongly associated with prostate size, irrigation fluid volume, and resection time. However, all these factors become insignificant ($p \geq 0.05$) for their effect on low sodium, when these variables were adjusted with each other. Blood transfusion was performed in 27 patients. All these patients belonged to a group of patients with prostate size of more than 80 g with high resection time and irrigation fluid volume. Three patients had TUR syndrome. Post-operative hemoglobin and electrolytes monitoring contributed to a change in the management of only 14% of patients.

Conclusion: Routine post-operative hemoglobin and electrolyte measurement is not required in every patient undergoing TURP. Use of risk stratification approach will help us to decide which patient needs post-operative lab testing.

Keywords: Transurethral resection of prostate, Post-operative, Hemoglobin, Electrolytes, Benign prostatic hyperplasia

Öz

Amaç: Transüretral prostat rezeksiyonu (TURP) sonrası, hastalarda postoperatif hemoglobin ve elektrolit izleminin önemini değerlendirmek ve izlem için dikkate alınması gereken parametreleri belirlemektir.

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Gereç ve Yöntem: 2007-2017 yılları arasındaki TURP hastalarının verileri gözden geçirildi. Prostat büyüklüğü, irrigasyon sıvısı hacmi, rezeksiyon zamanı, ameliyat öncesi ve sonrası elektrolitler, 48 saatlik hemoglobin seviyeleri ve kan transfüzyonu bilgileri ile ilgili veriler toplandı. Ameliyat sonrası laboratuvar izlemi için parametreler belirlemek amacıyla sırasıyla; prostat büyüklüğü (<45 g, 45-60 g, 61-80 g ve >80 g), rezeksiyon zamanı (<30 dk., 31-60 dk. ve >60 dk.) ve irrigasyon sıvısı (<20 L, 21-40 L ve >40 L) vb. kategorize edildi.

Bulgular: Çalışmaya toplam 1,000 hasta dahil edildi. Ortalama yaş 66 yıl iken; minimum 46, maksimum 98 yıl idi. Ortalama prostat büyüklüğü 54,26 g idi. Tüm ameliyat öncesi ve sonrası laboratuvar parametreleri arasında sadece hemoglobin ve sodyum anlamlı bir değişim göstermiştir. Hemoglobin düşüşü, prostat büyüklüğünün artması ve irrigasyon sıvısının hacmi ile anlamlı olarak ilişkili idi. Prostat büyüklüğü >80 g olan hastalar, hemoglobinde 27,3 (>2 g) kat daha yüksek anlamlı düşüşe sahip iken; irrigasyon hacmi 40 L'yi aştığında bu düşüş 5,1 kat daha yüksek olmuştur. Prostat büyüklüğü, irrigasyon sıvısı hacmi ve rezeksiyon zamanı multinominal lojistik regresyon analizinden sonra düşük sodyum etkisi nedeniyle önemsiz ($p \geq 0,05$) hale gelmiştir. Postoperatif hemoglobin ve elektrolit izlemi, hastaların sadece %14'ünün yönetiminde bir değişikliğe katkıda bulunmuştur.

Sonuç: TURP uygulanan her hastanın, postoperatif rutin hemoglobin ve elektrolit ölçümleri gerekli değildir. Risk sınıflandırma yaklaşımının kullanımı, postoperatif laboratuvar testlerine hangi hastanın ihtiyaç duyduğuna karar vermede bizlere yardımcı olacaktır.

Anahtar Kelimeler: Transüretal prostat rezeksiyonu, Postoperatif, Hemoglobin, Elektrolit, Benign prostat hiperplazisi

Introduction

Transurethral resection of the prostate (TURP) is one of the most common urological procedures. It has been the gold standard procedure for benign prostatic hyperplasia (BPH) with symptomatic bladder outlet obstruction (BOO) (1). Despite introduction of newer procedures, such as holmium laser enucleation, GreenLight laser and diode laser ablation, TURP still retains its position (2). Previously, post-procedure complications occurred quite frequently, with early complications of bleeding, sepsis, electrolytes imbalance, TUR syndrome, incontinence, and urinary retention (3). In the past few decades, there has been considerable decrement in the incidence of these early complications mainly due to standardization of the procedure, and improvement in equipment, perioperative management, and anesthetic techniques (4). Although bleeding is the most important complication of TURP (5), a combined data from 10654 procedures reported that only 2.9% cases required transfusion due to bleeding (6). Later, it was recommended that routine blood testing was not necessary (7). After bleeding, the next most important complication is electrolyte imbalance, due to the significant risk of developing TUR syndrome (8). However, it has also become rare with time. The risk of developing electrolyte imbalance is less than 1.1%, and this is attributable to a better understanding of its pathophysiology and advances in technology (9).

Despite considerable reduction in complications, major urological associations have not been specified by the guidelines for which patients require post-TURP hemoglobin (Hb) and electrolyte monitoring. Although such testing is performed routinely in many centers, it varies amongst different centers, usually not taking into account risk factors associated with electrolyte imbalance. Routine testing in all patients irrespective of risk factors is costly and burdensome. A study from an academic institute shows that out of a total of 24482 laboratory tests performed in 426 patients admitted for different diseases,

67.9% of the tests were irrelevant or unnecessary and the test results did not contribute towards the effective management of the patient (10).

At a time when a practice is both evidence-based and economical, we set out to establish certain parameters that can be considered before going for routine post-operative Hb and electrolytes measurement.

Materials and Methods

We retrospectively reviewed data of patients who underwent TURP between 2007 and 2017. The cases were performed by all urologists within the unit. Ethical review committee approval was taken before commencement of the study from the Kidney Centre Ethical Review Committee, under the Auspices of Dorab Patel Post Graduate Training and Research Centre (reference number: 26-URO-062015). All patients, who had normal pre-operative clotting profile and negative urine cultures, were included in the study. Patients excluded were those who were taking diuretics, antithrombotic, and anticoagulant drugs. The pre- and post-operative electrolytes, Hb levels taken within 48 hours before and after surgery and blood transfusion information were collected from the hospital's medical record department. Information regarding prostate size, irrigation fluid volume and resection time were also collected. A consultant or senior resident under supervision of a consultant carried out TURP using a 26 Fr continuous flow resectoscope with monopolar diathermy. During the procedure, the bladder was irrigated with 1.5% glycine. After the surgery, 0.9% saline was used for irrigation.

In order to establish parameters for post-operative laboratory monitoring, variables were categorized into groups. Prostate size was categorized in 3 groups i.e., <45 g, 45-60 g, 61-80 and >80 g. Similarly, resection time and irrigation fluid volume were also categorized into 3 groups: (<30 min, 31-60 and >60 min) and (<20 L, 21-40 L and >40 L). Drop in Hb was considered mild if <1

g/dL, considered moderate and severe if the drop was 1-2 g/dL and >2 g/dL, respectively. To see electrolyte derangements, post-operative serum sodium and potassium values were analyzed in all groups.

Statistical Analysis

Data analyses were performed by using software IBM SPSS version 21. Mean and standard deviation were reported for normally distributed continuous variables while for skewed data medians with interquartile range were described. At the stage of inferential analysis, continuous variables were categorized and association was obtained between different variables by the chi-square test. Two predicted model using binary and multinomial logistic regression analyses were established to evaluate the effect of factors leading toward low sodium and drop in Hb. A p value of less than 0.05 was considered statistically significant.

Results

A total of 1,005 patients had TURP in the study period. Five patients were excluded due to incomplete data. A total of 1,000 patients were included. The median age was 66 years with the minimum of 46 years and maximum of 98 years (Table 1). The median prostate size was 54.26 g. Among all pre- and post-operative laboratory parameters, only Hb and sodium showed a significant change (Table 2), which were analyzed further. For drop in sodium levels, prostate size, resection time and quantity of irrigation fluid were analyzed with post-operative sodium levels. A prostate size of >80 g (49.6%), more than 40 liters of irrigation fluid used (50.4%) and a resection time of longer than 60 minutes (55.8%) were most strongly associated with low sodium post-operatively (Table 3). On further analysis,

Table 1. Descriptive analysis of clinical variables

	Median with IQR	Minimum	Maximum
Age (years)	66.13	46	98
Prostate size (grams)	54.26	34	120
Irrigation fluid (liters)	20.15	5	60
Resection time (minutes)	43.30	20	92

IQR: Interquartile range

Table 2. Pre- and post-operative differences of laboratory parameters

	Median with IQR	Minimum	Maximum	p value
Pre-operative serum creatinine (mg/dL)	1, 0.4	1	3	0.024
Post-operative serum creatinine (mg/dL)	1, 0.4	1	2	
Pre-operative hemoglobin (g/dL)	12.7, 2.3	8	16	<0.001
Post-operative hemoglobin (g/dL)	11.8, 2.2	7	16	
Pre-operative sodium (meq/L)	140, 4	134	150	<0.001
Post-operative sodium (meq/L)	139, 5.7	123	148	
Pre-operative potassium (meq/L)	3.9, 0.4	3	5	0.22
Post-operative potassium (meq/L)	3.8, 0.5	3	6	

IQR: Interquartile range

Table 3. Association of post-operative decrease in sodium with different variables

		Post-operative sodium (meq/L)			p value
		≥134 meq (n with %)	<134 meq (n with %)	Total	
Prostate size	>80 grams	95 (59.7)	64 (40.3)	159	<0.001
	61-80 grams	180 (89.1)	22 (10.9)	202	
	45-60 grams	347 (93.3)	25 (6.7)	372	
	<45 grams	249 (62.4)	18 (37.6)	267	
Irrigation fluid	>40 liters	108 (62.4)	65 (37.6)	173	<0.001
	20-40 liters	325 (90.3)	35 (9.7)	360	
	<20 liters	438 (93.8)	29 (6.2)	467	
Resection time	>60 minutes	137 (65.6)	72 (34.4)	209	<0.001
	31-60 minutes	444 (92.5)	36 (7.5)	480	
	30 minutes	290 (93.2)	21 (6.8)	311	
	Total	871	129	1000	

the odds ratio for >80 g of size of the prostate was 9.3 times higher than <45 g for low sodium ($p < 0.001$). Similarly, when >40 L of irrigation fluid was used, the patients suffered 9.1 times more with low sodium than with the use of <20 L of fluid ($p < 0.001$). In the same manner, a resection time of >60 minutes was associated with 7.3 times greater risk for low sodium as compared to 30 minutes ($p < 0.001$). When all these variables were adjusted with each other, we found that all these factors become insignificant ($p \geq 0.05$) for their effect on low sodium (Table 4). For drop in Hb, cross tabulation analysis among four categories of post-operative Hb drop with different variables was performed. We observed that a Hb drop of greater than 2 g was significantly associated with the size of the prostate,

quantity of the irrigation fluid used and resection time. 46.3% of patients with a prostate size >80 g had a Hb drop greater than 2 g as compared to 4% in those having <45 g of size. On the other hand, <1 g drop in Hb mostly occurred in patients who had a prostate size of <45 g (40.5%). Similar pattern can be seen with irrigation fluid and resection time (Table 5). On further analysis by multinomial logistic regression analysis, patients with a prostate size of >80 g had 62.4 times higher chance of significant (greater than 2 g) drop in Hb while those with a prostate size 61–80 g and 45–60 g had 11 times and 8.8 times greater risk, respectively, as compared to those with a prostate size of <45 g ($p < 0.001$). After adjustment of other confounding variables, the risk was reduced but remained

Table 4. Univariable and multivariable binary logistic regression analysis for effects of factors on post-operative serum sodium

	Unadjusted analysis				Adjusted analysis			
	Odds ratio	95% CI for exp(B)		p value	Odds ratio	95% CI for exp(B)		p value
		Lower	Upper			Lower	Upper	
Prostate size >80 grams	9.3	5.3	16.5	<0.001	3.0	0.9	10.5	0.069
Prostate size 61-80 grams	1.7	0.9	3.2	0.114	1.3	0.5	3.0	0.59
Prostate size 45-60 grams	0.98	0.5	1.9	0.99	0.9	0.1	1.9	0.81
Prostate size <45 grams	1.0	-	-	-	-	-	-	-
Irrigation fluid >40 liters	9.1	5.6	14.8	<0.001	1.9	0.6	6.0	0.260
Irrigation fluid 20-40 liters	1.6	1.0	2.7	0.063	1.4	0.7	2.8	0.34
Irrigation fluid <20 liters	1.0	-	-	-	-	-	-	-
Resection time >60 minutes	7.3	4.3	12.3	<0.001	1.7	0.6	4.9	0.360
Resection time 30-60 minutes	1.1	0.6	2.0	0.691	0.9	0.4	1.9	0.79
Resection time 30 minutes	1.0	-	-	-	-	-	-	-

CI: Confidence interval

Table 5. Association of post-operative hemoglobin drop with different variables

	Drop in hemoglobin (g/dL)				p value
	<1 gram (n with %)	1-2 gram (n with %)	>2 gram (n with %)	Total	
Prostate size	>80 grams	40 (25.2)	509 (31.4)	69 (46.3)	<0.001
	61-80 grams	95 (47)	78 (38.6)	29 (14.4)	
	45-60 grams	184 (49.5)	143 (38.4)	45 (12.1)	
	<45 grams	217 (81.3)	44 (16.5)	6 (2.2)	
Irrigation fluid	>40 liters	42 (24.2)	61 (35.3)	70 (40.5)	<0.001
	20-40 liters	164 (45.6)	147 (40.8)	49 (13.6)	
	<20 liters	330 (70.7)	107 (22.9)	30 (6.4)	
Resection time	>60 minutes	61 (29.2)	79 (37.8)	69 (33)	<0.001
	31-60 minutes	235 (49)	179 (37.3)	66 (13.8)	
	30 minutes	240 (49)	57 (18.3)	14 (4.5)	
	Total	536	315	149	

significantly higher at 27.3, 6.7 and 6.1 times, respectively (Table 6). Figure 1 shows the mean Hb drop with the increase in the size of the prostate. Regarding resection time, a significant drop (>2 g) in Hb occurred, in those patients with resection time >60 minutes (p<0.001) as compared to those with 30 minutes (19.4 times more). However, the effect of resection time on Hb drop became insignificant when adjusted with other variables (p≥0.05). On the other hand, the volume of irrigation fluid for significant drop (>2 g) in Hb remained significant even after adjustment of confounding variables. The adjusted odds ratio decreased from 18.3 times to 5.1 times for >40 liters (Table 6). Out of 1000 patients, blood transfusion was done in 27 patients, and 11% of patients, who needed further treatment like water restriction and diuretic therapy, had low sodium levels post-operatively. Three patients developed TUR syndrome. Therefore, post-operative Hb and electrolyte monitoring contributed to a

change in the management of only 14% of patients. All these patients belonged to a group of patients with a prostate size of more than 80 g, long resection time and high irrigation fluid volume. Considering these results, a more practical risk stratification approach is suggested (Table 7).

Discussion

TURP is the gold standard surgical treatment for patients with moderate to severe lower urinary tract symptoms associated with BPH, and is most effective in relieving BOO due to large prostate size (11). Although perioperative mortality and morbidity rates have declined over time, they still remain at 0.1% and 11.1%, respectively, mainly due to bleeding, acute kidney injury, and TUR syndrome (12,13).

Table 6. Univariable and multivariable multinomial logistic regression analysis for effect of factors on drop in hemoglobin after surgery

Drop in hemoglobin		Unadjusted multinomial analysis				Adjusted multinomial analysis			
		Odds ratio	95% confidence interval for exp(B)		p value	Odds ratio	95% confidence interval for exp(B)		p value
			Lower bound	Upper bound			Lower bound	Upper bound	
1-2 gram	Prostate size >80 grams	6.2	3.6	10.4	<0.001	1.1	0.39	3.16	0.85
	Prostate size 61-80 grams	4.1	2.6	6.3	<0.001	2.0	1.2	3.4	0.011
	Prostate size 45-60 grams	3.8	2.6	6.3	<0.001	2.5	1.6	3.9	<0.001
	Prostate size <45 grams	1.0	-	-	-	-	-	-	-
>2 gram	Prostate size >80 grams	62.4	25.4	153.2	<0.001	27.3	5.8	129.0	<0.001
	Prostate size 61-80 grams	11.0	4.4	27.5	<0.001	6.7	2.4	18.5	<0.001
	Prostate size 45-60 grams	8.8	3.7	21.2	<0.001	6.1	2.4	15.6	<0.001
	Prostate size <45 grams	1.0	-	-	-	-	-	-	-
1-2 gram	Resection time >60 minutes	5.5	3.5	8.5	<0.001	2.0	0.9	4.2	0.080
	Resection time 31-60 minutes	3.2	2.3	4.5	<0.001	1.6	1.1	2.5	0.047
	Resection time 30 minutes	1.0	-	-	-	-	-	-	-
	Resection time >60 minutes	19.4	10.2	36.8	<0.001	0.6	0.2	1.9	0.350
>2 gram	Resection time 31-60 minutes	4.8	2.6	8.8	<0.001	1.5	0.7	3.1	0.28
	Resection time 30 minutes	1.0	-	-	-	-	-	-	-
	Irrigation fluid >40 liters	4.5	2.9	7.0	<0.001	3.7	1.4	9.4	0.007
1-2 gram	Irrigation fluid 20-40 liters	2.8	2.0	3.8	<0.001	1.7	1.1	2.4	0.011
	Irrigation fluid <20 liters	1.0	-	-	-	-	-	-	-
	Irrigation fluid >40 liters	18.3	10.7	31.3	<0.001	5.1	1.6	16.9	0.008
>2 gram	Irrigation fluid 20-40 liters	3.3	2.0	5.4	<0.001	1.7	0.9	3.0	0.078
	Irrigation fluid <20 liters	1	-	-	-	-	-	-	-

The reference category is: <1 gram

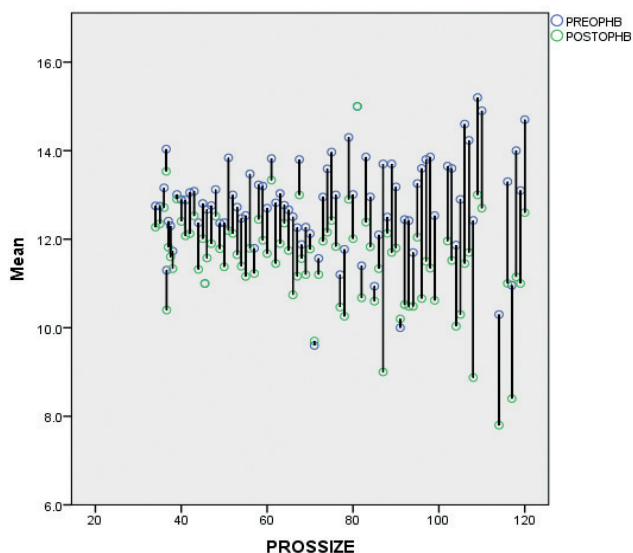


Figure 1. Change in mean hemoglobin pre- and post-transurethral resection of the prostate in relation to prostate size

PREOPHB: Preoperative hemoglobin, POSTOPHB: Postoperative hemoglobin, PROSSIZE: Prostate size

Table 7. Risk stratification strategy

Low risk group	Post-operative Hb and electrolytes monitoring not required
Prostate size: <45 mL	
Intermediate group	Post-operative Hb and electrolytes monitoring is optional. Consider age, comorbid, and general condition of patients
Prostate size: 45-80 mL	
High risk group	Post-operative Hb and electrolytes monitoring should be done in all cases
Resection time >60 minutes	
Irrigation fluid >40 L	
Prostate size >80 mL	
Hb: Hemoglobin	

Bleeding has many contributing factors, which include acetylsalicylic acid intake, activation of fibrinolysis system, size of the prostate gland, weight of the resected gland, duration of the procedure, histologic presentation of the gland, and presence of urinary tract infection (14,15).

Regarding irrigation fluid used during TURP, it has been proven that 1.5% glycine and 2.7% sorbitol have not shown significant impact on the result (16). Therefore, glycine 1.5% was used in the present study. A resection time of longer than 60 minutes was related to an increase in loss of blood in two studies (17), but was refuted by another study (18). Mebust (19) has reported that the incidence of blood loss was higher in patients with a resected prostate tissue greater than 45 g. In this study, blood loss was also strongly associated with prostate size. The mean

change in Hb in our study was 0.9 g/dL, which appears to be slightly lower as compared to other studies (20).

Studies have used different methods for estimating blood loss after TURP, but these require additional resources and hence have added costs and a margin of error of 4-5% (20,21). Post-TURP, maximum blood loss occurs within 2 days, with time to 50% blood loss at 16 hours. Hence, testing of Hb levels within 48 hours TURP is a practical and widely used method of determining blood loss (22). Although post-operative Hb is a useful guide to the need for transfusion and it is included in the TURP integrated care pathway at many centers, but routine testing of post-operative Hb in every patient is questionable. Often these results are overlooked or not documented, as discovered during this study. In addition, unnecessary blood testing raises ethical concern and discomfort to the patient. This testing should only be done where indicated, as in patients with large vascular glands, who have undergone long resections, ongoing blood loss or symptomatic anemia.

Another important complication of TURP is electrolyte imbalance. This includes TUR syndrome. The amount of fluid absorbed is directly related to the number and size of opened venous sinuses. This hypervolemic hyponatremic state may lead to mental confusion, bradycardia, hypertension, nausea, vomiting, and visual disturbances associated with hyponatremia (23).

Recent advancements in technology and with better understanding of pathophysiology, TUR syndrome has become a rare condition (less than 1.1%). These include development of continuous flow resectoscopes, utilization of non-hemolytic solutions, such as glycine, sorbitol, and mannitol, limited resection time and advances in training techniques (9,24). Hydrostatic pressure at the prostatic bed is an important factor for fluid absorption during TURP. This is dependent on the height of irrigating fluid column, and pressure inside the bladder during surgery (25). For good vision during resection, 60 cm is the suggested ideal height of irrigating fluid to obtain around 300 g of fluid per minute. In this study, the irrigation fluid column height was constant so that other determinants could be assessed.

In patients with deranged electrolytes, a higher volume of irrigant was found to be used in previous studies (26). Several proposed strategies are present for reduction in risk of fluid absorption during TURP, but none has been completely successful. Resection time is suggested to be kept below 60 min for minimal fluid absorption (27). In our study, three patients developed clinical TUR syndrome (0.3%), and the value of <135 mEq/L was used to define hyponatremia. In relation to potassium, post-operative hyperkalemia may result due to cell lysis and release of intracellular potassium, or due to acute

kidney injury secondary to sepsis or obstruction. A significant change in serum potassium levels was not encountered post-operatively, which can be explained by the fact that absorption of irrigation fluid causes hemodilution and offsets any changes in potassium. Also with the use of 1.5% glycine as an irrigant, hemolysis is comparatively minimal (28). Few studies have investigated the usefulness of routine electrolyte testing following TURP (29). Most of them focused on post-TURP Hb monitoring (30). It was concluded that post-operatively, routine blood testing is unnecessary and should only be sought on clinical need or after technically demanding surgery. Newer techniques, such as bipolar resectoscopes and vaporizing of tissue instead of resection, have caused reduction in absorption of fluid and hence electrolyte imbalance. Therefore, routine monitoring of fluid absorption has been abandoned in many hospitals. However, no guideline on routine monitoring of post-operative electrolytes is present. It has been shown in this study that post-operative Hb and electrolyte monitoring contributed to a change in the management of only 14% of patients as only 2.7% patients needed blood transfusion and 11% patients needed treatment for hyponatremia. Therefore, routine Hb and electrolyte measurements post-operatively are not required in every patient.

In view of the above findings, a more practical approach is suggested. A risk stratification strategy should be implemented, which will help decide which patients need post-operative lab testing. As a result, elimination of unnecessary investigations will be more cost effective and comfortable for patients.

Study Limitations

There are a few limitations in this study. As this is a retrospective study, information related to resected volume of the prostate was not available. Lack of uniformity in terms of expertise of different surgeons was another limitation.

Conclusion

Routine Hb and electrolyte measurements post-operatively are not required in every patient. Use of risk stratification approach will help us decide which patient needs post-operative lab testing.

Ethics

Ethics Committee Approval: Ethical review committee approval was taken before commencement of this study from the Kidney Centre Ethical Review Committee, Under the Auspices of Dorab Patel Post Graduate Training and Research Centre (reference number: 26-URO-062015).

Informed Consent: Retrospective study.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: M.H.A.M., S.E.K., Concept: M.H.A.M., Design: M.H.A.M., Data Collection or Processing: M.H.A.M., S.A.K., I.S., A.S.A., Analysis or Interpretation: M.H.A.M., S.A.K., I.S., Literature Search: M.H.A.M., S.E.K., A.S.A., Writing: M.H.A.M., S.E.K.

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