PREDICTIVE FACTORS OF BLOOD TRANSFUSION AFTER TURP AT SARDJITO GENERAL HOSPITAL YOGYAKARTA

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ABSTRACT

Objective: *To know the factors that can predict the need for blood transfusions after transurethral resection of the prostate (TURP) at Dr. Sardjito General Hospital.* ***Material & method:*** *This is a retrospective study. Analysis performed on 250 patients who underwent TURP between the years 2013 to 2015. The independent variables evaluated were age, body mass index (BMI), the estimated size of the prostate by transabdominal ultrasonography (TAUS), duration of surgery, hemoglobin level (Hb), the value of international normalized ratio (INR), history of hypertension, diabetes mellitus (DM) and the use of aspirin, and leukosituria. The dependent variable evaluated was the estimated amount of bleeding which was described by the blood transfusion requirements in patients after TURP.* ***Results:*** *Hb levels before surgery (p=0.000), history of hypertension (p=0.001) and a history of aspirin consumption (p=0.008) had a significant association with blood transfusion after TURP. The Hb cut-off value was 12.45 g/dl. Age, BMI, the estimated size of the prostate by TAUS, duration of surgery, history of diabetes and leukosituria did not have a significant association with blood transfusion after TURP.* ***Conclusion:*** *The results showed that Hb levels before surgery, a history of hypertension and aspirin usage can be predictive factors for blood transfusions after TURP.*

Keywords: *Transurethral resection of the prostate, benign prostate enlargement, blood transfusion.*

ABSTRAK

Tujuan: *Mengetahui faktor-faktor yang dapat memprediksi kebutuhan transfusi darah pasca tindakan transurethral resection of the prostate (TURP) di RSUP Dr. Sardjito Yogyakarta.* ***Bahan & cara:*** *Penelitian ini merupakan penelitian retrospektif. Dilakukan analisis pada 250 pasien yang menjalani tindakan TURP antara tahun 2013 sampai dengan tahun 2015. Variabel bebas yang dievaluasi adalah usia, indeks massa tubuh, taksiran ukuran prostat berdasarkan transabdominal ultrasonografi (TAUS), kadar prostate spesific antigen (PSA), durasi operasi, kadar hemoglobin (Hb), nilai international normalized ratio, pemeriksaan digital rectal examination (DRE), hasil patologi anatomi, riwayat hipertensi, riwayat diabetes mellitus (DM), riwayat pemakaian aspirin dan adanya lekosituria. Variabel terikat yang dievaluasi adalah estimasi jumlah perdarahan yang digambarkan oleh kebutuhan transfusi darah pada pasien pasca tindakan TURP.* ***Hasil:*** *Kadar Hb sebelum operasi (p=0.000), riwayat hipertensi (p=0.001) dan riwayat penggunaan aspirin (p=0.007) mempunyai hubungan yang signifikan dengan kebutuhan transfusi darah pasca TURP. Diperoleh cut-off value Hb sebesar 12.45 g/dl. Usia, indeks massa tubuh, taksiran ukuran prostat berdasarkan TAUS, kadar PSA, durasi operasi, pemeriksaan DRE, hasil patologi anatomi, riwayat DM dan adanya leukosituria tidak mempunyai hubungan yang signifikan dengan kebutuhan transfusi darah pasca TURP.* ***Simpulan:*** *Hasil penelitian ini menunjukkan bahwa kadar hemoglobin sebelum operasi, riwayat hipertensi dan riwayat penggunaan aspirin dapat menjadi faktor prediktif dibutuhkannya transfusi darah pasca TURP.*

Kata kunci: *Transurethral resection of the prostate, pembesaran prostat jinak, transfusi darah.*

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INTRODUCTION

Transurethral resection of the prostate (TURP) is a gold standard therapy for benign prostatic hyperplasia (BPH) which causes bladder outlet obstruction (BOO) symptoms. Prostate is a gland that contains many blood vessels vascularization. The arterial supply to the prostate derives from the inferior vesical artery, internal pudendal artery, and medial rectal artery. The veins from the prostate are drained into periprostatic plexus that has a connection with dorsal veins of the penis and

internal iliacvein.[1]

Histopathology of BPH is characterized by the increased proliferation of stromal and acinar cells, supported by the increased vascularization (neoangiogenesis) and the increased expression of vascular endothelial growth factor.[2]

The mortality rate after TURP occurred less than 1%, they were caused by the absorption of irrigation fluid, infection and bleeding primarily. Bleeding complication during and after TURP influenced by many factors. Arterial bleeding occurs in infection cases before surgery or urinary retention due to swelling on the glands. In general, venous bleeding occurs due to the perforation of the capsule so that the veins were injured.[3]

The need for blood transfusion for patients after TURP is about 1-4%.[4] Until now, there is a lot of controversy about the factors that influence the need for blood transfusion for patients after TURP. Factors which are considered able to influence the bleeding during and after TURP include the resected prostate weight, the duration of prostate resection, prostate tissue histology, presence or absence of urinary tract infection, and the use of anticoagulant before surgery.[5]

The aspirin consumption in patients who underwent TURP is associated with increased bleeding risk, which is confirmed in a prospective randomized placebo-controlled trials study and obtains a recommendation that aspirin termination 10 days before surgery can reduce the risk of perioperative bleeding in TURP. Several researchers have reported a decrease in the risk of bleeding when TURP is conducted by giving Atropine Sulfate previously, while another study showed that there is no relationship between them.[6]

Blood transfusion is not without a risk. The side effects of allogeneic blood transfusion were the transmission of infectious diseases, immuno-suppression, acute lung injury and transfusion reactions. The cost implication for blood transfusion is also significant and includes direct and indirect costs derived from additional treatment costs and prolonged hospitalization. In a study conducted in the United States, avoiding allogeneic transfusion reduces the total cost of treatment about five thousand dollars per patient.[7]

OBJECTIVE

The objective of this study is to find out the factors which are able to predict the need for post-TURP blood transfusion at Dr. Sardjito General Hospital.

MATERIAL & METHOD

The research design used in this study is a retrospective study from medical records of Dr. Sardjito General Hospital in order to determine the predictive factors for post-TURP blood transfusion at Dr. Sardjito General Hospital in 2013-2015. This research was conducted at Dr. Sardjito General Hospital. The research was conducted from 2013-2015. The population of the research was all patients who underwent TURP at Dr. Sardjito General Hospital in 2013-2015. Samples taken in the study were all patients who underwent TURP and needed a blood transfusion after TURP at Dr. Sardjito General Hospital in 2013- 2015.

The inclusion criteria were patients who underwent TURP and needed blood transfusion after TURP. Exclusion criteria were the patients with a preoperative hemoglobin of less than 10 g/dl, with a history of getting 5-alpha-reductase inhibitor therapy, incomplete medical records and anatomic pathology examination results in the form of prostate carcinoma.

All TURP intervention were done by using an exactly identical 24 Fr resectoscope, with standardized sterile aquadest irrigation fluid and regional (spinal) anesthesia technique without exception. The duration of resection was measured from the insertion of resectoscope until its removal. Normal saline fluid was used for bladder irrigation after TURP. All patients in this research underwent TURP by using an identical set of TURP tools and identical anesthesia technique so there were no analysis on the tools and anesthesia factors. Operators in this study were senior residents with the number of TURP work experience of at least 10 times.

RESULTS

Based on data from 217 patients, the average age of the patients who underwent TURP was 68.24 ± 9.29 years. The average of body mass index of patients was 22.03 ± 3.06 kg/m^2. The average of prostate size of patients who took TURP based on the estimation of ultrasonography was 39.36 ± 13.79 ml. The average of duration of TURP surgery in this research was 52.40 ± 10.12 minute. The average of preoperative hemoglobin levels of patients who took

TURP was 12.44 ± 1.68 g/dl and was 11.86 ± 1.81 g/dl for the post-TURP with an average of decrease in hemoglobin concentration of 1.36 ± 0.61 g/dl. The average of INR value before TURP in this research was 1.08 ± 0.13.

A history of co-morbid diseases such as hypertension was found in 76 patients (35.0%), while diabetes mellitus was found in 33 patients (15.2%). A history of aspirin consumption was found in 11 patients (5.1%) and leucocyturia in 182 patients (83.9%). The patients who required transfusions were 36 patients (16.6%).

Table 1. The characteristics of research subjects (numeric variables).

Variable	Mean ± SD
Age (years)	68.24 ± 9.29
BMI (kg/m^2)	22.03 ± 3.06
TAUS (ml)	39.36 ± 13.79
Duration of surgery (minutes)	52.40 ± 10.12
Pre-operative hemoglobin (g/dl)	12.44 ± 1.68
Post-operative hemoglobin (g/dl)	11.86 ± 1.81
Hemoglobin	1.36 ± 0.61
Pre-operative INR	1.07 ± 0.13

Table 2. The characteristics of research subjects (categorical variables).

Variable		Total
History of hypertension	Yes	76 (35.0%)
	No	141 (65.0%)
History of DM	Yes	33 (15.2%)
	No	184 (84.8%)
History of aspirin consumption	Yes	11 (5.1%)
	No	206 (94.9%)
Urine leucocytes	Yes	182 (83.9%)
	No	35 (16.1%)
Blood transfusion	Yes	36 (16.6%)
	No	181 (83.4%)

Table 3. Data analysis results.

Variable	Blood transfusion	No blood transfusion	p	Test
Age (years)	69.5 ± 10.6	67.9 ± 9.01	0.261	T-test
BMI (kg/m^2)	21.81 ± 2.68	22.07 ± 3.04	0.509	Mann Whitney-U
TAUS (ml)	41.53 ± 14.32	38.93 ± 13.67	0.272	Mann Whitney-U
Duration of surgery (minutes)	53.33 ± 10.48	52.21 ± 10.07	0.473	Mann Whitney-U
Pre-operative Hb (g/dl)	10.83 ± 0.74	12.76 ± 1.63	0.000	Mann Whitney-U
Pre-operative INR	1.12 ± 0.12	1.06 ± 0.13	0.055	Mann Whitney-U
History of hypertension				Mann Whitney-U
Yes	25 (32.9)	51 (67.1)	0.001	
No	11 (7.8)	130 (92.2)		
History of DM				Mann Whitney-U
Yes	7 (21.2)	26 (78.8)	0.439	
No	29 (15.8)	155 (84.2)		
Aspirin				Mann Whitney-U
Yes	5 (45.5)	6 (54.5)	0.008	
No	31 (15.0)	175 (85.0)		
Urine leucocytes				Mann Whitney-U
Positive	33 (18.1)	149 (81.9)	0.165	
Negative	3 (8.6)	32 (91.4)		

An analysis was made from these data for the relationship between post-TURP transfusion needs with varied factors such as age, BMI, estimated prostate size, duration of surgery, pre-TURP hemoglobin level, INR value, history of diabetes and hypertension, history of aspirin consumption and the presence of leucocyturia.

DISCUSSION

This research finds that the average age of patients who need blood transfusion were older than those who do not need a post-TURP blood transfusion, but there was no statistically significant relationship between age and the need for post-TURP blood transfusion (p=0.261). Although it is different from the results of previous studies which implies that age significantly increases the need for postoperative transfusion, but age is not a factor that is considered to affect hemostasis in TURP.[5,8]

The average of BMI of patients who need post-TURP blood transfusion were lower than those who do not need transfusion, but there was no statistically significant relationship between BMI and the need for post-TURP blood transfusion (p=0.509). BMI is not one of the factors that affect hemostasis in TURP.[5]

The average of the estimated size of the prostate of patients who need post-TURP blood transfusion were greater than those who do not need transfusion, but there was no statistically significant relationship between estimated size of the prostate by TAUS and the need for post-TURP blood transfusion (p=0.272). This is in contrast to the results of previous study which states that the weight of the prostate measured by transrectal ultrasonography (TRUS) has a significant relationship with the increased blood loss during surgery.[9] The differences between the accuracy level of TRUS and TAUS may lead to those differences in the results.[9,10]

The average of duration of surgery of the patients who need blood transfusions after TURP were longer than those who do not need transfusion, but there was no statistically significant relationship between the duration of surgery and the need for post-TURP blood transfusion (p=0.473). Therefore, the average of those two sample groups were still under 60 minutes, so it is in line with the results of previous studies which state that the time of resection longer than 60 minutes is correlated with the increased blood loss in TURP significantly.[9,11,12]

The preoperative hemoglobin level of the patients who need post-TURP blood transfusion were lower than those who do not need transfusion and there was no statistically significant relationship between preoperative hemoglobin level and the need for post-TURP blood transfusion (p=0.000). This is in line with the results of previous studies which proves that the optimization of preoperative hemoglobin level can significantly reduce the need for postoperative transfusion. The analysis of receiver operating characteristic (ROC) curve shows the cut-off value of minimal Hb level of the patients who do not need post-TURP blood transfusion of 12.45 g/dl.[13]

The average of preoperative INR value of the patients who need post-TURP blood transfusion were higher than those who do not need blood transfusion, but there was no statistically significant relationship between preoperative INR value and the need for post-TURP blood transfusion (p=0.055). Although the hemostasis factor described with INR value generally affects the amount of blood loss during surgery, but it did not reflected at the results of this research because all of the patients who underwent TURP had the INR value that is still within the normal limit. Whereas the remaining patients who have impaired hemostasis were usually corrected firstly.[14]

In general, the comorbid diseases did not include among the factors that affect hemostasis in TURP.[14] But in this research, it found a statistically significant relationship between the history of hypertension and the need for post-TURP blood transfusion (p=0.001), but there was no statistically significant relationship between the history of diabetes mellitus and the need for post-TURP blood transfusion (p=0.439). The high pressure in the blood vessels may increase the amount of bleeding in TURP, although at the time of surgery, blood pressure was always controlled by the anesthesia team. Further research may be useful to explain the relationship between hypertension and the amount of bleeding in TURP.

There was a statistically significant relationship between the history of aspirin consumption with the need for post-TURP blood transfusion (p=0.008). It was almost the same as the results of previous studies which found the aspirin consumption while taking TURP is associated with the increased blood loss significantly, although in this study, all of the aspirin consumption were stopped 5-7 days before surgery and the physiology

of hemostasis were within the normal limit value.[15]

There was no statistically significant relationship between the presence of leucocyturia and the need for post-TURP blood transfusion (p=0.165). There were study that mentioned UTI was associated with the increased significant secondary bleeding after TURP although there wasno study that prove it is associated with the increased perioperative blood loss.[11]

CONCLUSION

The results showed that Hb levels before surgery, a history of hypertension and aspirin usage can be predictive factors for blood transfusions after TURP.

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