https://doi.org/10.29309/TPMJ/2024.31.11.8188

The Professional Medical Journal
www.theprofesional.com
2024, Volume, 31 Issue, 11

ORIGINAL ARTICLE

Comparison of mean postoperative decrease in hemoglobin level in patients undergoing transurethral resection of prostate with and without preoperative intraprostatic epinephrine.

Hafeez Sohaib Ahmad Warraich[1], Muhammad Akmal[2], Muhammad Tahir Bashir Malik[3], Muhammad Saifullah[4], Muhammad Sheraz Javed[5], Suaiba Ali[6]

Article Citation: Warraich HSA, Akmal M, Malik MTB, Saifullah M, Javed MS, Ali S. Comparison of mean postoperative decrease in hemoglobin level in patients undergoing transurethral resection of prostate with and without preoperative intraprostatic epinephrine. Professional Med J 2024; 31(11):1562-1567. https://doi.org/10.29309/TPMJ/2024.31.11.8188

ABSTRACT… Objective: To determine and compare the mean decrease in hemoglobin level from the baseline value in patients undergoing TURP with and without preoperative intraprostatic epinephrine injection. **Study Design:** Analytical Cross Sectional study. **Setting:** Department of Urology, Allied Hospital, Faisalabad. **Period:** Nov 2023 to Feb 2024. **Methods:** After ERC approval and taking informed consent a total of 40 patients with enlarged prostate and scheduled for TURP, having comparable baseline clinical and laboratory characteristics such as age, preoperative prostate size and baseline hemoglobin were enrolled in the study & were divided in two equal numbered groups called group A and group B, each having 20 patients in it. Before performing monopolar TURP group A patients were given 200mcg of intraprostatic epinephrine injection diluted in 20ml of normal saline (10ml in each right & left lobe) under transrectal ultrasonic guidance via the transperineal route, while no such intervention was done before TURP in group B patients. One pint of whole blood was transfused to the patients of both the groups intraoperatively and blood samples were sent to laboratory on 1st post-operative day to determine the postoperative hemoglobin levels of patients of both the groups. Data was entered on the designated pro forma for analysis. **Results:** Postoperative hemoglobin levels were significantly higher in group A patients (mean and S.D 11.83 ±1.01 g/dl) as compared to the group B patients (mean and S.D 11.00 ± 1.06 g/dl) with a p value of 0.015, and hence drop of hemoglobin levels from the baseline values were lower in group A patients (mean and S.D 1.28 ± 0.89 g/dl) as compared to the group B patients (mean and S.D 2.31 ± 0.98 g/dl), confirming a statistically significant difference with p value of 0.001. **Conclusion:** The hemorrhage associated with TURP can be decreased significantly by giving preoperative intraprostatic epinephrine injection. This is a clinically safe technique that can not only reduce the postoperative blood transfusion requirements but can also allow the operating surgeon to resect more tissue within the desired time thus increasing the efficacy of TURP.

Key words: Bladder Outlet Obstruction (BOO), Intraprostatic Epinephrine, Postoperative Hemoglobin, Transurethral Resection of Prostate (TURP).

INTRODUCTION

Benign Prostatic enlargement (BPE) is a common cause of bladder outlet obstruction (BOO) leading to occurrence of lower urinary tract symptoms (LUTS) in males. Up to 50% of male population with age greater than 50 years and up to 80% of male population with age greater than 80 years suffer from benign prostatic enlargement related LUTS.[1] Treatment strategies include modifying the life style, medications and surgical interventions, each having their own respective indications. Surgery is generally performed on patients who have severe LUTS or those who do not respond well to the non-surgical options. Transurethral resection of the prostate (TURP) has been the historical gold standard for many years when it comes to the surgical management.[1] Even in the present times it has maintained its importance because of the remarkable developments in technology and technique.[2]

Intraoperative bleeding is one of the commonest intraoperative complications of TURP. A study showed that 4.4% of patients required transfusion

1. MBBS, FCPS (Urology), Senior Registrar Urology & Renal Transplantation, Allied Hospital/Faisalabad Medical University, Faisalabad.
2. MBBS, FCPS (Urology), Associate Professor Urology & Renal Transplantation, Faisalabad Medical University, Faisalabad.
3. MBBS, FCPS (Urology), FRCS (Urology) Assistant Professor Urology, Faisalabad Medical University, Faisalabad.
4. MBBS, FCPS (Urology), Senior Registrar Urology & Renal Transplantation, DHQ Hospital/Faisalabad Medical University, Faisalabad.
5. MBBS, FCPS (Urology), Senior Registrar Urology & Renal Transplantation, Allied Hospital/Faisalabad Medical University, Faisalabad.
6. MBBS, FCPS (Urology), Senior Registrar Urology, Aziz Fatima Medical & Dental College, Faisalabad.

Correspondence Address:
Dr. Hafeez Sohaib Ahmad Warraich
Department of Urology & Renal Transplantation
Allied Hospital/Faisalabad Medical University, Faisalabad.
sohaib135@gmail.com

Article received on: 19/03/2024
Accepted for publication: 29/08/2024

after TURP; this is why it is very important to maintain hemostasis throughout the procedure and afterwards.[2] Intra-operatively it can be achieved by electro fulguration of the arterial spurts but this slows down the resection process leading to increased operation time.[2] For venous bleeding the catheter can be subjected to traction to maintain pressure on the prostatic fossa post-operatively.[2] Other strategies to reduce the TURP related bleeding include preoperative prescription of oral 5-alpha reductase inhibitors (5-ARIs) like dutasteride and finasteride.[3] Intravenous use of Tranexamic Acid and Intraprostatic Phenol have also been proved to reduce TURP related blood loss.[4,5] A study concluded that injection of Fibrin glue in the prostatic fossa post-operatively was effective in decreasing TURP related blood loss.[6] A more recent study supports the use of Tranexamic Acid in the irrigation fluid during TURP and injection into the bladder postoperatively to decrease TURP related blood loss.[7]

Another agent is epinephrine which is an adrenergic receptor agonist and is used as a hemostatic agent due to its vasoconstrictive properties.[8] It has proven its significance to reduce blood loss and to maintain a bloodless surgery field during arthroplasty and in dental procedures.[9,10] It has also been proved as an effective agent to reduce bleeding in endoscopic ear surgery when used topically.[11] Recently few studies have explored and demonstrated encouraging results with its use as intra-prostatic injection before beginning TURP to reduce blood loss and subsequently reducing resection time, use of the irrigation fluid, and requirement of blood transfusion during/after TURP.[12,13,14] A very recent study emphasizing its importance has shown that Mean + S.D of Loss of Hemoglobin from the baseline in patients undergoing TURP with preoperative intraprostatic epinephrine was 1.15 + 0.42 g/dl as compared to the value of 1.87+1.04 g/dl in patients who received intraprostatic normal saline injection pre-operatively.[12] These results demonstrated a significant difference between both groups (p=0.007) in terms of blood loss.

The aim of this study is to further evaluate the role of intraprostatic injection of epinephrine when given before TURP in reducing TURP related blood loss.

METHODS

After seeking approval from the ethical review committee (48-ERC/FMU/2022-23/356-27-11-23) and obtaining informed consent a total of 40 male patients between Nov. 2023 to Feb. 2024 fulfilling the inclusion criteria of prostate size ≥60g, age ≥50 years and undergoing TURP were included in the study with the objective to determine the mean decrease in hemoglobin level from the baseline value, when the TURP was performed with and without preoperative intraprostatic epinephrine by the consultant urologists having comparable experience. Patients taking any medications potentially altering TURP related bleeding were excluded as well as those with uncontrolled diabetes/ hypertension, DRE findings suspicious of malignancy and raised serum prostate specific antigen (PSA).

Patients were divided in two groups; group A & group B each having 20 patients in it (n=20), based on their serial number in the sequence such that the patients with odd serial numbers were included in group A while those with even serial number were included in group B. Group A patients were topically given 200mcg of epinephrine diluted in 20ml of normal saline preoperatively such that 10ml was injected in each of the right & left lobes after giving spinal anesthesia via the transperineal route under guidance of a transrectal ultrasound probe while this intervention was not done for group B patients. Every case of TURP involved the utilization of a 26FR continuous flow resectoscope with a monopolar current. Each patient received a single preoperative dose of IV ceftriaxone 1g, which was continued twice a day for two days after the operation. In accordance with local guidelines, all patients were transfused one-pint of whole blood during the surgery. Extensive cardiovascular monitoring was done throughout the duration of surgery and after shifting to the postoperative recovery room to promptly detect and manage any cardiovascular side effects associated with the epinephrine use and all the patients were carefully observed for any other immediate

post-TURP complication. On 1st postoperative day blood samples were sent to the hospital laboratory for detecting postoperative decrease in hemoglobin level from the baseline value and the data was entered in the designated research pro forma.

Data was analyzed using SPSS V-25. Mean ± SD were calculated for quantitative variable like age, preoperative hemoglobin, preoperative prostate size and postoperative hemoglobin and decrease in hemoglobin level from the baseline value and t test was applied for comparison between the two groups. There are no qualitative variables in this study. P value ≤ 0.05 was taken as significant.

RESULTS

Each of the groups A & B included 20 patients and both of the groups were comparable in terms of age of the patients (p = 0.173) and also there was no significant difference between the two groups in terms of preoperative prostate size (p = 0.423) and preoperative hemoglobin levels (p = 0.214). Upon analysis of the postoperative data it was revealed that postoperative levels of hemoglobin were significantly higher in group A as compared to the group B (p= 0.015) and hence drop of hemoglobin levels from the baseline values were lower in group A patients as compared to the group B patients, confirming a statistically significant difference (p = 0.001). Table-I shows the mean and standard deviation of baseline characteristics of both the groups along with the respective p values, while Table-II shows the mean and standard deviation of the data collected postoperatively along with the respective p values. There were no complications noted in patients of both the groups during the immediate one week postoperatively.

DISCUSSION

Benign prostatic enlargement leading to appearance of symptoms related with the lower urinary tract is a fairly common condition in older males and statistics are consistent among all the regions of the world. TURP is the most common surgical procedure performed worldwide to treat such symptomatic cases when indicated for example failure of the life style and pharmacological interventions to provide any significant clinical benefit as determined by the international prostate scoring system (IPSS), development of any urological complications related with the bladder outlet obstruction due to an enlarged prostate or when there is retention of the urine refractory to the use of pharmacological agents for example alpha adrenergic receptor blockers.

Variables	Group A (n= 20) Intraprostatic Epinephrine	Group B (n= 20) No Intraprostatic Epinephrine	P-Value
Age (years) (Mean with S.D)	68.7 ± 2.65	69.8 ± 2.34	0.173
Prostate size (grams) (Median with IQR)	70 IQR 5	70 IQR 5	0.423
Preoperative hemoglobin (g/dl) (Mean with S.D)	13.50 SD 0.89	13.16 SD 0.82	0.214

Table-I. Baseline characteristics of group A & group B

Variables	Group A (n= 20) Intraprostatic Epinephrine	Group B (n= 20) No Intraprostatic Epinephrine	P-Value
Postoperative hemoglobin (g/dl) (Mean with S.D)	11.83 SD 1.01	11.00 SD 1.06	0.015
Drop in hemoglobin from the baseline value (g/dl) (Mean with S.D)	1.28 SD 0.89	2.31 SD 0.98	0.001

Table-II. Postoperative data of group A & group B

Recently there has been made much technological advancement towards developing other minimally invasive solutions for the symptomatic enlarged prostate but they not only require a lot of the training of the urologists but are also expensive and not readily available especially in developing countries. For this reason TURP continues to maintain its position as the gold standard surgical procedure for the bladder outlet obstruction caused by an enlarged prostate when indicated.

TURP is a relatively safe surgical procedure however the associated hemorrhage makes it challenging to complete the procedure within the desired time i.e less than 90 minutes by hampering the visibility in the surgical field. This associated hemorrhage also leads to less amount of the prostatic tissue to be resected in the desired time because much of the time is utilized in electro fulgurating the bleeders and has a significant impact on increasing the postoperative requirements of blood transfusion. Several methods have been successfully tried with an aim to decrease the hemorrhage associated with the TURP. In this study the clinical experience at Urology Department, Allied Hospital, Faisalabad regarding the reduction in TURP associated hemorrhage is being reported when intraprostatic epinephrine injection was given preoperatively via the transperineal route under ultrasonic guidance of the injecting needle.

Urology department, Allied hospital, Faisalabad is a tertiary care center that caters patients not only from all over the Faisalabad Division but also from the nearby divisions of Punjab Province. Due to this busy nature of the department we had an excellent chance to conduct a research study on treatment options being offered to patients with symptomatically enlarged prostates especially the TURP, because a major proportion among all the patients admitted in Urology department, Allied Hospital, Faisalabad consists of the patients with a provisional plan of TURP.

In our study comprising of two research groups i.e. group A & group B each having 20 patients in it we observed significantly higher levels of postoperative hemoglobin among group A patients (who were given preoperative intraprostatic epinephrine injection) as compared to the patients among group B (who were not given preoperative intraprostatic epinephrine injection). The mean postoperative hemoglobin and standard deviation as calculated for group A and group B were 11.83 SD 1.01 g/dl and 11.00 SD 1.06 g/dl respectively with a statistically significant p value of 0.015. All the baseline characteristics i.e. age, preoperative prostate size and preoperative hemoglobin had no statistically significant difference among group A and group B. Further analysis confirmed that the mean drop in hemoglobin from the baseline hemoglobin was lower among group A patients as compared to the patients among group B with mean and standard deviation of the drop in hemoglobin values calculated to be 1.28 SD 0.89 g/dl and 2.31 SD 0.98 g/dl for group A and group B respectively with a highly significant p value of 0.001. None of the patients developed any complications in the immediate postoperative period in both the groups as evidence of the safety of the technique of intraprostatic epinephrine injection when performed under very careful cardiovascular monitoring.

The results of this study are consistent with those of a study that was conducted at The Kidney Centre Postgraduate Training Institute, Karachi, Pakistan that reported a significantly lesser hemoglobin drop from the baseline value when intraprostatic epinephrine injection before TURP was given (mean and SD 1.15 $\pm$ 0.42) as compared to when no intraprostatic epinephrine injection was given before TURP (mean and SD 1.87 $\pm$ 1.04).[12]

TURP is a procedure that can offer significant relief of the lower urinary tract symptoms in patients with enlarged prostate when properly indicated. The efficacy of the TURP can be significantly increased and associated morbidity can be significantly reduced when TURP is started in conjunction with a preoperative injection of epinephrine in the prostatic tissue under ultrasonic guidance through the transperineal route. The introduction of special needles in the local market that are cost effective, readily available and are able to deliver

intraprostatic injections under direct visualization of the prostatic lobes through the working ports of ordinary cystoscopes/resectoscopes can further facilitate the job by ending dependency on the transrectal ultrasonic guidance.

CONCLUSION

The hemorrhage associated with TURP can be decreased significantly by giving preoperative intraprostatic epinephrine injection. This is a clinically safe technique that can not only reduce the postoperative blood transfusion requirements but can also allow the operating surgeon to resect more tissue within the desired time thus increasing the efficacy of TURP.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

SOURCE OF FUNDING

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

REFERENCES

1. Lokeshwar SD, Harper BT, Webb E, Jordan A, Dykes TA, Neal Jr DE, et al. **Epidemiology and treatment modalities for the management of benign prostatic hyperplasia.** Translational Andrology and Urology. 2019 Oct; 8(5):529-39. doi:10.21037/tau.2019.10.01

2. Welliver C, Helo S, McVary KT. **Technique considerations and complication management in transurethral resection of the prostate and photoselective vaporization of the prostate.** Translational Andrology and Urology. 2017 Aug; 6(4):695-703. doi:10.21037/tau.2017.07.30

3. Kloping YP, Yogiswara N, Azmi Y. **The role of preoperative dutasteride in reducing bleeding during transurethral resection of the prostate: A systematic review and meta-analysis of randomized controlled trials.** Asian Journal of Urology. 2022 Jan; 9(1):18-26. doi:10.1016/j.ajur.2021.05.011

4. Meng Q, Pan N, Xiong J, Liu N. **Tranexamic acid is beneficial for reducing perioperative blood loss in transurethral resection of the prostate.** Experimental and Therapeutic Medicine. 2018 Nov 28; 17:943-7. doi:10.3892/etm.2018.7025

5. Soleimani M, Masoumi N, Nooraei N, Lashay A, Safarinejad MR. **The effect of fibrinogen concentrate on perioperative bleeding in transurethral resection of the prostate: A double□blind placebo□controlled and Randomized Study.** Journal of Thrombosis and Haemostasis. 2017 Feb; 15(2):255-62. doi:10.1111/jth.13575

6. Ghanaat I, Khorrami M, Tadaion F, Alizadeh F. **The efficacy of fibrin glue injection in the prostatic fossa on decreasing postoperative bleeding following transurethral resection of prostate.** Advanced Biomedical Research. 2016 Feb 17; 5(1):161. doi:10.4103/2277-9175.192733

7. Tawfick A, Mousa W, El-Zhary AF, Saafan AM. **Can tranexamic acid in irrigation fluid reduce blood loss during monopolar transurethral resection of the prostate? A randomized controlled trial.** Arab Journal of Urology. 2022 Jan 23; 20(2):94-9. doi:10.1080/2090598x.2022.2026011

8. Chow Y-C, Hsu W-H, Chen M, Lin W-C, Chiu AW. **Safety and efficacy of intravesical epinephrine instillation in patients with intractable lower urinary tract hematuria – a novel approach.** Urology. 2023 May; 175:216-22. doi:10.1016/j.urology.2023.02.005

9. Liu H, Liu Z, Zhang Q, Guo W. **Utilization of epinephrine-soaked gauzes to address bleeding from osteotomy sites in non-tourniquet total Knee Arthroplasty: A retrospective cohort study.** BMC Musculoskeletal Disorders. 2020 Aug 25; 21(1):578. doi:10.1186/s12891-020-03595-6

10. Vág J, Gánti B, Mikecs B, Szabó E, Molnár B, Lohinai Z. **Epinephrine penetrates through gingival sulcus unlike keratinized gingiva and evokes remote vasoconstriction in human.** BMC Oral Health. 2020 Nov 4; 20(1):305. doi:10.1186/s12903-020-01296-z

11. Alicandri-Ciufelli M, Molinari G, Beckmann S, Caversaccio M, Presutti L, Anschuetz L. **Epinephrine use in endoscopic ear surgery: Quantitative safety assessment.** ORL. 2019 Nov 19; 82(1):1-7. doi:10.1159/000503725

12. Zohaib A, Siddiq A, Khalid SE, Mithani S, Hassan W, Saleem M**. Intra-prostatic injection of epinephrine during transurethral resection of prostate reduces blood loss and need for blood transfusions.** Pakistan Journal of Medical and Health Sciences. 2023 May 27; 17(5):38-41. doi:10.53350/pjmhs202317538

13. Lira-Dale A, Maldonado-Ávila M, Gil-García JF, Mues-Guizar EH, Nerubay-Toiber R, Guzmán-Esquivel J, et al. **Effect of intraprostatic epinephrine on intraoperative blood loss reduction during transurethral resection of the prostate.** International Urology and Nephrology. 2011 Oct 16; 44(2):365-9. doi:10.1007/s11255-011-0071-2

14. Stenmark F, Brundin L, Gunnarsson O, Kjölhede H, Lekås E, Peeker R, et al. **A randomized study of TURP after intraprostatic injection of mepicacaine/adrenaline versus regular TURP in patients with LUTS/BPO.** Scandinavian Journal of Urology. 2023 Aug 24; 58:46-51. doi:10.2340/sju.v58.7798

AUTHORSHIP AND CONTRIBUTION DECLARATION

No.	Author(s) Full Name	Contribution to the paper	Author(s) Signature
1	Hafeez Sohaib Ahmad Warraich	Principal author, Pricipal researcher.	
2	Muhammad Akmal	Co-Author.	
3	Muhammad Tahir Bashir Malik	Co-Author, Statistical analysis.	
4	Muhammad Saifullah	Co-Author.	
5	Muhammad Sheraz Javed	Co-Author, Data collection.	
6	Suaiba Ali	Co-Author.	