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ORIGINAL ARTICLE

COMPARISON OF GLYCINE VERSUS STERILE WATER USE IN TRANSURETHRAL RESECTION OF THE PROSTATE (TURP): A CROSS SECTIONAL STUDY

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ABSTRACT

Introduction: *All endoscopic surgery in urology needs irrigant fluid for the clear visibility and to wash out the blood and debris. Glycine 1.5% is widely accepted, but sterile water is cheaper and easily available. All types of irrigants are responsible to cause electrolyte disturbance in different degrees. In our study, we compared glycine 1.5% with sterile water as the irrigant fluid.*

Methods: *In this prospective, observational study where 64 patients were included with 31 patients on the sterile group and 33 patients in the Glycine group. Hemoglobin, sodium, and potassium was analyzed postoperatively after 6 hours. Weight of prostate, resection volume, volume of fluid, and resection time were calculated.*

Results: *There were changes in the parameters of hemoglobin and sodium but was not statically significant, whereas the change in potassium was statically significant in both groups.*

Conclusions: *Sterile water is safe, inexpensive, and easy available fluid for TURP compared to glycine 1.5%. Study did not show any significant difference in using both fluids, our sample size was small and so needs a similar study with large sample size to confirm the observation.*

Keywords: *benign prostatic hyperplasia (BPH); glycine; transurethral resection of prostate (TURP)*

INTRODUCTION

Benign hyperplasia of the prostate (BPH) is one of the common diseases in men after the age of 40 years.[1] It usually presents with the feature of lower urinary tract symptoms (LUTS). BPH affect 50% males at the age of 55 to 60 years and the incidence increases with age.[2] Transurethral resection of the prostate (TURP) is still the gold standard endoscopic procedure for the treatment of BPH.[1] Nearly all endo-urological procedures require irrigation fluid to dilate the lumen, to enhance vision, to remove the clot, and to wash out the debris.[3]

Various irrigation solutions are used for TURP, such as sterile water, glycine, 1.5%, sorbitol, and mannitol.[4] Sterile water is easily available and can be used for irrigation in a limited resource setting.[5]

The possible complication of TURP procedure is due to systemic absorption of hypotonic irrigant fluid into the vascular system due to an open prostatic venous plexus during surgery.[6] Clinical manifestation occur due to absorption of fluid during TURP called as TURP syndrome. TURP syndrome is described in approximately 2 - 12% of patients who undergo TURP.[7]

Preventive measures such as low pressure irrigation,[8]as variable amounts of irrigation fluid are absorbed during TUR of the prostate (TURP limitation of the duration of procedure,[9] and limiting the fluid absorption might reduce postoperative complications. Supportive treatment is one of the important therapeutic approaches to managing the complication.

We conducted a prospective study to compare the electrolyte change using sterile water and glycine 1.5% as irrigation fluid in TURP.

MATERIALS AND METHODS

An observation study was conducted at the National Medical College, Department of Surgery, Urology Unit, Birgunj from January 2021 to September 2021. Total 64 cases who presented with LUTS and diagnosed as BPH scheduled for TURP were included in the study. Written informed consents were included in the study. Ethical clearance (FNMC/323/074/75) was obtained from the institutional review committee of NMC Birgunj.

Patients with Diabetic Nephropathy, Congestive Cardiac Failure, liver dysfunction, Bladder Tumor, urethral Stricture, etc. were excluded from this study. Patients were divided into 2 groups. The glycine group was irrigated with 1.5% glycine and included 33 patients, and the sterile water group was irrigated with sterile water and included 31 patients.

The sample size was calculated using the formula

$N = AB/(E/S)^2$

Where,

$A = (1/q_1 + 1/q_2) = 4$ where $q_1 = 0.5$ and $q_2 = 1 - q_1 = 0.05$

$B = (Z_\alpha + Z_\beta)^2 = 1.2507$ where $Z_\alpha = 1.96$ and $Z_\beta = 0.8416$

$E = m_1 - m_2 = 2.13$ where m is meant from Kulshreshtha et al.[5]

$S = \sqrt{0.5(\sigma_1^2 + \sigma_2^2)} = 6.79$ where σ_1 and σ_2 are obtained from Kulshreshtha et al.[5]

Placing all values in the formula, the sample size calculated was 28 cases in each group. The cases available during our study were 70, 6 cases were excluded after surgery from the study, and the remaining 64 were included in the study. Among the excluded cases, 4 were in the sterile water group and 2 were in the glycine group.

All necessary investigations were performed and the pre-anesthetic evaluation was performed 5 days before the operation. All patients received injection amikacin 750 mg IV one hour before the operation. All patients were operated under spinal anesthesia and all underwent monopolar TURP. The irrigation fluid was kept at a height of 60 cm from the table. A 26 Fr Karl Storz resectoscope was used with an electrocautery power supply of 120W cut and 70W coagulation. The surgery was performed in a single center and by a single surgeon.

The parameters assessed during the operation were operating time, amount of irrigation fluid used, and weight of the resected prostate. The weight of the prostate was measured using a food weighing scale after collecting the resected pieces in a container. Some parameters were assessed preoperatively and postoperatively after 6 hours, such as sodium, potassium, hemoglobin, and creatinine. After completion of the procedure, a 24 Fr three-way Foley's catheter was kept in traction. Patient was orally allowed after 6 hours. Tractions were released after 12 hours and irrigation stopped at 14 hours where applicable. Patients with no intraoperative and postoperative complications after 24 hours were discharged.

The data was collected in a performa sheet and transferred to Excel 2016. Statistical analysis was done using Statistical Package for the Social Sciences (SPSS) version 16. Variables were expressed in mean ± standard deviation, frequency, and percentage where applicable. Comparison between groups was done using the independent t-test, P value of <0.05 was considered significant.

RESULT

A total of 64 patients were included in this study and divided into the glycine group and the sterile water group with 33 (52%) and 31 (48%) patients, respectively. They were in the age group 50-86 years. Mean age of Glycine group was 67.156 ±9.96 years whereas the mean age of Sterile water group was 66.60 ±9.4854 years. None of the cases developed TURP syndrome in our study. All parameters were comparable. An independent t-test was used to compare the different parameters.

Significant difference was seen between preoperative (p=0.004) and post-operative (p<0.001) potassium concentration, respectively. Similarly, a significant difference was seen in the total volume of fluid (p= 0.034).

Table 1: Comparison of different parameters

	Glycine		Sterile water		p value
	Mean	SD	Mean	SD	
Age in years	67.156	9.6657	66.600	9.4854	0.82
Pre Op Hb (gm/dl)	11.3262	1.39716	11.9590	1.66662	0.11
Post Op Hb (gm/dl)	10.5769	1.35897	10.3853	1.77916	0.31
Pre Op Na (mmol/l)	131.844	31.3802	138.867	3.9017	0.23
Post Op Na (mmol/l)	131.625	31.0044	131.067	32.6105	0.95
Pre Op K (mmol/l)	4.3781	0.48972	4.0077	.49427	0.004
Post Op K (mmol/l)	4.4156	0.40410	3.9893	.44286	<.001
Wt of prostate (gm)	35.250	11.7116	41.700	17.6457	0.093
Volume of Fluid (L)	28.000	8.1518	23.267	9.0246	0.034
Resection Time (min)	40.188	9.9626	44.067	11.1198	0.15

A slight decrease in sodium concentration was observed postoperatively (138.8 to 131.067 g / dl) in the sterile water group, but compared to the glycine group the difference was not significant (p = 0.95). The total volume of fluid required for resection was greater in the Sterile water group (23.27±9.02 L) and was significant, p = 0.034.

The mean resection time in the Glycine group was 40.188±9.96 minutes while in the Sterile water group it was 44.067±11.119 minutes. The difference was statistically insignificant (p = 0.15).

There were no significant differences in preoperative hemoglobin levels in both groups. The hemoglobin level post-operatively was found to be slightly raised in Glycine group, whereas in sterile water group it was found slightly decreased after 6 hours of surgery. The difference was statistically insignificant (p = 0.31).

In both groups, the preoperative volume of sodium level was not significantly different. After 6 hours of surgery, there was slight decrease in sodium volume in both group and more in sterile water group, but the difference was statistically insignificant (p>0.05).

DISCUSSION

TURP is still a common standard procedure for the treatment of BPH which has taken advantage over open prostatectomy due to less morbidity and excellent results.[10–12]various minimally invasive surgical therapies were developed to treat benign prostatic hyperplasisa (BPH An ideal irrigant fluid for transurethral resection should be easily available, non-conductive, good visibility, isotonic, and has less side effects when absorbed.[13] Glycine is an endogenous amino acid with osmolality of 230 mosm/L[2]. It is cheap, transparent, and does not cause any allergy.[14] Excess glycine absorption of glycine can cause encephalopathy, metabolic acidosis, and TURP syndrome.[8]as variable amounts of irrigation fluid are absorbed during TUR of the prostate (TURP Sterile water is used with clear visibility and is easily available. Its disadvantage is hypo-osmolality, which can cause intravascular hemolysis, dilution hyponatremia, and renal failure.[15]

Absorption of irrigant fluids occurs due to breech of the capsule during resection, open prostatic sinuses, long duration of surgery, and high irrigation pressure. Significant absorption of fluid leads to intravascular expansion, hyponatremia with dilution, cerebral edema, and raised intracranial pressure.[16] To minimize fluid absorptions, we must avoid high irrigation pressure, minimize resection time, avoid deep resection, use of continuous flow resectoscope, and use of isotonic solution.[17]

Different studies have compared sterile water with glycine 1.5% in TURP, Moorthry et al.[18] and Kulshreshtha et al.[5] who studied changes in serum electrolyte and their correlation with various other parameters like duration of the procedure, weight of prostatic resected and volume of irrigating fluid.

In our study, preoperative and postoperative hemoglobin levels were compared in both groups and were statistically insignificant (p = 0.11 and 0.31, respectively). The fall in haemoglobin (Hb) after TURP was similar in both groups. Moharari et al.[19] and Memon et al.[20] have reported insignificant changes in hematocrit and free plasma hemoglobin levels in TURP with sterile water used as irrigating fluid. The study conducted by Dissayabutra compared sterile water with 5% dextrose and observed significant intravascular hemolysis after using sterile water (p<0.001).[21] The volume of irrigating fluid used was more (15.66±8.72) and a longer duration of surgery (57.14±26.81 min) in the study conducted with explain complications.

In our study, the value of serum sodium were slightly decreased in the postoperative period in both groups but more in sterile water group. The range of serum sodium was large in the Glycine group compared with the sterile water group. However, postoperatively the difference was negligible. However, the change is not statistically significant both before and after the operation (p = 0.23 and 0.95, respectively). In a review done by Moharari et al. among 1,600 patients who underwent TURP, the frequency of hyponatremia observed was 2.5%.[19] The mean irrigating fluid absorbed was less (293±25 ml) in their study and could explain the lesser frequency of hyponatremia.

In our study, the change in the value of the preoperative potassium level and postoperative potassium level is statistically significant (p= 0.004 and <0.001 respectively). When observed separately between the groups, the difference were about 1 mmol/L, but the difference in the preoperative potassium level in Glycine and sterile water groups was 4.4 and 4.0 mmol/L, respectively. Therefore, a significant difference was observed between the 2 groups.

Post-operative hypokalemia and hyperkalemia have been reported in literature with the use of 1.5% glycine and sterile water.[17, 19] The changes in serum potassium levels rely on both dilution hypokalemia due to fluid absorption and hyperkalemia due to intravascular hemolysis.

The limitation of this study was that the study was carried out in a single institution and therefore does not represent the whole population. We divided the case randomly into 2 different groups to reduce the bias.

CONCLUSION

According to our observation in the present study, sterile water is comparable to glycine 1.5%. It is a safe and easily available irrigant fluid for TURP. It did not change the value of sodium and potassium significantly in post-op period. We did not have any TURP syndrome cases in either group although, the sample size of the study is small to definitely conclude about the incidence of TURP. Similar study is needed with large sample size to reach a definite conclusion.

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