CASE REPORT

A rare complication of transurethral resection: Transient blindness

Necmi Bayraktar

Department of Urology, Burhan Nalbantoglu State Hospital, Lefkoşa-*Cyprus*

ABSTRACT

Transient blindness is an extremely rare complication of transurethral resection (TUR) syndrome, which is a well-known complication recognized by urologists and anesthesiologists. TUR syndrome arises from the intravascular absorption of hypotonic fluids during the procedure. In this case report, an 80-year-old male patient experienced transient blindness after undergoing transurethral resection of the prostate. The patient's medical history included hypertension, lung cancer in remission, and paroxysmal atrial fibrillation. The surgery was performed under spinal anesthesia. During the procedure, the patient was found to be blind. The patient's postoperative blood samples revealed elevated plasma glycine levels, which is a known risk factor for TUR syndrome. The patient's visual impairment began to improve without further intervention. This case report highlights the importance of considering the patient's medical history and the potential risks associated with TUR syndrome.

Keywords: Glycine intoxication; transient blindness; transurethral resection; TUR syndrome.

INTRODUCTION

Transurethral resection (TUR) syndrome is a well-known complication recognized by both urologists and anesthesiologists. Transient blindness due to glycine intoxication is an extremely rare manifestation of TUR syndrome. This condition arises from the intravascular absorption of hypotonic fluids during the procedure. In clinical practice, low-cost, non-conductive hyperosmotic irrigation solutions containing 1.5% glycine are commonly utilized. The accumulation of glycine and its metabolites, which is dose-dependent, can occur independently of volume and electrolyte imbalance, leading to the development of TUR syndrome.[1,2] Prolonged surgical procedures and certain surgical techniques may increase the risk of developing TUR syndrome. The absorption of irrigation fluid carries its own risks, which can vary based on factors such as the use of hypotonic solutions and large volumes of irrigation fluid. Patients with preexisting health conditions, such as cardiovascular or renal diseases, may be at higher risk of developing TUR syndrome. Additionally, age can also contribute to the patient's risk profile. It is important to consider these factors when assessing the potential risks associated with TUR syndrome.[3] Complications associated with traditional irrigation solutions, such as glycine toxicity, underscore the need to transition to modern irrigation solutions. This serves as further evidence supporting a switch to safer, isotonic alternatives.

A multitude of hypotheses have been proposed to explain the genesis of TUR syndrome, which is characterized by intraoperative and postoperative symptoms such as headache, cerebral edema, convulsion, confusion, disorientation, fear, dyspnea, cyanosis, nausea, vomiting, coma, hypertension, or hypotension. Some of the mechanisms proposed to contribute to the development of TUR syndrome include intravascular fluid absorption, hyponatremia, hyperammonemia, and hyperglycemia.[4,5]

Glycine is metabolized in the liver, producing ammonia and glyoxylic acid, and acts as an inhibitory mediator in both the retina and central nervous system. Elevated serum glycine levels exceeding 4000 µmol/L have been associated with the development of visual impairments.[6] Thus, while glycine has

Cite this article as: Bayraktar N. A rare complication of transurethral resection: Transient blindness. Ulus Travma Acil Cerrahi Derg 2024;30:921-924.
Address for correspondence: Necmi Bayraktar
Department of Urology, Burhan Nalbantoglu State Hospital, Lefkoşa, Cyprus
E-mail: nbayraktar@ciu.edu.tr
Ulus Travma Acil Cerrahi Derg 2024;30(12):921-924 DOI: 10.14744/tjtes.2024.33979
Submitted: 23.03.2024 Revised: 08.09.2024 Accepted: 24.10.2024 Published: 04.12.2024

been a preferred choice due to its non-conductive properties, complications such as transient blindness further justify transitioning to modern irrigation solutions in settings where monopolar techniques are still utilized.

Our primary objective was to demonstrate our clinical expertise in the context of a single case of transient blindness resulting from glycine toxicity.

Ethical Considerations

Consent forms were obtained from patients prior to surgery, and ethical approval was granted by the TRNC Ministry of Health's Ethics Committee (Number: YTK.1.01-EK28/22).

CASE REPORT

An 80-year-old male patient hospitalized in the chest diseases ward was referred to the urology department for lower urinary tract symptoms. The patient was already taking tamsulosin 0.4 mg but was not experiencing full relief. Ultrasound evaluation revealed a 90 mL prostate with approximately 200 mL of post-void residual urine. During his hospitalization in the chest diseases ward, he was assessed and subsequently admitted to the urology department for transurethral resection of the prostate. His medical history included hypertension, managed with medication, as well as a history of lung cancer in remission and paroxysmal atrial fibrillation. Before surgery, the patient underwent evaluations by the Internal Medicine, Chest Diseases, and Cardiology departments, and the procedure was conducted under epidural anesthesia.

The surgical procedure lasted approximately 1 hour and 45 minutes, excluding anesthesia administration time. Considering the arrangement of the operating room, the distance between the irrigation fluid and the bladder was measured at 35 cm. The urologist began the procedure standing and, after about 10-15 minutes of resection, transitioned to a seated position. Once the operating table was adjusted to accommodate the surgeon's seated position, the distance between the bladder and the irrigation bag increased to approximately 60 cm.

According to the patient's retrospective account, he likely lost vision during the final 30 minutes of the procedure. He described the complication as "a sudden curtain being drawn in front of me while I was monitoring the operation on the screen."

In the immediate postoperative period, the patient was evaluated by the Anesthesia, Neurology, and Ophthalmology departments. Despite cranial spiral tomography and cranial magnetic resonance imaging (MRI), no significant findings were identified to account for the patient's condition. Consequently, toxic optic neuropathy was considered a possible diagnosis. The patient's postoperative blood samples were analyzed, with results summarized in Table 1. Additionally, serum ammonia levels and plasma quantitative amino acid measurements were taken two hours postoperatively to assess for postoperative glycine toxicity. Although the ammonia level was within the normal range at 13 umol/L (16-60), the plasma glycine level was elevated at 12,237.26 µmol/L (151-490). The patient exhibited no symptoms other than blindness in the early postoperative period, with a decline in general condition beginning with confusion eight hours after surgery.

The patient was transferred to the intensive care unit for close monitoring, without requiring intubation or a ventilator. After 12 hours of observation, the patient's overall condition improved, allowing transfer back to the urology ward. Approximately 36 hours postoperatively, the patient's visual impairment began to resolve without further intervention. On the fourth postoperative day, the urinary catheter was removed, and the patient was discharged on the fifth day without any additional complications. The ammonia level, assessed after the patient had recovered from blindness, was within the normal range at 11 umol/L (16-60). Additionally, the plasma glycine level was elevated to 238.73 µmol/L (151-490).

DISCUSSION

Transurethral resection of the prostate is widely regarded as the gold standard for the surgical treatment of benign prostatic hyperplasia.[7] Isolated glycine intoxication in TUR syndrome is significantly less common and less recognized than water intoxication. In our clinic, transurethral resection has been extensively used for treating bladder tumors and benign prostatic hyperplasia for approximately 30 years, during which time no other cases of glycine toxicity have not been observed besides this one. The most widely recognized form of glycine toxicity, which acts as an inhibitory mediator in the central nervous system, is transient blindness. In this case, the patient experienced blindness for 36 hours, which resolved spontaneously without requiring specialized treatment

Table 1. Descriptive assessment of postoperative features in the patient

	Hemoglobin (g/dL)	White Blood Cells (K/uL)	Sodium (mmol/L)	Potassium (mmol/L)	Chloride (mmol/L)	ECG (mmol/L)
1 hour	12.7	9930	131	4.5	88	Cr.AF
8 hours	11.3	12600	137	3.2	91	Cr.AF
24 hours	10.9	11100	135	3.6	92	Cr.AF

ECG: Electrocardiography; Cr.AF: Chronic Atrial Fibrillation.

beyond hemodynamic support. Although the patient had several risk factors, it was not possible to establish a specific causal relationship, as this was an isolated case.

TUR syndrome occurs due to the intravascular absorption of hypotonic solutions during TUR.[8,9] Although most commonly associated with transurethral resection of the prostate, it may also occur during other endoscopic procedures, such as cystoscopy, percutaneous nephrolithotripsy, bladder tumor resection, and transcervical endometrial resection. The condition frequently arises from direct infusion through open venous channels. However, it can also develop from reabsorption of extravasated fluid secondary to prostatic capsule or bladder perforation. The importance of this distinction is that in direct intravascular absorption, the presentation is acute, whereas in the extravasation-related form, resolution may be delayed by up to 24 hours.

Reports of TUR syndrome associated with the use of sterile water have documented cases of brownish serum, progressive oliguria, azotemia, pulmonary edema, and death. Electrolyte-free solutions containing glycine, mannitol, and sorbitol with similar serum osmolality (275-290 mOsm/kg H_2O) can be rapidly absorbed and may lead to hemolysis and renal failure. Today, the risk of TUR syndrome is significantly reduced with hypo-osmolar solutions (1.5% glycine=200 mOsm/kg), and the risk of hemolysis is negligible with these solutions. The incidence of TUR syndrome with hypo-osmolar solutions containing glycine is estimated between 1-10%, with mortality ranging from 0.2-0.8%.[10] Considering the surgical approach and operative plan, the modifications made to the procedural sequence were directly linked to the surgical intervention itself. The extended duration of the procedure and the increased distance between the prostate and the irrigation bag were considered contributing factors to glycine intoxication.

Although isotonic solutions and advancements in bipolar electrosurgery have made glycine irrigation solutions less common in modern urological practice, they are still used in some settings where monopolar techniques are applied. Glycine's low cost, availability, and non-conductive properties (1.5% glycine) make it a practical option in such cases. In this instance, glycine was used because the clinical setting relied on monopolar electrosurgery for transurethral resection procedures. The patient's cardiovascular history also influenced this decision, as the surgical team opted for the approach with which they were most experienced to minimize intraoperative risks. While modern irrigation solutions are gradually being adopted in clinics with a long history of using monopolar TUR, the transition has been incremental. Notably, this is the first case of glycine toxicity in our clinic's 30-year history of performing TUR procedures.

CONCLUSION

The use of bipolar electrocoagulation, advancements in imaging systems, shortened training periods, and the adoption of laser technology with isotonic solutions have contributed to a reduction in the frequency of TUR syndrome associated with glycine toxicity. However, it is still essential to implement measures to prevent glycine intoxication when performing TUR procedures in clinics that use monopolar electrocoagulation. Establishing protocols for managing toxicity after exposure is critically important in these settings.

Peer-review: Externally peer-reviewed.

Conflict of Interest: None declared.

Financial Disclosure: The author declared that this study has received no financial support.

REFERENCES

1. Collins JW, MacDermott S, Bradbrook RA, Keeley Jr FX, Timoney AG. A comparison of the effect of 1.5% glycine and 5% glucose irrigants on plasma serum physiology and the incidence of transurethral resection syndrome during prostate resection. BJU Int 2005;96:368–72. [CrossRef]
2. Ezri T, Issa N, Zabeeda D, Medalion B, Tsivian A, Zimlichman R, et al. Comparison of hemodynamic profiles in transurethral resection of prostate vs transurethral resection of urinary bladder tumors during spinal anesthesia: a bioimpedance study. J Clin Anesth 2006;18:245–50. [CrossRef]
3. Kil HK, Park IK, Song MS, Park JH. Usefulness of non-invasive cardiac output monitoring in elderly patients undergoing monopolar transurethral resection of the prostate: a pilot study. J Int Med Res 2020;48:300060520922422. [CrossRef]
4. Tauzin-Fin P. An adverse effect of glycine irrigation solution: absorption syndrome. [Article in French]. Therapie 2002;57:48–54. [CrossRef]
5. Tuzcu K, Canpolat H, Sılay E, Gökahmetoğlu G, İnci M: Şiddetli bir TUR-P Sendromu olgusu. Cumhuriyet Med J 2014;36:274–7. [CrossRef]
6. Wang JM, Creel DJ, Wong KC. Transurethral resection of the prostate, serum glycine levels, and ocular evoked potentials. Anesthesiology 1989;70:36–41. [CrossRef]
7. Koyuncu H, Yencilek F. Benign Prostat hiperplazisi'nin cerrahi tedavisinde transüretral rezeksiyon hala altın standart mıdır?. Turk Urol Sem 2012;3:10–3. [CrossRef]
8. Zhang Y, Fan N, Zhang L, Hu X, Wang L, Wang H, et al. Novel strategy to monitor fluid absorption and blood loss during urological endoscopic surgery. Transl Androl Urol 2020;9:1192–200. [CrossRef]
9. Hahn RG. Fluid absorption in endoscopic surgery. Br J Anaesth 2006;96:8–20. [CrossRef]
10. Olsson J, Hahn RG. Glycine toxicity after high-dose i.v. infusion of 1.5% glycine in the mouse. Br J Anaesth 1999;82:250-4. [CrossRef]

ORİJİNAL ÇALIŞMA - *ÖZ*

Transüretral rezeksiyonun nadir bir komplikasyonu: Geçici körlük

Necmi Bayraktar

Burhan Nalbantoğlu Devlet Hastanesi, Üroloji Departmanı, Lefkoşa, Kıbrıs

Geçici körlük, ürologlar ve anestezistler tarafından tanınan iyi bilinen bir komplikasyon olan transüretral rezeksiyon (TUR) sendromunun son derece nadir görülen bir komplikasyonudur. TUR sendromu, işlem sırasında hipotonik sıvıların intravasküler emiliminden kaynaklanır. Bu olgu sunumunda, 80 yaşında bir erkek hastada transüretral prostat rezeksiyonu sonrası geçici körlük gelişmiştir. Hastanın tıbbi öyküsünde hipertansiyon, remisyonda akciğer kanseri ve paroksismal atriyal fibrilasyon vardı. Ameliyat spinal anestezi altında yapıldı. İşlem sırasında hastanın kör olduğu tespit edildi. Hastanın postoperatif kan örnekleri, TUR sendromu için bilinen bir risk faktörü olan yüksek plazma glisin düzeylerini ortaya çıkardı. Hastanın görme bozukluğu daha fazla müdahale edilmeden düzelmeye başladı. Bu olgu sunumu, hastanın tıbbi öyküsünü ve TUR sendromu ile ilişkili potansiyel riskleri göz önünde bulundurmanın önemini vurgulamaktadır.

Anahtar sözcükler: Geçici körlük; glisin intoksikasyonu; transüretral rezeksiyon; TUR sendromu.

Ulus Travma Acil Cerrahi Derg 2024;30(12):921-924 DOI: 10.14744/tjtes.2024.33979