VISUAL DISTURBANCES IN TUR REACTION

W. GILLETT, M.D.
H. B. GROSSMAN, M.D.
R. LEE, M.D.

From the Section of Urology, Department of Surgery,
University of Michigan Medical Center, Ann Arbor, Michigan

ABSTRACT—Visual disturbances during transurethral resection (TUR) of the prostate are described and possible causes of this phenomenon are discussed. Awareness of this unusual manifestation of the TUR reaction may offer the first clue to excessive systemic absorption of irrigation fluid.

Creevy and Webb[1] first described a fatal reaction following a transurethral resection of the prostate (TURP) in 1947. They labelled this adverse response the "TUR reaction." Since that time, the symptom complex and pathophysiology have been well described.[2-5] The typical TUR reaction is characterized by irritability, confusion, headache, nausea and vomiting, hypertension, bradycardia, shortness of breath, muscular twitching, seizures, cyanosis, and occasional death. The symptoms are explained by a rapid decrease in serum osmolality which is presumably brought about by the rapid absorption of nonelectrolyte-containing irrigating fluid through open prostatic venous sinuses.

Visual disturbances have been reported as an unusual component of the TUR reaction.[6-8] We have observed visual disturbances as the only symptoms in 2 patients who each underwent a TURP. This phenomenon may occasionally be the earliest clue to excessive systemic absorption of irrigation fluid.

Case Reports

Case 1

A seventy-seven-year-old white man had microscopic hematuria on admission for amaurosis fugax. He also complained of nocturia, weak stream, urgency, and postmicturitional dribbling. Angiography revealed several bilateral carotid lesions that were not hemodynamically significant. An excretory urogram showed normal upper tracts and a prostatic impression.

The past medical history was remarkable for an allergy to penicillin. Medications included digoxin, furosemide, anhydrous theophylline (Theo-Dur), KCl, and an albuterol inhaler. The review of systems was noncontributory.

A TURP was performed with 1.5% glycine irrigation fluid. His preoperative serum sodium was 144 mEq/L. After completion of the TURP, the patient complained of decreased vision in both eyes, followed by complete blindness. A serum sodium was obtained and was found to be 116 mEq/L.

An ophthalmology consultant documented a normal fundoscopic examination. A neurology consultant found no mental status, cranial nerve, or motor deficits. Neither consultant thought the patient was having a transient ischemic attack. Both believed the patient's symptoms were secondary to occipital edema. He was treated with furosemide and 3% saline solution. His vision improved through the night. A repeat serum sodium was 128 mEq/L. By the next morning, the patient claimed he could "see better than before the operation." His serum at that time was 140 mEq/L.

Case 2

A seventy-eight-year-old white man was admitted for transient ischemic attacks. After adequate evaluation by the vascular surgery service, he underwent a right carotid endarterectomy. Postoperatively, he was unable to urinate after his Foley catheter was removed. Upon further questioning, it was found that he had been suffering from symptoms of prostatism for some time.

Ten days after his carotid endarterectomy, he underwent a TURP with 1.5% glycine irrigation fluid. His preoperative serum sodium was 135 mEq/L. Near the end of the resection, the patient complained of the room "being dark." Although he was otherwise asymptomatic, a serum sodium was obtained because of our experience with Case 1. A serum sodium was found to be 118 mEq/L. His procedure was rapidly completed. Except for decreased vision, no focal neurologic abnormalities were present. He was given normal saline and furosemide intravenously. His vision began to improve shortly after this. Two hours after his procedure, his serum sodium was 128 mEq/L. By the next morning, his vision was normal, and his serum sodium was 132 mEq/L.

Comment

Visual disturbances during the TUR reaction are rare. Nevertheless, an awareness of this clinical phenomenon is important. Our 2 cases demonstrate the benign nature of this complication provided appropriate therapy is instituted promptly. Although both cases had evidence of cerebrovascular disease, the onset of bilateral visual disturbances following TURP accompanied by hyponatremia and the correction of these abnormalities with appropriate fluid and electrolyte management suggest a causal relationship. In support of this, ophthalmologic and neurologic evaluation of Case 1 revealed no other cause for the transient bilateral visual disturbance.

There are two hypotheses regarding the development of visual disturbances in the TUR reaction. The most widely accepted one is based on the absorption of large amounts of nonelectrolyte-containing irrigating fluid during resection which causes a decrease in serum osmolality. Although the accompanying hyponatremia is associated with dramatic changes in the function of the central nervous system, these effects are thought not to be due to the sodium concentration of the intravascular fluid in the brain, but rather to the sodium ion's contribution in maintaining serum osmolality.[9] The decrease in serum osmolality with resulting occipital edema may be the basis for the observed visual changes.[7,8]

An alternative hypothesis as to the cause of the visual disturbances supposes a possible direct effect of glycine on the brain.[6] Glycine is a nonessential amino acid that readily passes the blood brain barrier. The normal plasma level is 13–17 mg/L. Glycine functions as an inhibitory transmitter in the spinal cord and may act in a similar fashion in the medulla oblongata, pons, tectum, and retina. Light has been shown to evoke the release of glycine from cat and rabbit retinas.[9] Ovassapian, Joshi, and Brunner[6] suggested that since glycine is absorbed during a TURP, it could cause visual disturbances by an inhibitory action. In their report, they measured serum glycine levels in a man who suffered visual disturbances while undergoing a TURP. These levels were high, and as the levels came back toward normal, so did the patient's vision. But just as with serum sodium, an association does not prove that glycine is the cause of the visual disturbances. The toxic effects of intravenously administered glycine have been documented in dogs[11,12] and in man.[13,14] These toxic effects are nausea and vomiting, weakness, muscular incoordination, and in dogs, death. In humans, infusion of 2.5% glycine at a rate of 3.58 mg of glycine/Kg/min is accompanied by feelings of malaise and nausea.[13] No visual disturbances have been reported.

Regardless of the mechanism of this phenomenon, every urologist should be aware of this unusual component of the TUR reaction. Visual disturbance during or immediately after a transurethral resection may be the first clue to excessive systemic absorption of irrigation fluid and may offer the alert clinician an early opportunity to institute appropriate therapy.

Urology Research Library
University of Michigan Hospital
1405 E. Ann St. Box 03 C5119
Ann Arbor, Michigan 48109

References

1. Creevy CD, and Webb EA: Fatal hemolytic reaction following transurethral resection: a discussion of its prevention and treatment, Surgery **21**: 56 (1947).

2. Ceccarelli FE, and Mantell LK: Studies on fluid and electrolyte alterations during transurethral prostatectomy: I, J Urol **85**: 75 (1961).

3. Harrison RH, Boren JS, and Robinson JR: Dilutional hyponatremic shock: another concept of the transurethral prostatic resection reaction, *ibid* **75:** 95 (1956).

4. Still JA, and Modell JH: Acute water intoxication during transurethral resection of the prostate, using glycine solution for irrigation, Anesthesiology **38:** 98 (1973).

5. Drinker HR Jr, Shields T, Grayhack J, and Laughlin L: Simulated transurethral resection reaction in the dog: early signs and optimal treatment, J Urol **89:** 595 (1963).

6. Ovassapian A, Joshi CW, and Brunner EA: Visual disturbances: an unusual symptom of transurethral prostatic resection reaction, Anesthesiology **57:** 332 (1982).

7. Appelt GL, Benson GS, and Corriere JN: Transient blindness: unusual initial symptom of transurethral prostatic resection reaction, Urology **13:** 402 (1979).

8. Defalque R, and Miller D: Visual disturbance during transurethral resection of prostate, Canad Anaesth Soc J **22:** 620 (1975).

9. Katzman R: Effect of electrolyte disturbance on the central nervous system, Ann Rev Med **17:** 197 (1966).

10. Ehinger B, and Lindberg-Bauer B: Light evoked release of glycine from cat and rabbit retina brain, Research **113:** 535 (1976).

11. Handler P, Kamin H, and Harris J: The metabolism of parenterally administered amino acids, J Biol Chem **179:** 238 (1949).

12. Pitts RF: A renal reabsorptive mechanism in the dog common to glycin and creatine, Am J Physiol **140:** 156 (1943).

13. Doolan PD, Harper HA, Hutchin ME, and Alpen EL: The renal tubular response to amino acid loading, J Clin Invest **35:** 888 (1956).

14. Fahey JL: Toxicity and blood ammonia rise resulting from intravenous amino acid administration in man: the protective effect of L-arginine, *ibid* **36:** 1647 (1957).