Toxicity Symptoms Following Hysteroscopic Surgery: A Case Report

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Abstract

A case with hypoosmolar hyponatremia that was caused by glycine after the hysteroscopic septum resection is reported. The patient who had complaint of total bilateral blindness, headache, nausea, weakness, agitation, lethargy, dyspnea due to glycine intoxication was followed up and treated in intensive care unit.
It is noticed that symptoms such as nausea-vomiting, confusion, blindness, seizures, lethargy, coma, respiratory distress, and cyanosis can be seen with glycine intoxication after hysteroscopic surgery using glycine solution. The complications seen after glycine intoxications may be treated with appropriate medical care and treatment.

Keywords: glycine intoxication, hysteroscopic surgery, treatment

Özet

Histeroskopik Cerrahi Sonrası Toksisite Semptomları: Olgu Sunumu

Glisin entoksikasyonunun neden olduğu solunum güçlüğü, letarji, ajitasyon, güçsüzlük, bulantı, baş ağrısı ve bilateral görme bozukluğu olan hasta yoğunbakım ünitesinde takip edildi ve tedavisi yapıldı.
Glisin solüsyonunun kullanıldığı histeroskopik cerrahi sonrası glisin entoksikasyonu için siyanoz, solunum sıkıntısı, koma, letarji, nöbetler, körlük, konfüzyon, bulantı-kusma gibi semptomlara dikkat edilmelidir. Glisin entoksikasyonu sonrası görülen komplikasyonlar uygun tedavi ve bakımla tedavi edilebilir.

Anahtar sözcükler: glisin entoksikasyonu, histeroskopik cerrahi, tedavi

Introduction

Hysteroscopic surgery is performed for septum resection, endometrial ablation, myomectomy, polypectomy and adhesiolysis. Different liquid distension media are used for good visualization during hysteroscopy. Absorption of excessive amount of irrigation fluid during operation may lead to a toxicity syndrome, which is familiar to urologists and anesthetists as transurethral resection of the prostate (TURP) syndrome.

In this syndrome, bradycardia, hypertension, hypotension, nausea, vomiting, headache, visual disturbances, agitation, confusion and lethargy are described. These symptoms are due to hypervolemia, dilutional hyponatremia and decreased osmolality. If untreated, this clinical entity may result in seizures, coma, cardiovascular collapse and death (1).

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In this report; a case with hypoosmolar hyponatremia caused by glycine after a hysteroscopic septum resection is reported.

Case Report

Hysteroscopic surgery was performed under general anesthesia on a 27-year-old and secondary infertile woman who had no past surgical or medical disease history. A partial septum of the uterus was determined at the hysterosalpingographic examination. Preoperative medication consisted of midazolam (Dormicum amp, Roche, Istanbul, Turkey) [7.5 mg intramuscularly (IM)], and metoclopramide (Metpamid amp, Yeni İlaç, Istanbul, Turkey) [10 mg intravenously (IV)]. Anesthesia was induced with thiopental (Pentothal flacon, Abbott, Istanbul, Turkey) (350 mg IV) and fentanyl (Fentanyl citrate amp, Abbott, Istanbul, Turkey) (100 μg IV). Succinylcholine (Lysthenon fort amp, Fako, Istanbul, Turkey) (100 mg IV) was used to facilitate endotracheal intubation and anesthesia was maintained with 66% nitrous oxide and 1-2.5% sevoflurane in oxygene. Lactated Ringer's solution was given at approximately 200 ml/h, and the patient was monitored.

A total 2000 ml of the 1.5% glycine solution (1.5% glycine solution, 3000 ml, Eczacıbaşı, Istanbul, Turkey) was used under pressure of 40-75 mmHg during hysteroscopy. The fluid was connected to the side part of the continuous flow resectoscope (Karl Storz, Ankara, Turkey 2003).

The operation lasted 20 minutes and hysteroscopic septum resection was successfully performed. No surgical complication happened during surgery. After 6 hours from surgery, the patient complained of total bilateral blindness, headache, and nausea those revealed neurologic and visual deficits. Weakness, agitation, lethargy, dyspnea were also detected. On the initial examination, she had no light perception and mildly dilated pupils. Reflexes of the pupils and deep tendons were positive and there were no pathological reflexes. Intraocular pressure was in normal limits.

The patient was transported to the intensive care unit (ICU). At this time (eight hours later after surgery), serum sodium, chloride, protein levels, osmolality, hematocrit, serum glycine, ammonia levels, pH, arterial $PaCO_2$, arterial PaO_2, base excess were found as 127 milimol/L, 88 milimol/L, 4.8 g/L, 195 mosm/L, 30%, 720 milimol/L, 238 milimol/L, 7.39, 26.3 mmHg, 94.8 mmHg, and -7.3, respectively. Preoperative and postoperative laboratory values are shown In Table 1. A cerebral computed tomography scan revealed minimal cerebral edema. Intravenous infusion of hypertonic saline normalized the serum sodium concentration in 24 hours. Anti-edema therapy was made for cerebral edema. Arterial pH values and base excess were normalized with bicarbonate therapy. For the first 8 hours in the ICU, the patient was intubated and mechanical ventilation was performed. After extubation, sedation and nasal oxygen therapy were applied until the symptoms began to recover. The ammonium level returned to normal levels at 48 hours after surgery. The patient was discharged from the ICU after 78 hours uneventfully.

Discussion

The frequency of complications of hysteroscopic surgery is reported to be about 2.7-25%, consisting of uterine perforation, excessive glycine absorption, hyponatremia, etc. Hysteroscopic myomectomy and resection of uterine septum are associated with greater rate of complications (2). In this case report, a patient is reported that developed hypo-osmolar hyponatremia after hysteroscopic septum resection in which glycine solution was used as distension media.

The irrigating solutions are infused to the uterine cavity in order to facilitate surgical visualization and wash away operative debris during hysteroscopic surgery. These include 1.5% glycine, 5% sorbitol, 5% mannitol, and dextran 70. The most commonly used irrigation fluid is 1.5% glycine. It is hypotonic (osmolality of glycine is 188 $mOsm.kg^{-1}$) (3).

The pressure in large venous sinuses in the myometrium is 8-10 mmHg. Although views of the uterine cavity are possible with irrigation pressure of 40 mmHg, it has been shown that pressure of 100-110 mmHg may be required to see the tubal orifices. Because the intrauterine pressure for distention and flow is 40-60 mmHg, the rapid intra-vasation can occur (2-3). In this case report, irrigation solution pressure was 40-75 mmHg during hysteroscopic surgery.

Glycine is a non-essential, simple amino acid that is normally present in the circulation. 1.5% glycine solution is possible to lose up to 1300 ml in to the circulation without any adverse effect. Glycine can lead to hemodilution and extracellular volume expansion with subsequent decrease of serum sodium (4). Following infusion of 1.5% glycine, glycine does not remain in the intravascular space (half-life is 85 minutes). Glycine is initially (1-2 hours) confined to the extracellular space, and the plasma sodium level is lowered by a combination of dilution and osmotic movement of water

Table 1. Laboratory values of plasma sodium, plasma osmolarity, plasma ammonia level, arterial pH, arterial $PaCO_2$, arterial PaO_2, base excess, glycine are showed in the preoperative period and 8., 16., 28., 36., and 48., hours after operation

Characteristic	Preoperative	8th hour	16th hour	28th hour	36th hour	48th hour
Plasma sodium (mmol/L)	142	127	128	140	137	144
Plasma osmolarity (mOsm)	-	195	212	227	262	289
Plasma ammonia level (mg/ml)	-	238	195	183	120	15
Arterial pH	7.39	7.39	7.45	7.49	7.39	7.48
Arterial $PaCO_2$ (mmHg)	40	26.3	28.2	32.0	36.9	33.9
Arterial PaO_2 (mmHg)	94	94.8	143.1	218.6	126.8	112.9
Base Excess	-0.6	-7.3	-4.1	-2.2	-1.7	1.7
Glycine (milimol/L)	-	720	640	600	256	221

from the cells (5). A rapid increase of intravascular free water leads to decreased osmolality and movement of water into the brain, causing cerebral edema (6).

Glycine functions as a neuroinhibitory transmitter, not only in the spinal cord but also in the brain, including retina. Oxidative deamination of glycine in the liver and the kidneys results in the formation of ammonia, which could lead to an increase in blood ammonia levels (6). Ammonia may produce deterioration of cerebral function when its blood concentration exceeds 150 μmol.L^{-1} (normal 11-35 μmol.L^{-1}). In addition, alteration of the neural amino acid metabolism, transient arterial oxygen desaturation, hypercapnia and coagulopathy have been reported (7). Signs or symptoms of glycine intoxication are demonstrated in Table 2.
In the presented patient, high serum levels of ammonia and glycine coexisted with visual disturbances and neurological changes. A return of normal sight was seen with a concomitant decrease in the serum ammonia. In this case; headache, nausea, weakness and afterwards agitation, and lethargy were detected as clinical manifestations in the postoperative period.

Table 2. Signs and symptoms attributed to excessive fluid absorption during hysteroscopic surgery

Cardiopulmonary	Hematologic and Renal	Central nervous system
Hypertension	Hyperglycinemia	Nausea-vomiting
Bradycardia	Hyperammonemia	Confusion
Dysrhytmia	Hyponatremia	Blindness
Respiratory distress	Hypoosmolality	Seizures
Cyanosis	Hemolysis	Lethargy
Hypotension	Acute renal failure	Dilated/ nonreactive pupils
Shock	–	Coma
Death	–	–

Treatment of glycine intoxication should start immediately. However the opportunities are variable, it should have to include intravenous saline for correcting the serum sodium level and forced diuresis for removing the excess fluid. Initially serum electrolytes should be monitored for every four hours.

In the presented case, intravenous infusion of hypertonic saline normalized the serum sodium concentration with in 24 hours. Anti-edema therapy was made for cerebral edema. Arterial pH values and base excess were normalized with bicarbonate therapy.

In summary, this report points out the potential for development of glycine intoxication in hysteroscopic surgery. General anesthesia during such surgical procedures precludes the use of the patient's mental status as an indicator of glycine intoxication and dilutional hyponatremia. Frequent serum Na++ estimations and new monitoring methods (e.g. ethanol labeling) may be of value in detecting excessive absorption of irrigating fluid. It is noticed the symptoms such as nausea-vomiting, confusion, blindness, seizures, lethargy, coma, respiratory distress, and cyanosis for glycine intoxication after hysteroscopic surgery using glycine solution.

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