



Case Report

Ascending Tonic-Clonic Seizure Syndrome Secondary To Iohexol During CT Cisternography: Case Report

Zeynep PESTİLCİ¹, İnanç ÇAĞIRAN³, Esra ÇAĞIRAN¹, Muhammed Fatih SARI⁴, Ramiz AHMEDOV²

¹Ege Üniversitesi, Anestezi, izmir, Türkiye ²Ege Üniversitesi, Beyin Cerrahisi, izmir, Türkiye
³Ağrı Özel Sağlık Hizmetleri, Beyin Cerrahisi, izmir, Türkiye ⁴Manisa Devlet Hastanesi, Beyin Cerrahisi, izmir, Türkiye

Summary

Ascending tonic-clonic seizure (ATCS) syndrome secondary to Iohexole is a rare, potentially fetal status epilepticus condition which is misdiagnosed and mixed up with malignant hyperthermia. Additionally to the hardness of rapid and correct taking on diagnosis due to different clinical findings and variable presentation from patient to another, inappropriate treatments usually effects prognosis with poor outcome.

Key words: Tonic-clonic seizure syndrome; contrast agent anaphylaxis; Omnipaque; cisternography; malignant hyperthermia

BT Sisternografi Sırasında Iohexol'e Sekonder Gelişen Asendan Tonik- Klonik Nöbet Sendromu: Vaka Sunumu

Özet

Iohexole Sekonder Tırmanıcı Tonik Klonik Sendrom'u az rastlanılan, potansiyel olarak fatal ve bazen malignant hipertermi ile karıştırılarak yanlış tanı konulmasına neden olan nadir bir status epilepticus tablosudur. Farklı klinik bulgular ve hastadan hastaya değişebilen prezentasyon nedeniyle hızlı ve doğru teşhisi koyabilmenin güçlüğü yanında uygun tedavi planlamasının yapılamaması prognozu olumsuz etkilemektedir.

Anahtar Kelimeler: Tonik-klonik nöbet sendromu; Kontrast ajana bağlı anaflaksi; Omnipaque; Sisternografi; Malign hipertermi

CASE PRESENTATION

47 year old, 68 kilograms female patient who had no medical treatment, trauma or surgery in her previous medical history was admitted to the department of neurosurgery of Ege University with the major complaint of clear and salty water leakage from her right nasal hole. She was incharged with the prediagnosis of spontaneous rhionaire. In her neurological examination there was no positive sign. After verifying the clear and salty water with biochemical testing there was no doubt that it was cerebrospinal fluid so that

her direct two sided skull graphies and cranial computed tomography (CT) were scan. In her radiologic examination there was no sign of pneumosephalia. For further examination computed cisternography was planned. After the emission of 10 ml cerebrospinal fluid (CSF) by lumbar puncture with 22 gauge spinal quincke needle (Figure 1), 10 ml Iohexole 28 (Omnipaque ®) was administered slowly in 2 minutes intratecally. The samples of CSF were sent to the microbiology and biochemistry laboratories for testing and there was also no clinical finding. Next to the interventional approach the patient was

positioned in elbow-knee position on the stretcher and then taken to the CT unit.

During her standby in front of the CT room, with in 20 minutes after the injection of the nonionic contrast agent, the patient start to have a spasm and then a convulsive construction which had been gotten ahead to a secondary generalised tonic clonic seizure. Afterwords the patient felt down on the stretcher and hit her nose to the barr and her epistaxis started. Because of due to the short distance between CT and emergency units, the patient was taken to the shock room in the emenrgency unit urgently. The initial medical attention to the unconsonus patient was administration of 10 mg diazepam intravenously (IV). Patient's seizure was controlled. After the IV bolus administration of 10 % dextrose, 80 ml % 0.9 saline was infused in one hour IV to the post-ictal, sleepy and confused patient. The routine biochemical testing and hemogram were performed following the achievement of medical stabilisation. After her first seizure within interval of 20 minutes the patient had a second generalised tonic clonic seizure which was coming to existance secondary to the start of focal contraction in her right arm. This second seizure was controlled by the administration of 0.2 mg/ kg diazepam.

Due to not having any additional convulsion the patient had taken to the CT room to perform the CT cisternography. At the end of the cisternography superficial respiration was achieved produced and the patient was taken back to the emergency room as soon as possible. The patient's blood pressure was 90/50 mm Hg and there was flushing on her face. In order not to skip the diagnosis of anaphylactic shock, the patient was intubated with the premedication of 0.2 mg / kg midazolam and 0.5 mg/kg atracurium IV. There was no sign of laryngospasm during the intubation. 2 minutes after the intubation the patient had her third generalised tonic clonic convulsion. This time second phase antiepileptic drug was chosen and 17 mg/

kg phenytoin was administered to the patient in 30 minutes. During the phenytoin infusion there was not any extra seizure and the patient was examined as E₁M₅V_E post-ictal glaskow coma scale score (the pupillas were normal and isochoric, direct and indirect pupillary rephlexes were positive on the both sides and the cranial nerve examination was intact but there was frust hemiparesis on the right side compared to the left. Uneventually the patient had one more generalized tonic- clonic convulsion after a few seconds of the completion of phenytoin infusion and for that reason the antiepileptic treatment had been upgraded to the second phases second group drugs and administration of midazolam 200 µg/ kg was our choice. Midazolam infusion was continued 0.75 µg/ kg/ min. and the second CT was taken in order not to misdiagnose any extra intracranial or intracerebral pathology. Then the patient had been taken to the neurosurgery intensive care unit. On account of having three more tonic clonic seizures despite the midazolam infusion, the patient had been accepted as resistant status epilepticus and then consulted to the anaesthesiology doctor for the sedation protocol during mechanical ventilation. By the time in the arterial blood sample pH 7.05, pO₂ 100 mmHg, pCO₂ 56 mmHg, HCO₃ 15, O₂sat was 95. After the consultation the patient was moved to an upper level of intensive care unit in the department of anaesthehosiology & reanimation. The patient's breathing was supported by mechanical ventilation with 14 per min. breath, 700 ml tidal volume, 40% inspired oxygen concentration, 5 cm H₂O PEEP. As treatment first of all 0.15 mg/ kg midazolam administered directly and afterwards it continued with 2 mg/ h infusion.

As the treatment 0.15 mg/ kg midazolam (continued with 2 mg/ h infusion), 2 mg/ kg propofol (starting with a dose of 10 mg/ kg/ . and then decreased to 3 mg/ kg/ h. in 12 hours) and 0.5 mg/ kg/ h atracurium

infusion had been set on. In her vital findings and laboratory examinations body temperature 37.2 C, blood pressure 130/ 52 mm Hg, heart rate 120/ min., pH 7.10, pO₂ 105 mm Hg, pCO₂ mm Hg, HCO₃ 14, O₂ sat 96, WBC 16100, ALT (aspartat transaminase) 145, AST (alanin transaminase) 74. Due to deep metabolic acidosis, patient underwent dialysis by femoral catheterisation. Following dialysis pH 7.50, pO₂ 76 mm Hg, pCO₂ 37 mmHg, HCO₃ 28, O₂sat 99 levels observed. The patient was consulted to the poison and toxic substances center in the University of Dokuz Eylül but according to their reply there was not any antidot and there were only two subarachnoid hemorrhage cases secondary to the intratecal injection of Ioxehole in the previous medical literature. Purposely patient's prophylactic subarachnoid hemorrhage medical treatment was aranged and patient's monitorisation and observation was continued for 36 hours under curarization. When the curarization was stopped, it was seen that the patient's respiration was well enough

and there was no neurologic sign. For that the patient had been taken back to the neurosurgery intensive care unit. At the time of initial stabilization patient's creatine kinase (CK) was 198 IU, and within 12 hours it is increased to 4,800 IU and peaked at 50,600 IU 5 days later.

In the CT sisternography which was performed in the event day although there was normal contrasting in the phalx and in the cerebral ventricules there was pathological consantration on the superior nasal concha but there was no sign of hemorraghe or midline shifting (Figure- 2). After the patient' s neurologically stabilization was achieved, patient's cranial magnetic resonans imaging (MRI) and electroencephalography (EEG) were performed after the 48 hour interval of intratechal ioxehole injection. In her further observation period patient had only general debility and did not have any other seizure; for that reason she was discharged 9 days later with the oral medication of 300 mg phenitoin per day.



Figure 1: Lumbar puncture photography

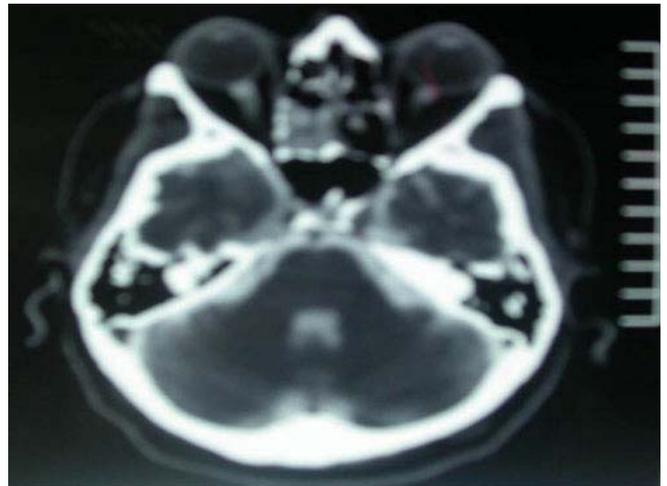


Figure 2: CT Cisternography image

DISCUSSION

Nonionic radiographic contrast agents have been taken the place of ionic agents for intrathecal use because of their lesser neurotoxicity to central nervous system.⁽²¹⁾ Although an intact blood-brain barrier limits entry of ionic contrast agents into the central nervous system,⁸ ionic contrast agents may alter the blood-brain barrier resulting in direct neurotoxic effects.^(4,11) Neurotoxicity is due to the destabilization of membrane potentials and their direct chemotoxic effects¹¹ causing cellular inflammation and edema.^(5,7)

The inadvertent intrathecal use of ionic contrast agents produce a characteristic and often fatal toxic syndrome which is named as the ATCS syndrome.⁴ Few case reports and small series shows that the ATCS syndrome is a very rare event.^(2,3,7,10,15,16,18,19,22) In the past medical literature it has been reported that ascending tonic clonic seizure syndrome could be developed as well by the intrathecal administration of nonionised contrast agents like iohexole(Omnipaque®) depending on the dose and injection speed.^(2,9,13,17,20)

The clinic could be accompanied by marked hypersympathetic state manifested by restlessness, agitation, tachycardia, hypertension, hyperpyrexia, metabolic acidosis, rhabdomyolysis, and disseminated intravascular coagulation.⁽¹²⁾ Usually the body temperature which is higher than 41.1°C (106°F) is common, probably due to tremendous muscle contraction and central thermoregulation defect.⁽³⁾ Although patients are fully conscious initially, progressive unconsciousness and seizures characteristically develop in time.⁽¹²⁾ Contractions and jerks usually start within the first hour of injection and they are characterised by rough, frisking. Muscle contractions and other changes typically appear when the contrast agent reaches up

the ventricles after a time interval following the intrathecal injection. Optimal management of the ATCS syndrome should include early neuromuscular paralysis done by nondepolarizing neuromuscular agents, aggressive temperature and blood pressure control, head elevation (to avoid caudal migration of contrast agent). Antiepileptics are frequently required, and EEG monitoring is essential.⁽¹²⁾ Though in the presence of high body temperature, acidosis and muscle activity the situation could be mixed up with malignant hyperthermia, dantrolene sodium is not valuable in this treatment. Antiepileptics are frequently required, and EEG monitoring is essential.⁽¹²⁾ Early emissive drainage of spinal fluid has been suggested to be beneficial, but there is not any treatment guidelines to determine when it is appropriate.^(3,10,16,18,21) Though its efficacy is debatable, there is no report of adverse effects CSF drainage in these conditions. According to the hypothesis that progressive ascending toxicity is caused by as the circulation of these agents upward toward the brain, rapid removal of at least 20 mL of CSF makes clinical sense.¹² Currently the symptoms disappear within two to five days.

The morbidity and mortality rates of the ATCS syndrome are material.^(3,7,19) However, complete recovery could be achieved after rapid recognition and aggressive management. Rapid recognition and aggressive supportive care appears to be the best opportunity for salvage from this rare but frequently fatal condition.^(3,10,16,18)

CONCLUSION

Ionic and nonionic contrast agents have similar appearance but substantially different intrathecal neurotoxicities.⁽¹²⁾ The reason for reporting this rare and uncommon case is taking attention to neurotoxicity caused by the epidural and intrathecal administration of nonionised

contrast agents used for radiologic evaluation. It should be always kept in mind that these situations eventhough could be fatal if the primary attention and assiduity not been handled. Emergency physicians must be capable of recognizing and rapidly initiating appropriate resuscitative responses for the ATCS syndrome. Additionally due to the suspicion of the diagnosis of malign hipertermia in these type of patients anesthesiologists should be involved in the treatment directly and the treatments like dialysis should be performed as quick as possible if it is necessary. After all it should be born in mind that quick retrival of muscle activation, hiperthermia and acidosis is associated with good prognosis and better outcome.

Correspondence to:

Esra Çağiran

E-mail: aecagiran@gmail.com

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