Case Report

A Case report: Rare Complication of a common procedure- Pneumocephalus after Epidural Injection

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Abstract

Our patient 26 yrs. an old female patient 47 kg, ASA II , GDM on insulin was given lumbar epidural for labor pain relief using loss of resistance to air technique with 3 ml of air. After 10 h, she developed sudden loss of consciousness. An urgent CT scan was done which revealed pneumocephalus. Our goal is to report the case of a patient who presented Pneumocephalus after Epidural Injection.

Key words: Epidural injection, Loss of Resistance to air (LORA), Pneumocephalus.

Introduction

Epidural injection is a frequently used treatment for relief of pain associated with labor. For the identification of the epidural space, several methods were used, the most common being "loss of resistance to air" (LORA)[1]. While commonly used, there is a rare complication of inadvertent air injection in the subdural / subarachnoid [2,3] space, which can lead to symptoms of increased intracranial pressure, headache, projectile vomiting and even loss of consciousness. With the assistance of radiological imaging, the position of air in the cranium will direct us to locate the source of air introduction through subdural or subarachnoid space. Our goal is to report the case of a patient who presented with Pneumocephalus after Epidural Injection.

Case report

A 26 yrs. old female patient 47 kg, ASA II, GDM on insulin requested epidural analgesia for labor pain. Preanesthetic check-up was done, and the patient was conscious and well oriented to time, place and person with motor and sensory functions intact. After taking consent and discussion of risk and benefits of the procedure epidural was established at 2100 hrs. Between L3 –L4 interspace, in first attempt with loss of resistance with air technique (LORA). Catheter fixed at 13 cm at the skin and test dose of 3 ml of 2% lidocaine was given. After that bolus of 7 ml of Ropivacaine 0.1% with 2 mcg/ml fentanyl given and Ropivacaine 0.1% with 2 mcg/ml fentanyl started at 6 ml/hr. with patient administered bolus of 3 ml with lockout period of 20 minutes and maximum hourly dose of 15 ml. Procedure was uneventful and post procedure vitals for the patient were BP 110/60, HR- 90, SpO_2 – 100. I received call at around 0640Hrs for E1 LSCS and patient shifted to OR at 0651 Hrs. Preoperative vitals as BP 102/54, HR-120, Hb- 9.6. She was having 20 G cannula on her left hand. As Epidural was working fine – I decided to go ahead with a top up of the same. 3 ml of incremental dose with a total of 20 ml of 2% lidocaine with 50 mcg of fentanyl given between 0655 to 0702 Hrs. and surgery started at 0702 Hrs.

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Table 1: Time line of vitals

Time	BP	HR	SpO2	intervention
0655	102/54	120	98	0655 to 0702 lidocaine 2% with fentanyl 50 mcg total of 20 ml in increment of 3-5 ml given
0700	99/43(63)	107	99	0702 surgery started
0705		120	100	
0710	94/43 (68)	117	100	
0715	87/42(63)	120	100	0717 Ephedrine 5 mg
0720	86/42(63)	137	100	
0725	126/62(87)	150	100	Same time the patient became unresponsive and I called for help.
0735	128/63	150	100	Under propofol 50 mg and scholine 100 mg patient intubated. Arterial line taken and blood glucose measured
0740	110/59	145	100	
0745	102/45	130	97	0747 surgery finished
0750	106/45	117	99	
0755	102/46	102	100	0751 blood glucose 5.4 mmol/l
0800	103/50		100	0757 PH 7.32, pCO_2 33, pO_2 284, HCO_3 17, BE 9
0805	155/55		100	Preop HB was 9 .6 post of Hb 7.5

The patient was shifted to the Radiology Unit with mechanical ventilation and ET Tube in situ for urgent CT scan. CT scans revealed significant air bubbles in subarachnoid space.

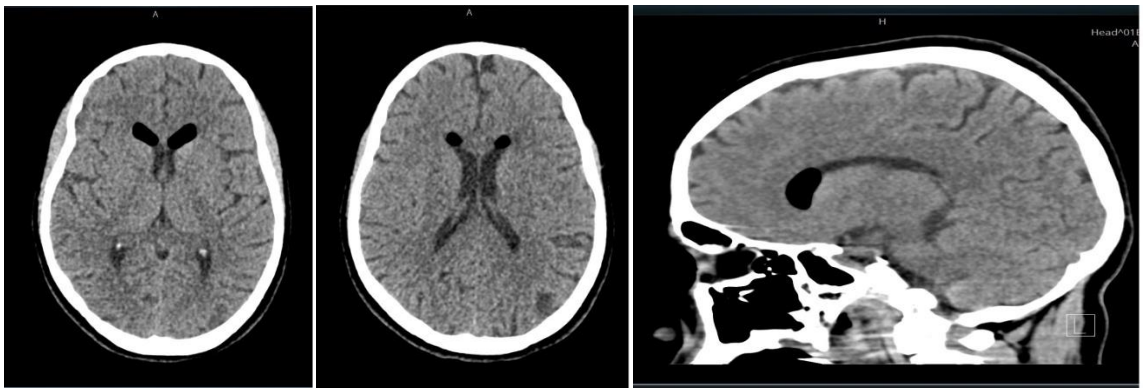

Fig 1: CT scan shows the presence of an air bubble in subarachnoid space

After the CT patient was shifted to ICU**.** Vital on shifting were 186/119, HR 147, RR 12, SpO_2 100, Temp 35.6. Vitals remained stable during the ICU stay, and 100 percent oxygen saturation was preserved by the patient. The next day, the patient was extubated. The patient was completely aware and well-oriented and transferred to the ward. Without a neurological deficit, the patient was released.

Discussion

In the cranial cavity, pneumocephalus literally means air/gas. While normal in neurosurgery,[4] as a consequence of accidental dura puncture, it is rarely seen after epidural injection resulting from the introduction of air into subarachnoid / subdural space and subsequent cranial migration[2,3].

The occurrence of pneumocephaus is unknown and there are only a few recorded cases. Hypotension, postdural puncture headache (PDPH), dizziness, intermittent paraplegia, and pneumocephalus are procedure-related complications per se[5].In addition to other approaches, such as ultrasonography guided and fluoroscopy guided, epidural space can be detected using loss of resistance technique (using air or saline),

identification of negative pressure (hanging drop and inflated balloon). LORA and loss of resistance to saline (LORS) are widely used and bring their own benefits and drawbacks with them[6,7].Space can be well appreciated using LORS, but it can dilute the solution of local anesthetics and it is difficult to determine subarachnoid puncture. On the other hand, due to air being compressible, LORA could lead to false-positive results[8,9].Compression of nerve roots and spinal cord, subcutaneous emphysema, incomplete analgesia, paraesthesia,pneumocephalus,hypotension, bradycardia, apnoea were other complications related to the LORA technique[10]. During epidural space detection, air might unintentionally reach the cranium via subdural / subarachnoid space. Since there was no cerebrospinal fluid leakage in our case; thus, ruling out the possibility of subarachnoid puncture, the likely reason for pneumocephalus could be that the air may have entered the cranium via subdural space. Subdural space refers to the space between the dura and arachnoid mater, filled with a small volume of serous fluid and connected via second sacral vertebrae to cranium and the possible route for intracranial migration of air[11-13].Sign and symptoms following migration of air comprise mainly of headache.[9,14]. Other signs of space-occupying lesions, such as nausea and vomiting, disorientation, agitation, reduced level of consciousness, seizures, and dysarthria, depend on air quantity and spread[15,16]. In our case, 3 ml of air was used to identify space and pneumocephalus may be caused air volume as low as 2 ml [17]. In our situation, patients presented with loss of consciousness rather than headache, which was delayed by 20 minutes after epidural top-up.

With symptomatic therapy,pneumocephalus typically recovers spontaneously. Supplementation of oxygen in the supine position to speed up intracranial air absorption and rapid denitogenation prophylactic antibiotics, analgesics, and sufficient hydration[18,19]. Due to intubation, our patient was also placed on midazolam infusion to alleviate her anxiety and restlessness. The woman was discharged on the 5th day of her clinical rehabilitation.

Pneumocephalus can be avoided by using saline instead of air or, if at all, a maximum of 2 ml of air should be used. Among other things, diligent control is important in minimizing the number of attempts and preventing coughing and deep breathing (creates negative intrathoracic pressure). While a rare complication like Pneumocephalus can be prevented by these measures, the question arises; is blind epidural technique a safe choice? Blind epidural procedure drawbacks culminate with proof from multiple trials[20]. For my team, this case was an eye opener, and yet it should be for those of us who practice pain management. Using image modalities for the best outcome is highly recommended.

Conclusion

Thus, we conclude that Pneumocephalus, while not common, carries a possibility of loss of consciousness and neurological problems if it occurs. LORS should be given preference; air should be reduced if used, and not used at all in the case of dura puncture. If signs occur within hours of the procedure, a high index of suspicion should be held in mind and diagnosis should be confirmed radiologically.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms.

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