

# 내시경을 이용한 제3뇌실 천공술중 발생한 폐 공기색전증

- 증례 보고 -

윤수한 · 조기홍 · 김세혁 · 안영환 · 안영민 · 조경기 · 문봉기\*

= Abstract =

## A Case of Pulmonary Air Embolism during Endoscopic third Ventriculostomy - A Case Report -

Soo Han Yoon, M.D., Ki Hong Cho, M.D., Se Hyuk Kim, M.D.,  
Young Hwan Ahn, M.D., Young Min Ahn, M.D.,  
Kyung Gi Cho, M.D., Pong Ki Moon, M.D.\*

Department of Neurosurgery, Department of Anesthetics, \* Ajou University Hospital, Suwon, Korea

Several cases of pulmonary air embolisms during surgery have been reported. However, such incidences are very rare during endoscopic surgeries. A 5-year-old boy with third ventricular arachnoid cyst and hydrocephalus underwent endoscopic third ventriculostomy under the general anesthesia, during which continuous intraventricular irrigation was maintained with normal saline. During the procedure, arterial and transcutaneous oxygen tension and end-tidal carbon dioxide tension became suddenly decreased while arterial carbon dioxide tension increased. Within 3 minutes after the inspired gas mixture was changed to 100% oxygen, the patient's respiratory variables returned to near base line. The second attack occurred about 10 minutes later and decreased arterial oxygen tension with increased arterial carbon dioxide tension continued for about 5 minutes. After waking up from anesthesia, the patient suffered a generalized seizure attacks that was managed with anticonvulsant therapy. We believe that we are the first to report an attack of pulmonary air embolism during brain endoscopic procedure. It was reported with the review of literatures.

**KEY WORDS :** Pulmonary embolism · Air embolism · Endoscopic surgery · Third ventriculostomy.

서 론

8)12)

7)19)

1000

14

가

16)

1

4)7)

가

증 례

가

5

4)

3  
(Fig. 1),

3

(Fig. 2).

가

3

100cm H<sub>2</sub>O

3

3

150cm H<sub>2</sub>O

가

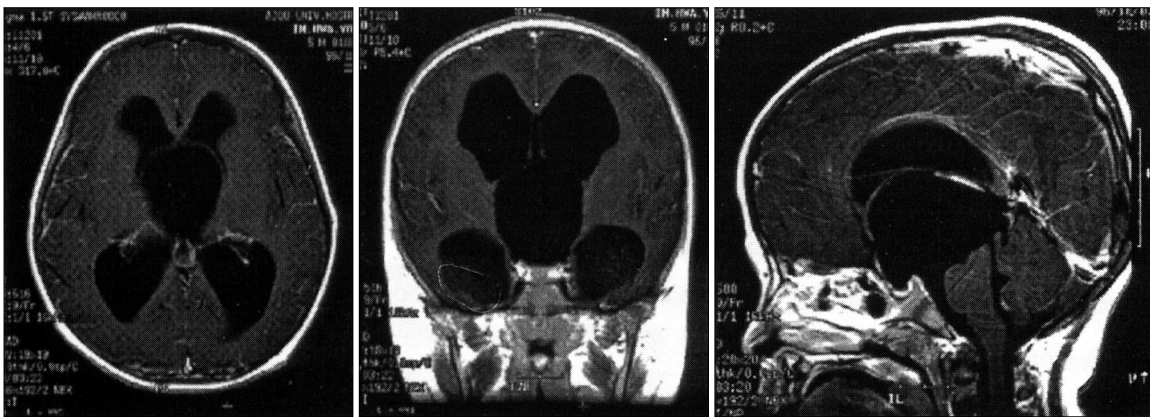


Fig. 1. Axial(left), coronal(middle), and sagittal(right) MRI scans show the arachnoid cyst(arrow) in the third ventricle bulging into both enlarged lateral ventricles.

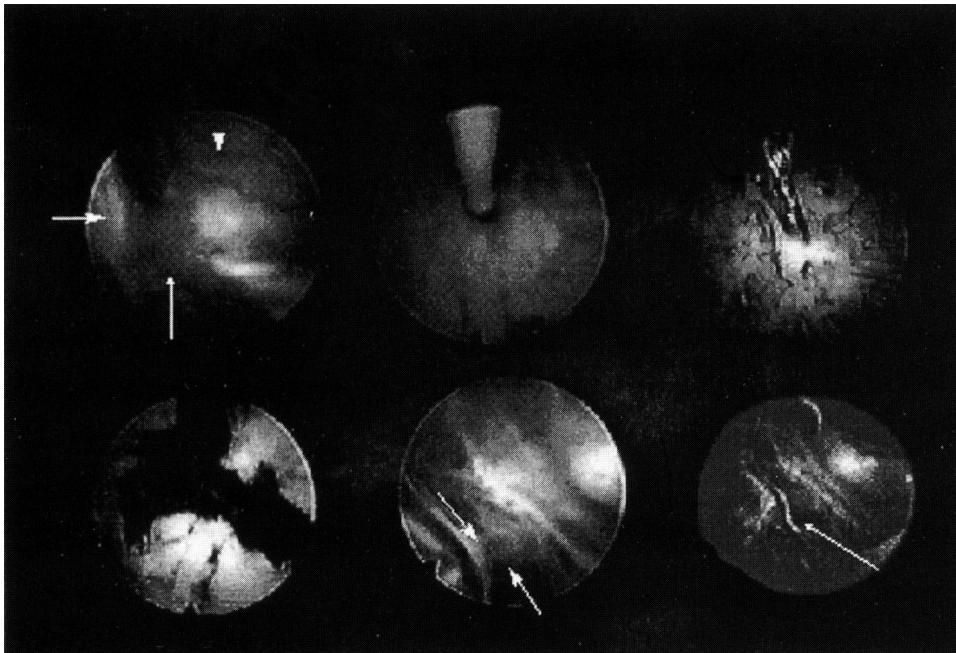


Fig. 2. Endoscopic findings : Upper left ; third ventricular arachnoid cyst(arrow head) and enlarged foramen Monro(large arrow) with choroid plexus(small arrow). Upper middle ; electrocoagulation of arachnoid cyst. Upper right ; removal of coagulated arachnoid membrane with endoscopic forcep. Lower left ; removed upper wall of arachnoid cyst. Lower middle ; basilar artery(two arrows) through arachnoid membrane. Lower right ; perforated lower wall of arachnoid membrane.

가 200cm H<sub>2</sub>O  
100/70mmHg,

90 / , 99%,  
32mmHg 7)19)

가 10 가 65/40mmHg,

60 / , 75%, 17)  
18mmHg

100%

가 PH 7.21, 5),  
65mmHg, 75 가

mmHg 3 6)

Siegler Valle<sup>18)</sup>  
가  
200

200cm H<sub>2</sub>O mmHg 가 가  
, 10 100ml Nd :  
8mmHg Yag  
60/45mmHg, 55 / 가 가  
ST 1)2)17)

가 5 가 , Perry Baughman<sup>15)</sup> 2

가 PH 7.26, 48 ,  
mmHg, 270mmHg ,  
99%, 35mmHg 가

50cm H<sub>2</sub>O , Na -  
chum <sup>11)</sup>  
가 300mmHg 가 1

고 찰 Derouin <sup>4)</sup>

가 50mL/min

1.0 7.5ml/kg/5sec <sup>9)14),</sup> 20  
100ml/sec <sup>13)</sup> 가 가 가

가 <sup>3)</sup> 가

가 , 가  
<sup>20),</sup> 3  
가 <sup>10)</sup> 가 , 가

가 ,

가

가  
가  
가

가

가

결 론

3

3

- : 1996 11 22
- : 1997 1 7

References

1) Baggish MS, Daniell JF : *Death caused by air embolism associated with neodmium : yttrium-aluminium-garnet laser surgery and artificial sapphire tips. Am J Obst Gyn* 161 : 877-880, 1989

2) Baggish MS, Daniell JF : *Catastrophic injury secondary to the use of coaxial gas-cooled fibers and artificial sapphire tips for intrauterine surgery : a report of five cases. Lasers in Surgery and Medicine* 9 : 581-584, 1989

3) Brechner VL, Bethune RWM : *Recent advances in monitoring pulmonary air embolism. Anesth Analg* 50 : 255-261, 1971

4) Derouin M, Couture P, Boudreault D, et al : *Detection of gas embolism by transesophageal echocardiography during laparoscopic cholecystectomy. Anesth Analg* 82 : 119-124, 1996

5) Glenski JA, Cucchiara RF, Michenfelder JD : *Transesophageal echocardiography and transcutaneous O<sub>2</sub> and CO<sub>2</sub> monitoring*

*for detection of venous air embolism. Anesthesiology* 64 : 541-545, 1986

6) Greenblott G, Barker SJ, Tremper KK, et al : *Detection of venous air embolism by continuous intraarterial oxygen monitoring. J Clin Monit* 6 : 53-56, 1990

7) Greville AC, Clements EA, Erwin DC, et al : *Pulmonary air embolism during laparoscopic laser cholecystectomy. Anaesthesia. Feb ;* 46 : 113-114, 1991

8) Hewitt PM, Knottenbelt JD, Mortimore S : *Combined systemic and pulmonary air embolism after penetrating chest injury. Injury* 25 : 553-554, 1994

9) Lucus CE, Frani F : *Air embolism via subclavian catheters. N Engl J Med* 281 : 966-967, 1969

10) Munson ES : *Effect of nitrous oxide on the pulmonary circulation during venous air embolism. Anesth Analg* 50 : 785-794, 1971

11) Nachum Z, Kol S, Adir Y, et al : *Massive air embolism-a possible cause of death after operative hysteroscopy using a 32% dextran-70 pump. Fertil Steril* 58 : 836-838, 1992

12) Okada Y, Suzuki H, Mukaida M, et al : *Penetrating cardiac injuries. A pathological analysis of 20 autopsy cases. Am J Forensic Med Pathol.* 11 : 144-148, 1990

13) Ordway CB : *Air embolus via CVP catheter without positive pressure : presentation of case and review. Ann Surg* 179 : 479-481, 1974

14) Oppenheimer MJ, Durant TM, Lynch P : *Body position in relation to venous air embolism and associated cardiovascular respiratory changes. Am J Med Sci* 225 : 362-373, 1953

15) Perry PM, Baughman VL : *A complication of hysteroscopy : air embolism. Anesthesiology* 73 : 546-547, 1990

16) Peterson HB, Hulka JE, Philips JM : *American Association of gynecologic laparoscopists' 1988 membership survey on operative hysteroscopy. J Reprod Med* 35 : 590-591, 1990

17) Schroder TM, Puolakkainen PA, Hahl J, et al : *Fatal air embolism as a complication of laser-induced hyperthermia. Lasers in Surgery and Medicine.* 9 : 183-185, 1989

18) Siegler AM, Valle RF : *Therapeutic hysteroscopic procedures. Fertil Steril* 50 : 685-701, 1988

19) Singh A, Holmes RA, Witten DM : *Rapid resolution of perfusion/ventilatory abnormalities in pulmonary air embolism. Clin Nucl-Med.* 10 : 327-329, 1985

20) Yahagi N, Miyazaki H, Ito Y : *Cardiopulmonary effect of halothane concentration during pulmonary air embolism in dogs. Resuscitation* 13 : 81-86, 1986